

University of Arkansas, Fayetteville

ScholarWorks@UARK

Graduate Theses and Dissertations

5-2021

An Adventure Therapy Mountain Bike Program for Middle School Students: A Pilot Study

Cian L. Brown

University of Arkansas, Fayetteville

Follow this and additional works at: <https://scholarworks.uark.edu/etd>



Part of the [Junior High, Intermediate, Middle School Education and Teaching Commons](#), and the [Recreational Therapy Commons](#)

Citation

Brown, C. L. (2021). An Adventure Therapy Mountain Bike Program for Middle School Students: A Pilot Study. *Graduate Theses and Dissertations* Retrieved from <https://scholarworks.uark.edu/etd/4028>

This Dissertation is brought to you for free and open access by ScholarWorks@UARK. It has been accepted for inclusion in Graduate Theses and Dissertations by an authorized administrator of ScholarWorks@UARK. For more information, please contact scholar@uark.edu.

An Adventure Therapy Mountain Bike Program for Middle School Students: A Pilot Study

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

by

Cian L. Brown
Texas A&M University
Bachelor of Science in Psychology, 2011
University of North Texas
Master of Science in Counseling, 2014

May 2021
University of Arkansas

This dissertation is approved for recommendation to the Graduate Council.

David D. Christian, Ph.D.
Dissertation Director

Anthony J. Vajda, Ph.D.
Committee Member

Kristin K Higgins, Ph.D.
Committee Member

Allison A. Boykin, Ph.D.
Committee Member

ABSTRACT

Adolescence is a time of significant physical, mental, emotional, and social development marked by numerous transitions and challenges. Middle school is one of the earliest and perhaps first times of significant social and physical transition that impacts early adolescent development. As a result, schools are becoming a primary care setting for children and families to identify and address mental health needs. However, only 2% of school mental health services are provided by licensed professionals. Therefore, schools and service providers continue to seek out comprehensive modalities that can efficiently provide preventative and responsive interventions to students beyond individual and school counseling services. Adventure Therapy (AT) is an approach that mental health professionals in schools can use to foster mental health in students. The purpose of this dissertation is to test an adapted AT program for the school setting during the course of the academic semester to assist incoming middle schoolers adjusting to a new environment and navigate developmental transitions. A mountain bike specific program was created to assess the effectiveness of the kinesthetic activity along with the addition of AT concepts. The program was informed by a conceptual framework that integrates the EcoWellness holistic model of wellbeing with AT. The effects of an AT mountain bike program and a non-AT mountain bike program on middle school students' perceptions of group climate (i.e. Engagement, Conflict, and Avoidance) and factors of resiliency (i.e. Optimism, Self-Efficacy, and Adaptability) were tested in this study using an experimental design. The program was implemented in a charter arts public school in Northwest Arkansas as an introduction to mountain biking course. An observed sample of 30 participants were used for the data analysis. The visual analysis of the profile plots indicated differences within and between groups on all outcome variables. However, further analyses using the mixed model for a two-group

experimental design with repeated measures to test statistical significance yielded few differences. There were statistically significant effects for participant Engagement and Conflict based on the Group Climate Questionnaire (MacKenzie, 1983). The only statistically significant effect for resiliency factors was on Adaptability as measured by the Resiliency Scales for Children and Adolescents – Sense of Mastery. Despite the few statistically significant results, clinical significance indicates the treatment group saw a greater increase and sustainability in scaled rankings when compared to the comparison group. This pilot study sought to explore the effects of developing an AT program centered around a specific kinesthetic activity on group and individual participant outcomes. According to the literature review, this is one of the few studies that focuses on a specific kinesthetic activity, particularly mountain biking from an AT perspective. Additionally, this study informs research and clinical application for the development of an AT program with middle school students in a school setting. The outcomes of this program provide clinical and practical significance to inform the field of counseling and further the development of AT practices.

©2021 by Cian L. Brown
All rights Reserved

ACKNOWLEDGEMENTS

I am frequently reminded that pursuits are about the journey and not the destination. To reach this culminating point gives me pause to reflect on the beginning of this journey in 2016 and the fortunate shared experiences I've had to face various challenges, suffer well, grow, and opportunities to develop fruitful relationships along the way. I want to recognize and thank a few of the individuals who have made this journey possible and enabled me to pursue this dream. First, I would like to acknowledge my committee members. To Dr. Christian, no amount of words can define the abundance of gratitude I have for the energy, guidance, mentorship, opportunities, and friendship you have provided to navigate this process from 2016 until now. I truly would not be here if it were not for you. Professionally, you challenged me, you allowed me to struggle, and you fostered opportunities to be successful. Beyond the classroom, you and your family brought a sense of community, joy, opportunities for adventure, helping me make Arkansas my home. Dr. Higgins, you always find a way to keep things joyful, yet intentional. I recall each moment I've shared with you as being a purposeful engagement, whether to support me or to crack-a-smile. I will always hear your laughter carried through the halls of GRAD ED and know your dedication to support students and faculty. Dr. Vajda, your generosity and genuineness has endlessly provided me the space to wrestle with this life transition, to feel authentic, and embrace life's challenges. Dr. Ames, your continuous support and feedback inspired me to do and be more, igniting my passion for statistics. I will forever be grateful for your office hours, encouragement in class, and attention to detail in my numerous emails.

In addition to the support of the program and faculty members at the University of Arkansas, this journey would not have been possible without the support of my peers, friends, former supervisors, and family. Thank you for taking the time to be patient with me, answering

my phone calls and checking-in, creating opportunities to enjoy the journey, and overall acceptance. I am forever grateful and will cherish your words as I transition beyond this journey. Your unconditional love and support provided me the encouragement I needed to persevere. Thank you to the community, students, participants, and more. It has been a tremendous joy to work with you, hear your stories, and walk with you through these opportunities. Thank you for trusting me. Finally, I would like to thank God, for without His presence none of this would be possible. Thank you for all the synchronous moments of answering my prayers.

DEDICATION

I dedicate this dissertation to all who value community, resilience, and adventure. To the students and clients, may you always pursue the road less traveled filled with awe towards the opportunity of growth and adventure. To counselors and future counselors, may you always be reminded of the importance of the work you do and who you are accountable to. To doctoral-level students, may you be authentic, congruent, and passionate in your pursuits.

TABLE OF CONTENTS

CHAPTER I: INTRODUCTION.....	1
Statement of the Problem.....	2
Purpose of the Study	3
Significance of the Study	3
Research Questions and Hypotheses	4
Research Design.....	4
Theoretical Framework.....	5
Assumptions and Limitations	5
Definition of Terms.....	6
Summary	7
CHAPTER II: LITERATURE REVIEW	8
Adventure Therapy	8
History and Evolution of Adventure Therapy	9
AT Setting.....	9
Kinesthetic Activities.....	10
Mountain Biking.....	11
Key Concepts	13
Risk	13
Full Value Contract.....	14
Challenge-by-Choice	15
AT Process	15
AT Outcomes	17

Group Development.....	17
Resilience.....	17
Framework	19
Nature.....	20
EcoWellness.....	22
AT-EcoWellness Model.....	23
Middle School Student Development	25
Executive Functioning	25
Social Development.....	26
Mental Health.....	27
Mental Health Services in Schools	30
School-Based Mental Health Counseling	31
Summary.....	32
CHAPTER III: METHODOLOGY	33
Problem Statement.....	33
Restatement of Purpose.....	33
Research Questions and Hypotheses	34
Participants.....	35
Facilitator Characteristics	37
Instrumentation & Measures.....	37
Demographics Questionnaire.....	37
Group Climate Questionnaire Short Form.....	37
Resiliency Scales for Children and Adolescents	38

Procedures	40
Informed Consent.....	41
Recruiting Participants.....	41
Data Collection	42
AT Group Design and Program	42
Research Design.....	43
Assessment Administration	43
Data Analysis	43
Power Analysis	47
Threats to Internal & External Validity	48
Summary	49
CHAPTER IV: RESULTS.....	51
Results.....	51
Reliability.....	51
Descriptive Statistics.....	53
Mixed Model Analysis.....	55
Group Climate Questionnaire	55
Engagement.....	55
Conflict	57
Avoidance	60
RSCA-MAS	61
Optimism.....	61
Self-Efficacy	62

Adaptability.....	64
Total Sense of Mastery	65
Summary.....	66
First Research Question	66
Second Research Question.....	67
Clinical Significance.....	67
Total Sense of Mastery	68
Sense of Mastery Subscales	71
CHAPTER V: DISCUSSION.....	73
Discussion.....	73
Summary of Findings.....	73
First Research Question	74
Engagement.....	75
Conflict	76
Avoidance	76
Second Research Question.....	78
Optimism.....	79
Self-Efficacy	80
Adaptability.....	80
Sense of Mastery.....	81
Subjective Evaluations.....	82
Implications.....	84
Clinical.....	84

Clients	84
AT Practitioners	85
Counselor Education	86
Training	86
Supervision	86
Research	87
Limitations	88
Conclusion	91
REFERENCES	92
APPENDICES	109
Appendix A: Participants Demographics Questionnaire	109
Appendix B: IRB Approval Letter	126
Appendix C: Informed Consent	128
Appendix D: Participant Assent Form	131
Appendix E: Dissertation Program	134
Appendix F: Model Fit Comparison	152
Appendix G: Covariance Matrices	154
Appendix H: Random Effects Results	157
Appendix I: SAS Code	163

LIST OF TABLES

Table 1: Demographic Data	36
Table 2: Internal Consistency Reliability of Composite Measures	52
Table 3: Test-Retest Reliability of Composite Measures	53
Table 4: Descriptive Statistics for GCQ-S	53
Table 5: Descriptive Statistics for RSCA-MAS using Scaled and T Scores	54
Table 6: Summary Table for Engagement	56
Table 7: Differences of Least Squares Means for Engagement by Phase	57
Table 8: Summary Table for Conflict	58
Table 9: Differences between Groups by Phase on Conflict	59
Table 10: Differences of Least Squares Means for Conflict by Group and Phase Interaction	59
Table 11: Summary Table for Avoidance	60
Table 12: Summary Table for Optimism	62
Table 13: Summary Table for Self-Efficacy	63
Table 14: Summary Table for Adaptability	64
Table 15: Summary Table for Total Sense of Mastery	66
Table 16: RSCA-MAS Score Rankings Based on Resiliency Scaled and T Score Ranges	68
Table 17: Comparison Group Reported Ranking Percentages by Phase	69
Table 18: Treatment Group Reported Ranking Percentages by Phase	70
Table 19: Participants Reported Changes in Sense of Mastery Scores	70
Table 20: Participant Reported Changes in Subscale Scores	72
Table 21: Summary of Findings	74

LIST OF FIGURES

Figure 1: AT-EcoWellness Model	25
Figure 2: Diagnosis Prevalence among School-aged Children.....	28
Figure 3: Rates of Mental Health Diagnosis between School-aged Children	29
Figure 4: Visual Profile for GCQ-S Engagement Mean Scores by Groups	56
Figure 5: Visual Profile for GCQ-S Conflict Mean Scores by Groups	58
Figure 6: Visual Profile for GCQ-S Avoidance Mean Scores by Groups	60
Figure 7: Visual Profile for RSCA-MAS Optimism Mean Scores by Groups	61
Figure 8: Visual Profile for RSCA-MAS Self-Efficacy Mean Scores by Groups.....	63
Figure 9: Visual Profile for RSCA-MAS Adaptability Mean Scores by Groups	64
Figure 10: Visual Profile for RSCA-MAS Total Mean Scores by Groups.....	65

CHAPTER I

INTRODUCTION

Adolescence is a time of significant physical, mental, emotional, and social development marked by numerous transitions and challenges. Middle school is one of the earliest and perhaps first times of significant social and physical transition that impacts early adolescent development (Coelho et al., 2017; Rogers et al., 2017). Middle school is usually comprised of grades sixth through eighth and ages 11 to 13, with some variability. Children at this age are tasked with adjusting to a myriad of challenges such as a different academic environment, new peer/social groups, physiological changes, and a fluctuating self-concept, all of which can affect self-worth, self-esteem, emotional regulation, and social skills (Akos et al., 2015; Brass et al., 2019; Coelho et al., 2017; Rogers et al., 2017). Failure to navigate this transition successfully can result in lower self-esteem (Brass et al., 2019; Coelho et al., 2017) and increased levels of depression (Danielson et al., 2018a ; Duchesne et al., 2012; Ghandour et al., 2019), anxiety (Brass et al., 2019; Danielson et al., 2018a; Duchesne et al., 2012; Ghandour et al., 2019), behavioral (Akos et al., 2015; Brass et al., 2019; Danielson et al., 2018a; Duchesne et al., 2012; Ghandour et al., 2019; Holmes et al., 2016; Ojanen & Nostrand, 2014), and academic problems (Brass et al., 2019; Coelho et al., 2017; Danielson et al., 2018a; Duchesne et al., 2012; Ghandour et al., 2019; Holmes et al., 2016).

An increase in mental health issues has shown to negatively impact academic performance (Auger, 2011; Kelly, 2013; Vander et al., 2003) and social development (Kelly, 2013). As a result, schools are becoming a primary care setting for children and families to identify and address mental health needs (Christian & Brown, 2018; CDC, 2017). School Counselors are primarily tasked with the challenge of attending to the diverse needs of students

but are restricted from fully meeting the ongoing mental health needs of students due to time constraints, large caseloads, limited training, and resources (Christian & Brown, 2018). As schools position themselves to provide services, they have increased efforts to collaborate with licensed mental health professionals to provide therapeutic services in schools (Christian & Brown, 2018). Despite the increased use of mental health professionals in schools, most services addressing student needs continue to be provided by teachers (Sanchez, et al., 2018) as a result of the limitations of school-based mental health services (Kolbert et al., 2017; Lambie et al., 2019).

Statement of the Problem

Limited research has explored the effectiveness of the use of licensed mental health professionals in schools (Christian & Brown, 2018; Lambie et al., 2019). Currently, only 2% of school mental health services are provided by licensed professionals (Sanchez et al., 2018). Attempts to meet the needs of all students and provide individual counseling is seen as inefficient and significantly limited (Kolbert et al., 2017; Lambie et al., 2019). Therefore, schools and service providers continue to seek out comprehensive modalities that can efficiently provide preventative and responsive interventions to students beyond individual and school counseling services. Adventure Therapy (AT) is an approach that mental health professionals in schools can use to foster mental health in students.

Adventure Therapy is defined 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” (Gass et al., 2012, p. 1). AT has been adapted for a variety of settings and populations utilizing key AT concepts such as the *full value contract*, *challenge-by-choice*, and *adventure wave*. The intentional use of the natural environment and kinesthetic activities engages participants through a parallel process to focus on

therapeutic goals related to the cognitive, behavioral, affective, physical, and spiritual facets of a person. Participants are challenged to navigate group dynamics and assess potential risks, set goals, and make decisions to successfully achieve group therapeutic outcomes. An ongoing criticism of AT is the need for a consistent framework that considers AT concepts to serve as a working model and explore when and how change occurs during the AT process.

Purpose of the Study

The purpose of this dissertation is to test an adapted AT program for the school setting during the course of the academic semester to assist incoming middle school students adjusting to a new environment and navigate developmental transitions. A mountain bike specific program was designed to assess the effectiveness of the kinesthetic activity along with the addition of AT concepts. The program was informed by a conceptual framework that integrates the EcoWellness holistic model of wellbeing with AT (Reese & Myers, 2012). Working collaboratively with community partners, the effects of an AT mountain bike program and a non-AT mountain bike program on middle school students' perceptions of group climate and factors of resiliency (i.e. Optimism, Self-Efficacy, and Adaptability) were tested in this study.

Significance of the Study

While AT research has been shown to have positive effects on resilience (Beightol et al., 2012; Kelly, 2019; Scarf et al., 2017), group climate (Christian et al., 2019), and well-being (Luttenberger et al., 2015; Ritchie et al., 2014; Tracey et al., 2018), a review of the literature yielded limited results examining the specific effects of mountain biking, the adaptation of AT application in school settings, and the integration of a conceptual framework to guide the AT process. Together, these key features of this study may provide a new perspective on AT and school based mental health research. Especially as a preventative intervention in facilitating the

adjustment through middle school among young adolescence by fostering positive development across dimensions of wellbeing.

Research Questions and Hypotheses

This study seeks to explore how participating in an AT mountain bike program impact students' perception of group climate and factors of resiliency. Are there differences in AT and non-AT mountain bike programs on students' perception of group climate and resiliency factors? Further, are there differences on students' scores overtime? Specifically, at baseline, mid-point, post, and follow-up in AT and non-AT mountain bike programs on students' perception of group climate and resiliency factors? Based on these questions, I hypothesize students' scores on group climate (MacKenzie, 1983), and resiliency (Prince-Embury, 2007) measures will be statistically significantly different between groups participating in the AT mountain bike program from the non-AT mountain bike program. Students' scores on group climate (MacKenzie, 1983) and resiliency (Prince-Embury, 2007) measures will also be statistically significantly different overtime for the AT mountain bike and non-AT mountain bike program.

Research Design

This dissertation study utilizes an experimental design to answer the research question by forming two groups to be studied and assessed on two measures across five time points. Therefore, this design fits the criteria of a two-group experimental design with repeated measures (i.e. mixed design) as outlined by Hatcher and Stepanski (1994). The data includes multiple demographic variables including age, sex, race/ethnicity, socioeconomic status, and mountain bike experience/self-efficacy. The dependent variables include perceptions of group climate as measured by the Group Climate Questionnaire Short Form (GCQ-S; MacKenzie, 1983), and factors of resiliency as measured by the Resiliency Scales for Children and Adolescents sense of

mastery subscale (RSCA; Prince-Embury, 2007). An a priori power analysis indicates at least 40 participants are needed for this study to produce a large effect size ($f = .40$) where $\alpha = .05$ and power $(1 - \beta) = .80$. I propose using a mixed model with repeated measures, using an unstructured covariance matrix structure. This model determines the relationship between response and time to account for random and fixed effects (Howell, 2008).

Theoretical Framework

My dissertation proposes the integration of Reese and Myers' (2012) EcoWellness model with AT as a conceptual framework that emphasizes the therapeutic potential of nature. Nature is considered an essential part of holistic living and important for wellbeing, having shown to decrease anxiety, reduce somatic ailments, and increase one's greater sense of connectedness and belonging (Reese & Myers, 2012). EcoWellness considers "one's sense of appreciation, respect for, and awe of nature resulting in feelings of connectedness and perceptions of wellbeing" (Reese & Myers, 2012, p. 400). EcoWellness is comprised of seven factors: *physical access*, *sensory access*, *connection*, *protection*, *preservation*, *spirituality*, and *community connectedness* (Reese et al., 2015) that are uniquely experienced and perceived by the individual, providing a conceptualization of the human-nature connection. Reese et al. (2015) defined each of these factors to facilitate the human-nature connection into counseling practice.

Assumptions and Limitations

My dissertation is based on several assumptions. Data collected is assumed to have a multivariate normal distribution, independent observations, homogenous co-/variances, and be linear. Possible limitations that exist are sample selection and sample interaction. Obtaining eligible participants reduced the study's generalizability. In addition, students randomly assigned

to groups had opportunities throughout the school setting to interact and become aware of the study potentially affecting their performance and response.

Definition of Terms

Adventure Therapy

The term Adventure Therapy encompasses therapies that include *wilderness therapy*, *adventure based counseling*, *outdoor behavioral healthcare*, *nature-based counseling*, and *ecotherapy* (Dobud & Harper, 2018). While many definitions exist, Gass et al. (2012) provided a consensus definition accepted by the *Association for Experiential Education* (AEE), “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” (p. 1). For this dissertation, AT relates to the intentional use of an experiential activity to facilitate small group counseling to address therapeutic developmental outcomes.

EcoWellness

The construct of EcoWellness was developed to assist mental health professionals to integrate nature into counseling settings (Reese & Myers, 2012). *EcoWellness* refers to an individual’s “sense of appreciation, respect for, and awe of nature that results in feelings of connectedness with the natural environment and the enhancement of holistic wellness” (Reese & Myers, 2012, p. 400).

Natural Environment

The natural environment is concerned with *nature*. *Nature* is defined “as an organic environment where the majority of ecosystem processes are present (e.g., birth, death, reproduction, relationships between species)” (Maller et al., 2005, p. 46). Therefore, this study will reference

the natural environment as the surrounding atmosphere with which individuals engage with nature in the outdoor setting.

Resiliency

For the purpose of this dissertation, *resiliency* is defined as “the ability to bounce back in the face of adversity” (Prince-Embury, 2010, p. 287). Prince-Embury (2010; 2011) differentiates “resilience” from “resiliency” in that *resiliency* addresses personal attributes of the individual, whereas *resilience* refers to interactive and contextual dimensions of a group or program.

Summary

This dissertation has potential to advance the field of Adventure Therapy and school-based mental health counseling services by assessing the effectiveness of a specific kinesthetic activity (i.e. mountain biking) adapted for the school setting from an integrated AT-EcoWellness approach. Additionally, this study has the potential to provide empirical evidence supporting a preventative intervention (i.e. Adventure Therapy) for students transitioning to middle school. It is my intention for this study to serve as a pilot that can be replicated in schools and expanded to additional populations. Additionally, this study highlights the importance of collaborative research efforts between me, a community bike organization, and local school staff. In conclusion, this dissertation addresses how an AT intervention using mountain biking may impact the adaptive functioning of incoming middle school, 7th grade students.

CHAPTER II

LITERATURE REVIEW

School-aged children are experiencing increased mental health problems at early ages necessitating the need for additional support and preventative mental health services. Of school-aged children, middle school children are characterized by unique developmental milestones as they experience social and physical transitions. An inability to successfully navigate these transitions affects children's behavior, learning, and emotional regulation. Learning healthy social and coping skills to navigate problems as they arise directly impacts their quality of life and influences healthy functioning at home and school. Middle school aged children are challenged during this transformational phase of development with learning and adapting to social transitions through social-emotional development. School personnel, such as school counselors and school-based mental health professionals are tasked with helping middle school students' transition into and through this developmental phase by fostering social-emotional development. In the following section, I will explore how Adventure Therapy (AT), guided by an EcoWellness framework, can address the aforementioned problems of middle school adjustment.

Adventure Therapy

Adventure Therapy (AT) has shown to be an effective intervention with diverse populations across various settings to address mental health development as a preventative and responsive intervention (Bidell, 2010; Fletcher & Hinkle, 2002; Gass et al., 2012; McIver et al., 2018; Swank & Daire, 2010). AT's rich history emphasizes its adaptation to be utilized with school aged children within the educational setting to foster and promote social-emotional and academic outcomes. It is critical to understand the key concepts that define AT separating it from

other therapeutic modalities. AT intentionally uses the natural environment and kinesthetic activities to engage clients through a parallel process that attends to client's cognitive, behavioral, affective, physical, and spiritual dimensions. I will explore the history, key components, and supporting literature of AT application in the following section.

History and Evolution of Adventure Therapy

Rooted in the original work of Kurt Hahn and Lawrence Holt during the World War II era, the program "Outward Bound" was developed to focus on teaching through wilderness immersion. Hahn intended the program to build character, instill self-reliance, and foster resilience (Gass et al., 2012). By the early 1960's, Josh Miner formed a North American chapter and wilderness programming became popularized across the United States (Schoel & Maizell, 2002). Nearly a decade later, Jerry Pieh, a school principal, was determined to increase accessibility of Outward Bound's concepts and adapt them to the school setting. Pieh created Project Adventure with several colleagues and achieved Hahn's original intent of integrating Outward Bound into the school environment (Fletcher & Hinkle, 2002; Project Adventure, 2007; Schoel & Maizell, 2002).

AT Setting

The AT treatment environment is a critical component to the therapeutic process. The outdoor setting and the role of nature has been cited as the main therapeutic power in AT (Gass et al., 2012). The outdoor setting continues to be the most referenced in AT literature, Gass et al.'s (2012) emphasizes using the outdoor and nature elements adapted for other settings as described by the fourth dimension. This fourth dimension highlights the degree to which nature is used as a therapeutic factor. For instance, AT may occur in challenge course settings and city parks or lakes (*frontcountry*), areas within driving distance from a metropolitan area (*mixed*), or

remote wilderness areas (*backcountry*). As AT continues to develop, AT has become a multi-site modality to include schools (Gibbons et al., 2018; Glass & Schoffner, 2001) and universities (Kelly, 2019; Vlasmis et al., 2011), residential (Bettmann et al., 2015) and hospital facilities (Berman & Davis-Berman, 2013; Buckley et al., 2018), and private practice or community agencies (Vankanegan et al., 2019).

The degree to which nature is included to facilitate the therapeutic process is determined by the AT practitioner (Gass et al., 2012). Through the evolution of AT to multiple sites, AT has developed to become multidisciplinary. AT is facilitated across these settings by licensed practitioners such as professional counselors (Christian et al., 2019), family therapists (Bandoroff & Scherer, 1994; Gillis & Gass, 1993; Swank & Daire, 2010) social workers (Tucker & Norton, 2013), psychologists (Bandoroff & Newes, 2006; Becker, 2010; Bowen et al., 2016; Crisp & O'Donnell, 1998), occupational therapists (Crisp & O'Donnell, 1998; Eckstein & R  th, 2015; Jeffrey & Wilson, 2017; Levack, 2003), and nurses (Eklund et al., 2016). As AT has become multidisciplinary and multi-site it has developed to include terms such as wilderness therapy, adventure-based counseling, and outdoor behavioral healthcare (Dobud & Harper, 2018; Gass et al., 2012)

Kinesthetic Activities

Participation in leisure activities is associated with improved well-being through increased psychological and social competence, self-efficacy, academic performance, sense of peer support and friendships, and development of initiative and self-determination (Powrie et al., 2015). Tucker and Norton (2013) identified AT activities to include a variety of kinesthetic activities ranging from cooperative and problem-solving games, trust activities, rope/challenge courses, nature walks, hiking, paddle sports, and wilderness programs including backpacking and

camping expeditions. Several studies have specifically looked at the effect of activities such as rock climbing (Eckstein & R  th, 2015; Kleinst  uber et al., 2017; Luttenberger et al., 2015; Sutherland & Stroot, 2010), white water rafting and backpacking (Widmer et al., 2014), and hiking (Eckstein & Ruth, 2015). A majority of counseling related research includes a variety of activities as part of the AT program and does not solely focus on one type of activity as the mechanism of change. Rock climbing (indoor and outdoor) and hiking or walking are among the most researched and appear to reduce symptoms of depression and increase group dynamics of engagement and cohesiveness (Kleinst  uber et al., 2017; Luttenberger et al., 2015; Sutherland & Stroot, 2010). Although some literature surrounds the inclusion of mountain biking as part of AT initiatives (Widmer et al., 2014), no literature to date focuses on the impact of mountain biking on client outcomes.

Mountain Biking. Biking is a popular form of outdoor exercise and recreational activity with around 47.9 million riders in the United States (The Outdoor Foundation, 2020). Biking is among the top popular activities across age ranges (6+) and among ethnic groups (i.e. Caucasians, African Americans, Hispanics, and Asians) in the U.S. (The Outdoor Foundation, 2020). According to The Outdoor Foundation (2020) report, mountain biking included roughly 8.7 million riders above the age of six, with nearly 2 million between the ages of 6 to 17. Although research does not currently exist solely focusing on the effects of mountain biking from an AT perspective, recreational research, articles, and mountain bike programs have been developed and have shown to have positive outcomes.

Wood et al. (2017) developed a mountain bike program for at-risk youth in Western Australia and found from participant interviews that mountain biking appears to develop interpersonal skills and learning outcome, improved sense of wellbeing such as confidence and

self-belief, life skills (i.e. decision making, risk awareness, assessment and management), and positive school impact (i.e. reduced truancy, less disruptive behavior, greater academic engagement). Chapple et al. (2018) developed a similar mountain bike program for at-risk youth focused on developing pro-social skills and encourage recreational activity engagement in Western Australia. Their pilot program found support for mountain biking to enhance leadership and mentoring skills, teamwork, critical thinking, resilience, risk assessment and management, community involvement and belonging, and self-esteem and overall wellbeing (Chapple et al., 2018). Walker and Shafer (2011) found mountain bikers experienced increased attention as a result of having to attend to obstacles in the environment. Further, Roberts et al. (2018) looked at mountain bikers characteristics linked to mental health and found that mountain biking serves as a prominent coping strategy for improving mood and self-esteem and decreasing stress and worrisome feelings. As a result, Roberts et al. (2018) suggested mountain biking be used as an intervention for mental health.

Gerow (2019a, 2019b) has written about the mental health benefits of mountain biking and how individuals have equated mountain biking as a form of therapy, with specific focus towards riders who experience depression and anxiety. Gerow's (2019b) article explores a mountain bike program developed by Scottish researchers to integrate mental health treatment plans into mountain biking creating support for trail-based therapy. Whalen (2018) highlighted her experiences of emotional breakthroughs, processing trauma, and relationship struggles while undergoing therapy and learning to ride a mountain bike. "As we conquered the trails, and made emotional breakthroughs, I also gained a sense of bonus strength from attacking and overcoming rocky obstacles...this was his [therapist] plan all along. 'Being challenged with the terrain eases

the idea of being vulnerable” (Whalen, 2018). As mountain bike research and application continues to develop, there are apparent themes related to AT concepts and outcomes.

Key Concepts

AT is comprised of unique characteristics that separate it from other traditional therapeutic approaches. Risk, values, challenge-by-choice, adventure wave, and experiential learning cycle are considered unique components to AT. The integration of these concepts assists in the facilitation of AT activities and processing among group members.

Risk

Adventure Therapy inherently involves real and perceived risks used to motivate clients. These real or perceived risks create cognitive dissonance and disequilibrium for the client providing them a choice to display, confront, or change their behavior (Gass et al., 2012). Change is most likely to occur when clients engage in opportunities that move them outside of their comfort zones (Fletcher & Hinkle, 2002; Gass et al., 2012). Real risk pertains to the likelihood a posed threat or danger is to occur by engaging in the activity and is minimized as much as possible, making the activity reasonably safe for participants (Davis-Berman & Berman, 2002). Perceived risk relates to the subjective perception of potential danger or injury in the activity and reflects participants’ beliefs in self-control, mastery, competency, past-experiences, vicarious experiences, and predisposition to anxiety (Davis-Berman & Berman, 2002). When the perceived risk is high and the actual risk is low the subjective experience enhances levels of stress and coping. Perceived risk increases the individual’s anxiety response as they feel challenged and potentially unable to safely manage the situation (Bandura, 1988). This response informs how the individual will act. However, attempting and successfully managing the risk

results in reprocessing the perceived and actual risk which reinforces one's coping ability to respond and act differently to similar situations in the future (Bandura, 1988).

Full Value Contract

The full value contract (FVC) aids in the establishment of group norms, functioning as an agreement between participants to value and acknowledge one's autonomy and respect that of others without discounting their experiences (Christian et al., 2019; Schoel & Maizell, 2002). The FVC functions as a way to promote growth and change over enforcing control and order (Christian et al., 2019). This allows members to engage and provide feedback in a constructive manner, while empowering accountability towards self and others. Project Adventure (2007) has identified six traditional norms, "be here", "be safe", "be honest", "set goals", "care for self and others", and "let go and move on". However, the FVC can be adapted to fit the group needs or reflect other identified values. "Be here" emphasizes the client's attentiveness to the group and initiative, not only agreeing to be physically present, but affectively and cognitively present. "Be safe" promotes accountability for the safety for self and others. "Be honest" enlists participants to provide accurate and authentic feedback to others as well as interpersonal experience. "Set goals" ensures members are directing their energy towards an objective for themselves and the group. "Care for self and others" enhances participant responsibility to be mindful of risks and choosing their level of challenge to promote growth, health, and wellbeing of all participants. Lastly, "let go and move on" reinforces participants to release past grievances towards self, others, and failed tasks in order to move forward and approach new tasks with an open mindset. Together, these values foster inclusion, closeness, vulnerability, accountability, collectiveness, and collaboration (Glass & Myers, 2001; Schoel & Maizell, 2002).

Challenge-by-Choice

Challenge by Choice (CBC) is foundational to AT and promotes active participation among the group by empowering each participant to select a level of challenge and practice making healthy decisions (Christian et al., 2019; Project Adventure, 2007; Rohnke, 1989; Schoel & Maizell, 2002). CBC provides participants a chance to attempt difficult challenges with potential risk among a supportive and caring atmosphere, while allowing participants the opportunity to retract when feelings of panic or self-doubt ensue knowing future attempts will be available (Rohnke, 1989). Participants are provided a sense of responsibility and encouraged to reflect on personal boundaries and healthy decision-making processes by recognizing limits and becoming aware of somatic and cognitive responses. Therefore, emphasizing the value of the experience and process over externally imposed expectations (Christian et al., 2019).

AT Process

The AT process is informed by two pivotal concepts that work congruently to facilitate the activities and group process, the adventure wave and Kolb's (1984) experiential learning model. The adventure wave consists of three phases: briefing, experiencing, debriefing or processing (Project Adventure, 2007; Schoel & Maizell, 2002). The first phase sets the activity for the participants, as the counselor informs the group of the guidelines and safety procedures to aid in the development of setting appropriate goals (Christian et al., 2019). The second phase, experiencing, is where Kolb's adapted model, the experiential learning cycle (ELC) merges with the adventure wave. Experiencing results in the group attempting to perform the activity. The final phase of the adventure wave highlights the therapeutic factor of AT from educational and recreational programs. Processing occurs when the counselor facilitates the final three stages of the ELC: reflection, generalization, and transfer (Kolb, 1984). Folan (2012) has adapted these

three levels to recreational, educational, and therapeutic. The counselor specifically intends to navigate the processing phase through one or all stages. The reflection or recreational stage focuses on participants sharing what occurred and reflecting on the concrete experience itself. The generalization or educational stage challenges the participants to process what they learned from the activity. The final stage, transfer or therapeutic, implies the use of metaphor and conceptualize ways to transfer newly obtained insights to real life through a parallel process.

METAPHOR AND PARALLEL PROCESSING. The use of metaphor in adventure therapy is applied to generate insight by figuratively linking an idea or object with the analogy of another (Gass, 1991). The root term literally means to ‘transfer or carry over’ (Hartford, 2011). The use of metaphor is intentionally used by the AT professional to increase the therapeutic outcomes of the participant and group experiences (Bacon, 1983). Bacon (1983) encouraged the use of well-formed isomorphic metaphors to facilitate profound and meaningful links with real-life experiences.

Metaphor falls into a process conducted by the AT professional. During this process the intentional selection of the AT activity corresponds with the therapeutic outcome or goal and real-life application (Hartford, 2011). This is considered to be a parallel process (Gass, 1991). The parallel process occurs while participants engage in AT that relates the ongoing experiences of the AT activity and process to the participants’ daily experiences outside of AT (Gass, 1991; Tucker et al., 2016; Vankanegan et al., 2018). Within the parallel process, the metaphor can be explicit or implicit, meaning the AT professional does not necessarily need to explicitly build, state, and process the metaphor during debriefing. The activity and experiential process implicitly creates the metaphor for participants to intrinsically reflect and transfer (Schoel & Maizell, 2002; Tucker et al., 2016).

AT Outcomes

Literature continues to increase exploring the therapeutic benefits of AT. Recently, there has been a shift in focus on AT group development and self-efficacy. However, as the literature continues to develop, it is imperative these outcomes are explored in context of the school setting.

Group Development

Group development relates to the process of how the group changes over the course of the group. AT group development and effects on group outcomes continues to be of interest (Gass et al., 2012; Russell & Gillis, 2017; Russell et al., 2017). Christian et al. (2019) referenced the use of Tuckman's (1965) stages of development to inform the AT group process and provided supporting evidence that AT does follow a similar structure to traditional counseling groups as represented by group member's feelings of avoidance, conflict, and cohesion. This is evidenced by a decrease in avoidant behaviors, an initial increase in conflict then decrease through successful resolution, and an overall increase in cohesion overtime. Brigman et al., (2007) stated that a sense of cohesion is related to the effectiveness of students improving behavior and academic achievement. Cohesion has been cited in the literature with regard to AT group development (Clem et al., 2012; Glass, 2008; Glass & Benshoff, 2002; Glass & Shoffner, 2001).

Resilience

Resilience reflects the ability to persevere when faced with adversity, challenge, or risk that is followed by an established positive outcome (Hermann et al., 2011). Resilience research has characterized resilience by the presence of internal factors that include self-efficacy, optimism, adaptability (Prince-Embury, 2010), empathy, problem-solving, goals and aspirations

(Constantine & Bernard, 2001). Beightol et al. (2012) explored the impact of adventure concepts within a school setting on participant resilience. Their findings indicate that as students confronted and successfully completed challenges they experienced increased confidence and self-efficacy (Beightol et al., 2012). Scarf et al. (2017) found an increase in resilience scores among adolescent participants participating in a 10-day adventure education program when compared to a control group. A study that involved two separate voyage experiences of a 10-day sailing-training found supporting evidence for increases in adolescent sense of well-being and resilience (Koni et al., 2019). Furness (2017) found substantial positive effects in young adolescent's self-efficacy, resilience, connectedness, and well-being who participated in an AT program.

As self-efficacy is so closely related to resiliency, numerous AT researchers have explored the effectiveness of AT on adolescent self-efficacy (Clem et al., 2012; Cordle et al., 2016; Davis-Berman & Berman, 1994; Deane et al., 2017; Margalit & Ben-Ari, 2014; Mutz & Müller, 2016; Mygind et al., 2019; Richmond et al., 2018; Widmer et al., 2014). Among these articles, consensus is that by engaging in AT related activities and programs there is an increase in participant self-efficacy. While a majority of these studies occurred outside the United States, Widmer et al. (2014) most closely aligns with the purpose of this study. Widmer et al. (2014) explored the effects of a two-week, residential, adventure program with young adolescents. The adventure program included three activity elements: backpacking, whitewater rafting, and exploration (e.g. mountain biking). The results of their study supported the relationship between outdoor and academic self-efficacy among participants when compared to a control group. Resilience research further supports a positive relationship between resilience, academic performance, and mental health.

Framework

Therapeutic practice is guided by concepts, models, and theories that provide a sense of direction for therapeutic application (Rutko & Gillespie, 2013). A frequent criticism of AT is the need for a consistent framework that considers the aforementioned AT components and serves as a working model to conceptualize the AT process and its impact on client outcomes. In most circumstances, the answer being sought is when and how does change occur. Alvarez and Stauffer (2001) highlighted this limitation and concluded it is unnecessary to rely on a theoretical framework for AT. However, this claim appears to be contentious as AT literature and practice develops. Several arguments emphasize a clear need to have a theoretical framework to be considered an evidence-based practice (Russell & Farnum, 2004; Rutko & Gillespie, 2013).

Several articles relate AT to counseling theories, such as Adlerian (Christian et al., 2017; Glass & Myers, 2001; McCarty & Christian, 2019; Portrie-Bethke et al, 2009), Existential (Bowen et al., 2016; Glass & Jackson, 2008), and Acceptance Commitment Therapy (Tracey et al., 2018; Truong, 2018). Based upon literature connecting AT practice to theories, AT appears to be a transtheoretical modality. While these articles provide depth to how AT relates to themes found in prior developed counseling and psychological theories, they do not fully capture the process of AT as it relates to desired AT outcomes continuing the need for further exploration and development of a guiding framework. Richards et al. (2011) identified the need for reconciliation regarding the dualities of AT practice and theory to move towards a framework that inherently involves the fluidity of AT stages and components with specific attention towards identifying, aligning, and adapting desired AT outcomes. The intended result of providing a clear framework that incorporates this fluidity may develop a broader understanding of methodology for achieving psychological change.

Nature

Currently, a predominant amount of AT literature focuses on its prescriptive use in the outdoor setting, usually outside the client's daily environment. Nature has long been researched for its therapeutic and health benefits (Cumes, 1998; Frumkin et al., 2017; Irvine & Warber, 2002). Considered an essential part of holistic living and important for wellbeing, nature has shown to decrease anxiety, increase sense of greater connectedness and belonging, and reduce somatic ailments (Reese & Myers, 2012). However, decreased physical access to nature is becoming a global phenomenon and of growing concern (Kim et al., 2018). In fact, as early as the mid-2000's the concept of nature deficit disorder was introduced (Louv, 2005). The idea of nature deficit disorder was to highlight the growing gap between nature and children, further emphasizing how decreased access to the natural environment results in negative effects on cognitive, emotional, and physical well-being.

Nature has long been explored for its healing properties across disciplines. Historically, Eastern and Scandinavian philosophies and regions have valued the healing properties of nature through practices such as Japanese *shinrin-yoku*, or "forest bathing", Chinese *sēnlínyù*, or "tree bathing", and *friluftsliv* or "free air life" which embodies Sweden, Denmark, and Norway's cultural connection with nature. However, only recently has modern science been able to quantify the impact of nature on healing. Tsunetsugu et al. (2010) referenced the term "*shinrin-yoku*" emerging as a term to describe the practice of "forest bathing" in 1982 as a movement to increase Japanese connection to nature. As research continued to develop highlighting the benefits of its practice, more Western societies incorporated the practice, such as the Kniepp therapy in Germany (Tsunetsugu et al., 2010). Japanese researchers have found physiological effects related to reduced stress and anxiety levels such as, lower cortisol, pulse rate, blood

pressure, and lower sympathetic nerve activity and greater parasympathetic nerve activity (Park et al., 2010; Song et al., 2016; Tsunetsugu et al., 2010). In addition to physiological effects, *shinrin-yoku* was found to have greater positive effects on participants with depressive symptoms compared to those without depressive tendencies (Furuyashiki et al., 2019). As a result of these studies, Japan has seen an increase in literature and therapeutic centers that emphasize “forest bathing” or *shinrin-yoku* to support physiological and psychological health (Antonelli et al., 2019; Furuyashiki et al., 2019; Hansen et al., 2017; Park et al., 2010; Tsunetsugu et al., 2010). In addition to physiological effects, nature has shown to have an impact on lowering susceptibility to cancer, decreasing depression, and alleviating ADHD symptoms (Reese & Myers, 2012). Mutz and Müller (2016) found that young adolescents who participated in a *friluftsliv* program experienced greater life satisfaction, happiness, mindfulness, self-efficacy, and lower perceived stress. Mygind et al. (2019) conducted a systematic review of articles published between 2004 and 2017 in Scandinavian countries on the benefit of immersive nature-experience on children and adolescents’ mental, physical, and social health. They found similar findings across studies for supporting evidence for improved self-esteem, self-efficacy, resilience, academic and cognitive performance, social skills and behavior, and higher levels of physical activity (Mygind et al., 2019). *Friluftsliv* has increasingly become integrated into school curriculum and recreational and leisure programs to support learning outcomes (Mikaels, 2018; Mygind et al., 2019).

Dean and colleagues (2018) assessed nature relatedness (NR) in terms of one’s emotional affiliation (e.g., feelings of oneness with nature), cognitive processes (e.g., views about how nature overlaps with one’s sense of self), relationship commitment (e.g., feelings of attachment to nature), as well as personal experience and behavior (e.g., time spent in nature). Individuals

with higher NR scores and NR experience scores were more likely to report better self-reported health, and those with higher NR Experience were also more likely to report fewer symptoms of depression, anxiety and stress (Dean et al., 2018). These studies further substantiate nature's role in preventative healthcare for its physiological and psychological benefits.

The increased recognition and support for integrating nature as an instrument for healing has led to multidisciplinary efforts to prescribe nature to increase health and wellness. In regard to counseling, numerous efforts to explore the transcendence of nature into non-natural environments have found similar results and begun focusing on integrating nature into schools (Greenleaf, et al., 2014; Jo et al., 2019; Kamitsis & Simmonds, 2017; Reese et al., 2019; Song et al., 2018). Students who have increased accessibility to nature in school is shown to increase emotional well-being, greater cohesiveness, self-esteem, resilience and reduced behavioral problems (Chawla, et al., 2014; Malberg Dyg & Wistoff, 2018). Students who have more contact with nature are shown to lead less sedentary lifestyles and possess more positive outlooks towards schools, improved academic outcomes, and increased student engagement (Camasso & Jagannathan, 2018; Fifolt et al., 2018; Kuo, et al., 2019; Sackett, 2010).

EcoWellness

As nature continues to be integrated into interdisciplinary health professions, Reese and Myers (2012) identified current wellness models in counseling do not account for the impact of nature, resulting in the construction of EcoWellness. EcoWellness considers "one's sense of appreciation, respect for, and awe of nature resulting in feelings of connectedness and perceptions of wellbeing" (Reese & Myers, 2012, p. 400). From this context, nature is uniquely experienced and perceived by the individual, providing a conceptualization of the human-nature connection. The EcoWellness model is comprised of seven factors: physical access, sensory

access, connection, protection, preservation, spirituality, and community connectedness. (Reese et al., 2015). Reese et al. (2015) defined each of these seven factors to facilitate the human-nature connection into counseling practice. *Physical Access* relates to one's ability to interact or engage with nature (Reese, 2016; Reese et al., 2015; Reese et al., 2019). *Sensory Access* is one's perceived ability to engage nature through the senses (e.g. touch, smell, see, hear, taste) without the presence of contact with nature. *Connection* describes the individual's relationship with nature through the reflection of experiences affecting positive beliefs, memories, and emotions. *Protection* or "nature self-efficacy" reflects one's perceived beliefs to safely and effectively navigate the presence of natural environments while able to have a sense for one's survival needs and enjoyment for engagement with nature. *Preservation* or "environmental agency" considers the individual's perceived beliefs to have a greater understanding of environmental issues and positively impact the natural environment through action and advocating. *Spirituality* describes the connection between the individual and "conception of a higher power and/or life guiding principles" facilitated by nature. *Community Connectedness* is defined by an individual's enhanced sense of connection with others when in nature (Reese, 2016; Reese et al., 2015; Reese et al., 2019). Each factor operates from the context of the individual's perceived belief of what is considered to be nature.

AT-EcoWellness Framework

Figure 1 provides an overview of the proposed model merging AT concepts with EcoWellness. This proposed framework can operate as a conceptual flow chart for practitioners to intentionally navigate the AT group process using EcoWellness as a framework to achieve participant outcomes. In the initial phase of the AT program, participants are introduced to an unfamiliar environment and become aware of the physical and sensory access to their

surroundings. This unfamiliarity leads to a feeling of disequilibrium and processing of the program format that is met with various emotional responses ranging from excitement to anxiousness. As the group participates in various activities and initiatives, the framework indicates participants will revisit and reprocess their emotional and physical reactions.

Underlying the model is the group development process, where group members are initially introduced to each other as part of the unfamiliar environment. As the group progresses members become more familiar and connected and by the end members are able to relate their group experience to the community. Specifically, integrating AT with an EcoWellness framework can enhance a sense of greater well-being, resiliency, and connectedness.

Following AT group development and aforementioned concepts, participants are invited to engage in an unfamiliar environment facilitated by the AT setting while simultaneously informing participants' sense of access to nature. During this time, the group becomes familiar with established group norms and comfort levels through the use of the FVC and CBC. Similar to the briefing stage, the group becomes informed and prepared of what to expect. As the group progresses into the action phase, members face challenges through the use of kinesthetic activities that create imbalance and promote the use of decision-making skills to inform their level of participation and abilities. As participants engage in the facilitated activities they continue to engage with the natural environment and risks not only presented by the activity but within nature. Moving into the processing phase, group members process the experiences facilitated by the counselor and group members related to the group's anticipated outcomes.

Hypothesized relationships between AT and EcoWellness and Anticipated Outcomes

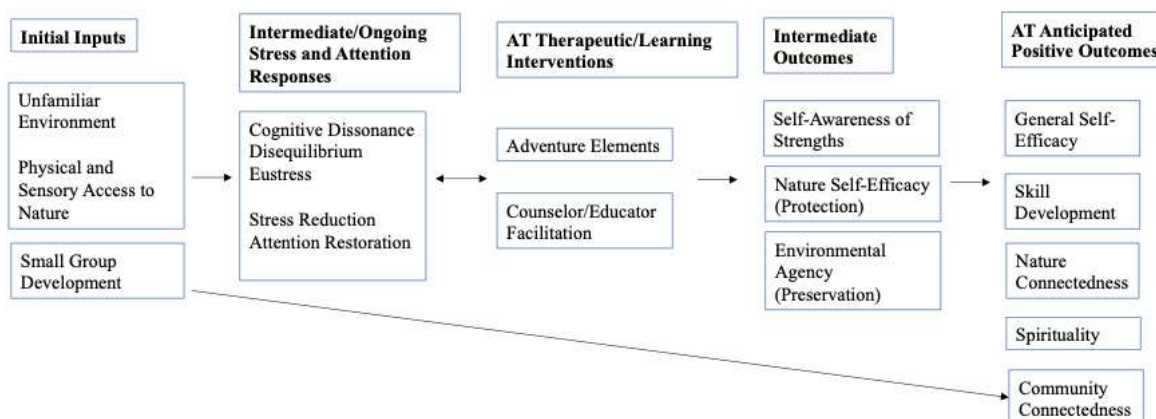


Figure 1. A conceptual flow of merged concepts over the course of an AT program; AT-EcoWellness Model.

Middle School Student Development

Children in grades 6 through 8 undergo significant developmental changes as they transition through the several years before high school. Defined as early adolescence, this age can be quite challenging as students change physically, mentally, socially, emotionally, and cognitively (Akos et al., 2015; Brass et al., 2019; Coelho et al., 2017;). This time is perhaps one of the earliest major transition most children face (Akos et al., 2015). Schools are seen as becoming less supportive at this stage of development than elementary school (Brass et al., 2019). This lack of support has increased concerns for student growth and well-being due to the many disruptions students face during this formative time period (Akos et al., 2015).

Executive Functioning

Executive functioning interacts and is influenced by the aforementioned areas of development. Executive functioning is the ability to monitor and regulate different types of

cognition and behavior to achieve specific internal goals that includes attention, inhibition, planning, working memory, and intentional action (Xu et al., 2013). Research indicates executive functioning is a strong predictor of academic attainment, socioeconomic status, and physical health (Karchach & Unger, 2014). Executive functioning is particularly important for this age group because of high behavioral and neural plasticity in the prefrontal lobes which are sensitive to environmental and social influences (Karchach & Unger, 2014). Therefore, many preventative and responsive interventions are focused on developing early adolescence executive functioning.

Social Development

Peer relationship and social skill development is instrumental for early adolescence as children assess their roles and derive meaning from their existence in context to their social environment (Duchesne et al., 2012; Holmes et al., 2016; Ojanen & Nostrand, 2014). Peer relationships are among the most dynamic and influential to the development of early adolescence (Akos et al., 2015; Duchesne et al., 2012; Ojanen & Nostrand, 2014; Rogers et al., 2017). As the aforementioned developmental areas (e.g. physical, cognitive, and social skills) change, peer relationships and dynamics change, resulting in children attempting to interpret, respond to, and reason their interactions and behaviors with peers. Increased executive functioning in early adolescence is related to improved peer relationships (Holmes et al., 2016). Alternatively, students who experience higher peer problems and social dysfunction tend to have lower executive functioning (Holmes et al. 2016).

The transition into middle school presents an increased complexity of relationships requiring more apt and diverse social skills (Holmes et al., 2016). Furthermore, this transition has shown to have an ongoing effect on students' academic, emotional, social and psychological adjustment throughout early adolescence. A failure to adjust and transition in a developmentally

appropriate manner can result in exacerbated challenges, specifically increase psychological symptoms and decreased quality of school life, academic achievement, intrinsic value, self-concept, and overall self-esteem (Coelho et al., 2017; Ryan et al., 2013). Therefore, leading to experience in anxiety and/or depression among other mental health concerns which can manifest into external behaviors resulting in poor attendance, increased office/discipline referrals, lower grades, and conduct issues (Duchesne et al., 2012; Holas & Hutson, 2012).

Mental Health

Research specific to middle school age mental health and statistics is sparse as this age group is often incorporated among other ages. However, the statistics inform the landscape of mental health among school age children and more specifically adolescence, where transitions as mentioned above are more frequent. The rate of mental health concerns for U.S. children aged 6 to 17 years has continued to increase from 2003 at alarming rates (Bitsko et al., 2018; Centers for Disease Control and Prevention [CDC], 2019; Roll et al., 2013). Approximately 14 to 20% of all school-aged children ages 3 to 17 struggle with problems related to mental health (Adelman & Taylor, 2010; CDC, 2013). Anxiety, depression, ADHD, and behavior related problems are the most commonly diagnosed mental health disorders for U.S. children ages 3 to 17 (CDC, 2019). For the same age demographic, the CDC (2019) identified approximately 7.1% of U.S. children (4.4 million) are diagnosed with anxiety, 3.2% (1.9 million) with depression, 9.4% (6.1 million) received an ADHD diagnosis, and 7.4% (4.5 million) with a diagnosed behavior problem (see Figure 2). Most of these diagnoses are co-occurring with another diagnoses. For instance, nearly 3 in 4 (73.8%) children with a diagnosis of depression are also diagnosed with anxiety and approximately half (47.2%) have behavior problems (CDC, 2019). More than 1 in 3 (37.9 %)

children diagnosed with anxiety are also identified as having behavior problems and nearly 1 in 3 (32.3%) are also diagnosed with depression (CDC, 2019).

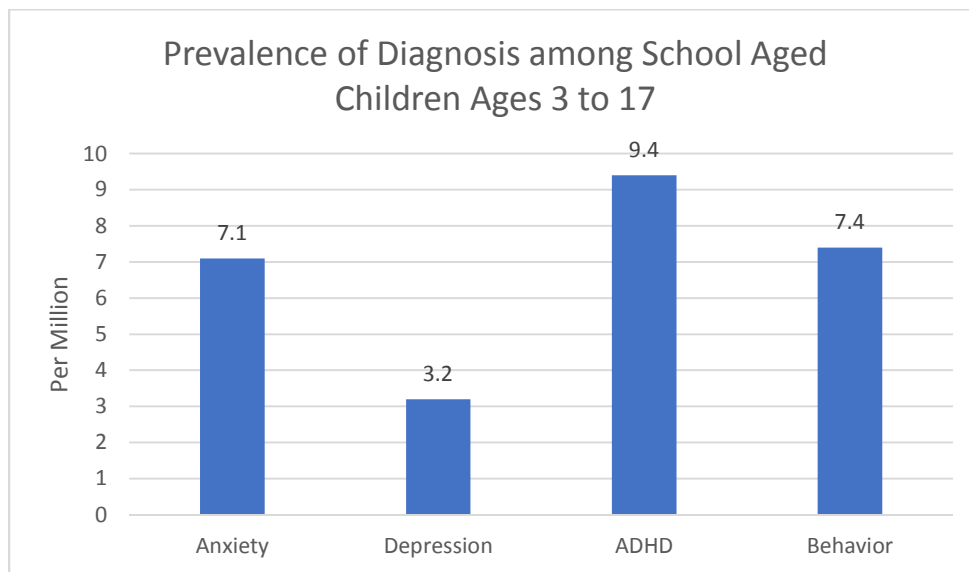


Figure 2. Diagnosis prevalence among school-aged children. The figure does not reflect co-occurring diagnoses.

Figure 3 provides a visualization of diagnosis rates between age groups 6 to 11 and 12 to 17. Rates of depression and anxiety diagnoses become more common as children age with a majority of diagnoses occurring between the ages of 12 and 17 (CDC, 2019; Ghandour et al., 2019). According to Ghandour et al., (2019), 6.1 % of children ages 12 to 17 are diagnosed with depression and 10.5% with anxiety compared to the prior age group (6 to 11) of 1.7% and 6.6% respectively. Behavioral related disorders appear to be early predictors of mental health concerns as a majority of diagnoses are prevalent between ages 6 to 11 at 9.1% compared to older ages 12 to 17 at 7.5% (Ghandour et al., 2019). As of 2016, approximately 6.1 million U.S. children (9.4%) ages 2 to 17 received a diagnosis of ADHD. Children diagnosed with ADHD increased with age with 9.6% of children ages 6 to 11 and 13.6% of adolescents' ages 12 to 17 having ever received a diagnosis, age 12 has the highest rate of diagnosis (Danielson et al., 2018a). About 2 in 3 (63.8%) children diagnosed as having ADHD commonly had a co-occurring disorder. Of the

previous listed comorbid disorders, behavioral or conduct is the most common (51.5%) followed by anxiety (32.7%), and depression (16.8%) (Danielson et al., 2018a).

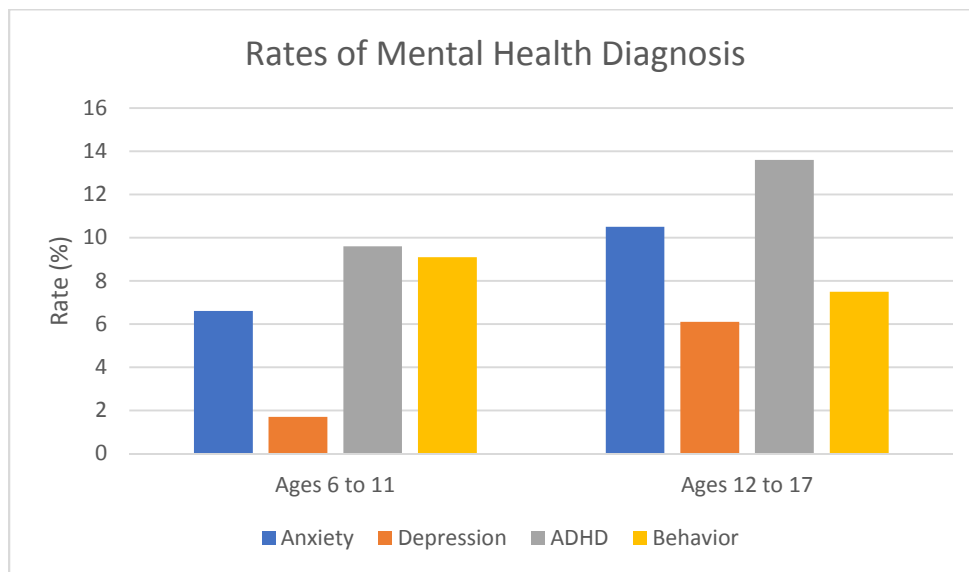


Figure 3. Rates of mental health diagnosis between school-aged children. The figure does not reflect co-occurring diagnoses.

Nearly a quarter (23%) of children diagnosed with ADHD reportedly did not receive medication treatment or counseling/behavioral interventions (Danielson et al., 2018a). However, a 2014 survey indicated nearly 90% of children receive support in school including accommodations and classroom aid (CDC, 2019; Danielson et al., 2018b). Additionally, 4 in 10 received social skills training (Danielson et al., 2018b).

As a result of both mental health illness and substance use, suicide is the third leading cause of death for US children ages 10-14 and the second leading cause of death for ages 15-24 (Christian & Brown, 2018; CDC, 2015). The alarming rates of mental health illness and suicide are prominent concerns demanding to be addressed from preventative and responsive treatment approaches. Early identification of mental health problems is critical to prevention and treatment to minimize the influence on social and academic success (CDC, 2019; Coelho et al., 2017; Holmes et al., 2016). If left untreated, social and academic development can be negatively

impacted (Kelly, 2013). Students diagnosed with mental health issues generally have poor academic outcomes than their peers and could potentially lead to drop out (Auger, 2011; Vander et al., 2003). However, improvement in mental health needs can lead to improved academic performance and achievement (Reback, 2010). Schools are in prime positions to identify and address the mental health needs of children (Christian & Brown, 2018). Schools are increasingly becoming a primary setting for access to health care services for children and families, especially in rural or isolated areas (Christian & Brown, 2018; CDC, 2017). The provision of mental health services at school can lead to improved social functioning and academic performance (Reback, 2010; Whiston, 2011).

Mental Health Services in Schools

Several reports indicate children diagnosed with mental health problems receive mental health treatment at school (Atkins et al., 2010; Simon et al., 2015). However, approximately 70-80% of diagnosed children are not receiving treatment (Mendez et al., 2009). School Counselors (SC) are tasked with attending to the diverse needs of students, which make it challenging for SC to fully meet the ongoing mental health needs of students due to limitations of time, training, and resources (Christian & Brown, 2018). To address student's mental health, SC are directed to refer students to appropriate mental health services, although few families follow through with seeking resources outside of the school setting (Christian & Brown, 2018; Kolbert et al., 2017). Research suggests the lack of follow through from families is a result of limited resources and inconvenience. Relying primarily on referrals to outside services will inevitably leave students-in-need unserved due to limited resources and perceived barriers (Christian & Brown, 2018; DeKruyf et al., 2013). As a result, schools have increased efforts to collaborate with clinical mental health counselors (CMHC) to provide therapeutic services in schools (Christian &

Brown, 2018). In order to differentiate between traditional school counseling services, literature such as, Christian and Brown (2018), refer to services provided by CMHCs in schools as school-based mental health counseling.

School-Based Mental Health Counseling

School-based mental health counseling services are either provided by school-employed mental health professionals or professionals contracted through community agencies and practices (Doll et al., 2017). SBMHCs are trained as CMHCs with a greater emphasis on the knowledge and skills of clinical mental health needs pertaining to a diverse range of clients (Christian & Brown, 2018). SCMHCs are usually licensed as professional counselors opposed to having school designations, typically resulting in a greater ability to provide psychotherapeutic services. Alternatively, SBMHCs are not trained or equipped to carry the large student to counselor ratios and responsibilities beyond counseling services often required of SCs (Christian & Brown, 2018; Lambie et al., 2019). It is not uncommon for SBMHCs to seek out additional training within specialized areas of counseling such as animal assisted therapy, play therapy, neuro-/biofeedback, and adventure therapy to meet the distinctive needs of populations served (Christian & Brown, 2018). Despite the increase in SBMHCs, limited research has explored the effectiveness of their services (Christian & Brown, 2018; Lambie et al., 2019). Of the existing literature, significant support for school-based services appears to be an increase in accessibility and decrease in stigma associated with mental health counseling (Becker et al., 2015; Bringewatt & Gershoff, 2010; Stephan et al., 2015). However, regarding the effectiveness of school-based mental health services, Sanchez and colleagues (2018) found only 2% of mental health services were provided by licensed professionals. Most services addressing student needs were provided by teachers (Sanchez et al., 2018). A current limitation to the provision of school-based mental

health services is attempting to meet the needs of all students and providing individual counseling is perceived as inefficient (Kolbert et al., 2017; Lambie et al., 2019). There is an increased need to provide effective services from a comprehensive modality that serves as a preventative and responsive intervention to students beyond individual counseling.

Summary

In conclusion, transitioning to middle school is characterized by unique physical and psychological changes in development. It is important during this time of adjustment students learn how to effectively manage and cope with these changes. A failure to adapt effectively might have a direct influential impact on physical, mental, and academic well-being leading to an increase in disruptive behaviors, mental health issues, and maladaptive coping (e.g. self-harm, substance use, isolation, etc.) that warrant responsive interventions. However, well-timed and executed targeted prevention services can help alleviate and assist students in navigating this transitional time. Schools are widely becoming a service provider of mental health needs and the integration of an AT program focused on student needs from an EcoWellness framework can support students social-emotional functioning, resiliency, and well-being. Therefore, an AT program facilitated by a school-based mental health counselor from an EcoWellness framework has the potential to address and support the social-emotional development of middle school students through the use of mountain biking.

CHAPTER III

METHODOLOGY

In the following section, I describe the methods and procedures used to implement the current study. I begin by re-stating the current problem and desire for this study that leads into this studies purpose. I then present my research questions and hypotheses followed by study characteristics. Study characteristics include defining my sample and participants, facilitator characteristics, instrumentation, procedures, program design, and data analysis.

Problem Statement

Despite numerous studies exploring the impact of Adventure Therapy (AT) programs with youth, there is a continued need for examining the effects of specific AT-related activities (i.e., mountain biking) in participants' daily environment using a specific framework. Well designed and targeted programs aimed to foster and support positive youth developmental outcomes are critical to aiding the transitions youth experience and effectively reaching developmental milestones. Schools are increasingly identified as primary environments to integrate programs to address youth needs and problems. Specifically, programs in middle schools can assist students with navigating these challenging transitions to ensure improved social-emotional development associated with academic and behavioral outcomes.

Restatement of Purpose

The purpose of this study is to develop and integrate an AT mountain bike program into the school setting to assist with the transition middle school students face from elementary school to middle school and from middle school to high school. Working collaboratively with community partners, this study assessed the effects of an AT mountain bike program and non-AT mountain bike program on middle school students social, emotional, and academic-related

outcomes. These outcomes include how participants change and improve in group climate and resiliency factors.

Research Questions and Hypotheses

Based on prior AT research and the purpose of this study, it was my interest to explore the following research questions:

Q1: How does participating in a mountain bike program (AT & non-AT) impact students' perception of the group climate factors between groups over time?

Q2: How does participating in a mountain bike program (AT & non-AT) impact students' perception of resiliency factors between groups over time?

Based on the research question, I hypothesize the following:

H1: There will be statistically significant differences between groups receiving interventions (AT and non-AT programs) on perception of group climate; students will become more engaged while exhibiting less conflict and avoidance as the group develops as measured by the Group Climate Questionnaire, short form (GCQ-S; MacKenzie, 1983).

H2: There will be a statistically significant difference between groups receiving interventions (AT and non-AT programs) on student resiliency factors; students participating in the mountain bike programs will exhibit higher levels of sense of mastery when compared to the comparison group, further the AT mountain bike group will have statistically higher sense of mastery scores compared to the non-AT mountain bike group as measured by the Resiliency Scales for Children and Adolescents (RSCA; Prince-Embury, 2007).

H3: There will be statistically significant differences within groups receiving interventions (AT and non-AT programs) on perceptions of group climate and factors of resiliency from baseline to mid-a, mid-b, post, and follow-up time points.

Participants

Study participants included students transitioning into 7th grade from a K-6 elementary school and 8th grade students preparing to transition into High School. Participants for this study were recruited from a 7-12th grade charter school campus in Northwest Arkansas. All incoming 7th grade students transitioning into the school and current 8th grade students were invited to participate. Students were selected based on the inclusion criteria of having little-to-no mountain bike experience to participate in the program curriculum as a program for advanced level mountain biking already exists at the school.

An initial sample of 126 students were identified to participate in the program, due to class restrictions a sample of 86 students were randomized to participate in the initial three groups of the program; 20 in each of the mountain bike groups and 20 in a control non-mountain bike class. Due to the COVID-19 pandemic this sample of 86 students was further reduced to a final sample of 41 students. Of the final selected sample, students were randomly assigned into a non-AT mountain bike program (n=20) and an AT mountain bike program (n=21), all students continued to receive traditional school services until the mountain bike course was offered again upon conclusion of the current programs. Of the 41 students, 25 (60.97%) are male, 14 (34.15%) are female, and 2 (4.88%) are non-binary. Based on Arkansas' Special Nutrition Program (ASNP; 2020) definition of being eligible for free or reduced lunch or another form of public assistance, 7 (17.07%) were identified as economically disadvantaged. Twenty-eight (68.29%) students identified as white (non-Hispanic), 5 (12.20%) identified as Latinx, 1 (2.44%) identified

as Asian, and 7 (17.07%) identified as bi-/multiracial; 5 (12.20%) identified English as a second language. 11 (26.83%) were identified as having academic accommodations according to their IEP/504 plan. The average age among the 41 students was 12.61, with ages ranging between 11 and 14.

Of the initial sample of 41, one student did not consent and an additional seven either had schedule changes, incomplete data, or were lost to attrition. An observed sample (n=30) was used for the data analyses (see Table 1).

Table 1
Demographic Data

	Treatment Group		Comparison Group		Total	
	n	%	n	%	n	%
Age	15	50	15	50	30	
12	9	60	5	33.33	14	46.66
13	5	33.33	8	53.33	13	43.33
14	1	6.66	2	13.33	3	10
Grade						
7 th	10	66.67	6	40	16	53.33
8 th	5	33.33	9	60	14	46.67
Race						
White	9	60	9	60	18	60
Latinx	3	20	1	6.66	4	13.33
Multiracial	3	20	4	26.66	7	23.33
Sex						
Male	11	73.33	9	60	20	66.66
Female	3	20	5	33.33	8	26.66
Non-binary	1	6.66	1	6.66	2	6.06
ESL	2	13.33	2	13.33	4	13.33
SES	4	26.66	1	6.66	5	16.66
504/IEP	6	40	4	26.66	10	33.33

Facilitator Characteristics

It was from my experience as a school-based practitioner and consultation with health professionals that inspired me to work collaboratively with community partners to develop a mountain bike program to facilitate further outcome research. The program involves the collaboration of multidisciplinary facilitators. I hold a master's degree in counseling and am a licensed professional counselor with school-based mental health experience. I have completed a doctoral level course in Adventure Therapy, co-facilitated several trainings and workshops, and co-facilitated several experiential groups. In addition to research, I have presented on the topic of AT at several local, regional, national, and international conferences. The co-facilitator is employed by the school as a teacher and trained mountain bike instructor. Throughout the duration of this study, I received supervision and maintained a bi-weekly journal documenting each session.

Instrumentation & Measures

Demographics Questionnaire

A demographics questionnaire was used to collect information including youth participant sex, age, ethnicity, additional kinesthetic activity/sport involvement, extracurricular activities (including outdoor), years of experience riding a bike, level of comfort riding a bicycle, and open-ended questions pertaining to students' perceived interest and participation in enrolling in a mountain bike class, and perceived effects of the COVID-19 pandemic on academic functioning (see Appendix A). Participants were coded with anonymous IDs and responses were collected and stored electronically on a secure password protected computer.

Group Climate Questionnaire Short Form

Group climate refers to the perceived dynamics of the group by the group's participants

and perceived relationship to the group. Group climate is measured by the Group Climate Questionnaire Short Form (GCQ-S; MacKenzie, 1983) comprised of 12 statements assessing group functioning on a 7-point Likert scale, ranging from 0 to 6 (*not at all/a little bit/somewhat/moderately/quite a bit/a great deal/extremely*). Three scaled scores are measured by calculating the mean of associated items to indicate participant's level of engagement, conflict, and avoidance. Engaged is comprised of five items which measure the construct defined by the participants perception of a positive working group atmosphere also known as "cohesion" (MacKenzie, 1983). The conflict scale assesses tension and anger within the group and is measured by four items. Avoidance reflects the participants' perception that members are avoiding personal responsibility and higher levels of reliance as indicated by the three item measures.

Several studies testing the validity and reliability have yielded mixed results. Kivlighan and Goldfine (1991) reported Cronbach's α of .94 for engagement, .88 for conflict, and .92 for avoiding. Kivlighan and Goldfine (1991) study included 14 male and 22 female student participants from a large Midwestern university enrolled in an elective course whose ages ranged from 20 to 36 years ($M = 24.1$, $SD = 2.1$). Christian et al. (2019) included 21, ninth grade male students from a southwestern high school and reported Cronbach's α of .81 for engagement, .86 for conflict, and .76 for avoiding. A review of the literature indicates this is the youngest age group the GCQ has been validated with.

Resiliency Scales for Children and Adolescents

The Resiliency Scales for Children and Adolescents (RSCA; Prince-Embury, 2007) was designed to identify and evaluate child and adolescent resiliency between the ages of 9 and 18. The RSCA produces scores for three global scales: Sense of Mastery, Sense of Relatedness, and

Emotional Reactivity that comprise the individual's total resiliency scale score. The RSCA includes 64 items and two index scores – Resource and Vulnerability, assessed on a 5-point Likert scale (*never/rarely/sometimes/often/almost always*). Each of these three primary scales are further broken down into ten specific subscales.

I have selected to only use the Sense of Mastery global scale because it is the most recognized by experts as a core characteristic of resiliency in children and adults (Prince-Embury, 2007). A Sense of Mastery provides adolescents the opportunity for them to interact with and enjoy the cause and effect of relationships in the environment. This scale distinguishes three personal characteristics that combine to form the underpinning of mastery. Each participant's reported raw score is a total of the three subscales and then is converted to a *T* score to assess the participants' clinical ranking (i.e. low, below average, average, above average, high). An average *T* score for Sense of Mastery is a mean of 50 with a standard deviation of 10. Sense of Mastery consists of 20 items divided among three subscales: Optimism, Self-Efficacy, and Adaptability.

Optimism is defined as the positive attitude one has about the world and life in general, as well as the individual's life specifically, currently, and in the future (Prince-Embury, 2007). Optimism is comprised of seven items along the Likert scale described above. Self-efficacy is defined by one's perceived approach addressing obstacles or problems, as well as having the sense to master one's environment through developing problem-solving attitudes and strategies. The self-efficacy scale is comprised of ten items along the Likert scale described above. Lastly, adaptability or 'flexibility' is defined as the ability to consider different options in problem solving, which includes receptivity to feedback and learn from one's mistakes. Adaptability is comprised of only three items using the Likert scale described above. Each subscale produces a

raw score that is converted to a scaled score which can be used to assess an individual's score ranking that falls along the same range as the *T* score rankings for Sense of Mastery. An average scaled score for the subscales is a mean of 10 with a standard deviation of 3.

Prince-Embury (2007, 2010, 2011) reported Cronbach's α for the current studies interested age range in two age groups (9-11 & 12-14) with normative samples. For the relative age groups, Sense of Mastery yielded an alpha coefficient of .85 and .89; Cronbach's α is provided for the subscales: self-efficacy (.77, .83), optimism (.69, .78), adaptability (.56, .61) (Prince-Embury, 2010).

Procedures

Following the quantitative procedure identified by Creswell (2019), I identified participants to be studied, obtain required permissions, specify variables and measures, chose appropriate instruments, and administer data collection process. In collaboration with a local school and school-counselor, an invitation to participate was administered to the middle school students after IRB approval (Appendix B). The initial forms contained parental consent and assent to participate, demographics questionnaire, and mountain bike survey to identify the targeted population. Students were selected to participate if they met the following criteria: have limited-to-no mountain biking experience and either transitioning into 7th grade or enrolled in 8th grade. Following simple random sampling procedure, students were selected at random after meeting inclusion criteria and assigned into one of two groups: non-AT MTB and AT MTB. Participants engaged in a 9-week closed experiential group study. A control group was originally planned to be waitlisted to engage in the program for future study, however due to the COVID-19 pandemic the sample size was reduced; all selected students were assigned into the treatment and comparison group to meet sample requirements. All participants completed the

GCQ-S and *Sense of Mastery Scale* as part of the *RSCA* at five time points; prior to the first day of the program, during the 4th week of the program after the school closed due to the COVID-19 pandemic, during the 5th week of the program upon returning from the pandemic closure three weeks later, after the last day (9th week) of the program, and a one-month follow-up.

Informed Consent

I obtained approval to conduct this study from the Institutional Review Boards (IRB) of the University of Arkansas and was approved. IRB informed consent procedures were followed, and consent was acquired from the school district, campus staff involved, and guardians of all participants. In addition to consent, all participants provided a written assent to participate in this study. (See Appendix C).

Recruiting Participants

In order to participate in this study, students were identified by the middle school counselor and staff as 7th graders transitioning into a new school or current 8th graders. Students eligible to enroll in the course self-selected and filed an enrollment and demographics form indicating their level of mountain biking ability. Students selected and enrolled in the course self-reported having limited ability in mountain biking. Participants completed a student assent form. (See Appendix D). The student applicants were randomly assigned into the groups and once the two mountain bike courses being offered were filled (limit of approximately 20 students per course) participants were assigned into a control group. Due to the COVID-19 pandemic several course changes occurred facilitated by the school staff, resulting in a diminished sample size and restructuring of the remaining sample to fill the two course sections eliminating the control group.

Data Collection

AT Group Design and Program

A 9-week mountain bike program adapted from a community mountain bike partner aimed at supporting middle school grade student transitions was developed. Two courses were offered over the 9-week period. Each class was held twice a week on Tuesday and Friday for 90 minutes for a total of 14 sessions beginning on September 1, 2020 and lasted until November 17, 2020. One course utilized AT key concepts as part of the program, the other followed the adapted community partner program without AT concepts infused. I provide a weekly overview of the non-AT mountain bike program and AT mountain bike program in Appendix E. Throughout the course of the program I maintained a journal record of session notes to highlight any deviations or processing procedures followed. Due to the COVID-19 pandemic, the school closed on September 25th and resumed on October 20th, the program resumed on Friday, October 23rd until the program ended on November 17th prior to Thanksgiving break. The initial seven sessions consisted of participants learning and demonstrating mountain bike skills on school grounds or local paved pathway. This period of time is captured by the time between datapoints one and two. The 3-week time period the school was shutdown due to the COVID-19 pandemic is captured between datapoints two and three. During this time, students were instructed to participate in a physical activity (some students did not have access to bikes) at home, until returning to campus to reconvene the program. The final seven sessions consisted of students applying their newly acquired knowledge of mountain bike skills on a local dirt trail system. This period of time is captured between datapoints three and four. Upon conclusion of the program, a local bike park opened called “the railyard”, which consists of multiple small all-weather trails of various difficulties. The course instructor/school teacher used this park for the students to ride

during the post-program duration (time between datapoints four and five).

Research Design

The two program group types, AT mountain bike and non-AT mountain bike, and time serve as the independent variables (IV) to the study. The following outcomes serve as the dependent variables (DV) to the study: group climate and resiliency factors.

Assessment Administration

All participants completed a demographics and self-developed mountain bike experience questionnaire at four timepoints, prior to the groups meeting, after session seven, after session fourteen, and at one-month follow-up. On the first day of the course prior to engagement, students completed the *GCQ-S* and *RSCA sense of mastery subscale*. The *GCQ-S* was not assessed for reliability and was not validated with this population. Each instrument was administered at five time points, prior to the first day of the program, during the 4th week of the program after the school closed due to the COVID-19 pandemic, during the 5th week of the program upon returning from the pandemic closure three weeks later, after the last day (9th week) of the program, and a one-month follow-up. All students were assigned a confidential ID and maintained by the primary researcher. All instruments were provided via Qualtrics and administered by the school counselor. Students were given the survey links to complete the instruments via Qualtrics to be completed in a secluded room next to the school counselors' office.

Data Analysis

My hypotheses are there will be statistically significant differences between the AT mountain bike program and non-AT mountain bike program groups on factors of resiliency and group climate. Further, there will be within group differences overtime for the AT and non-AT

mountain bike group on measurements at baseline, mid-1, mid-2, post, and follow-up time points. To answer my research questions, I used a mixed model to evaluate the statistical significance of the repeated measures data. I opted to use a mixed model analysis for this study because it identifies the effects for one between-subjects factor, one within-subjects factor, and covariates. Several advantages to using a mixed model is the ability to specify the variance-covariance structure, assume an unequal group variance, eliminate problems caused by missing data in repeated measures, and greater flexibility in modeling covariates.

The repeated measures mixed model is similar to a mixed ANOVA when exploring the results of fixed effects. However, the approaches differ in that the mixed model accounts for random effects and allows for leniency in assumptions, such as the assumption of sphericity or equal variances. This assumption in the mixed ANOVA is more restrictive and assumes a strong correlation of covariance between timepoints. Further, a mixed ANOVA uses maximum likelihood estimation in PROC GLM and removes participants who have incomplete or missing data, whereas the mixed model is able to retain the data of participants with missing information using restricted maximum likelihood (REML) in PROC MIXED.

First, I collected and reported the descriptive statistics which included demographic information (age, grade, race/ethnicity, sex) and reported the means and standard deviations of the dependent variables being measured (factors of resiliency & group climate). To answer the research questions, a repeated measures mixed model was utilized to analyze the dependent variables for participants assigned to each group. The mixed model approach is appropriate when working with longitudinal data for repeated measures in order to estimate unknown parameters. This study contains both a within-subjects or repeated factors analysis as well as a between-subjects or independent-group factors analysis. The following assumptions are made when using

the F-test: the response variable is continuous, individual independent observations, and random error follows the normal probability distribution with a mean equal to zero. The advantage of the mixed model is the flexibility in accounting for random error and random effect, therefore the assumption of equal-variance is not necessary. Instead, the mixed model requires the specification of the covariance structure of the model. A violation of assumptions would require further investigation of outliers and potential removal of data, mean imputation for missing values, or increase in sample size for further data. A model fit comparison of variance structures is included in Appendix F showing the AIC values for compound symmetry covariance, a more restrictive model, and the unstructured covariance. Compound symmetry assumes equal covariance for between each time point in the correlation matrix, violating the assumption of sphericity. The unstructured covariance matrix corrects for this assumption by specifying a model that does not make assumptions about the form of the covariance matrix. For this study, I specified the model to have an unstructured covariance which assumes each variance and covariance is unique at each time point and therefore less restrictive. The unstructured covariance matrices for each model are provided in Appendix G. The limitation to this approach is it will increase the estimates to be tested, lowering the denominator degrees of freedom and overall power.

All assumptions of the mixed model analysis were met and model convergence criteria was satisfied. The variance matrix estimates are acquired using the restricted maximum likelihood (REML) and the fixed effects are tested using the F-test. The F statistic (F) is reported to test the null hypotheses indicating the proportion of variance unexplained. I calculated and reported the effect size to represent the proportion of total variability in the dependent variable that can be explained by the variability in the groups over time represented by partial eta-squared

(η_p^2). Although arbitrary, Cohen (1988) classified partial eta-squared into three categories: small (0.01), medium (0.06), and large (0.14) effects (Heppner et al., 1999). To produce the partial eta square statistic, $\eta_p^2 = SS_{effect} / SS_{effect} + SS_{error}$ was calculated as a measure of explained variance (Tippey & Longnecker, 2016).

For each subscale of the DVs, I visually inspected the profile plot of the means for each group over time and across outcomes. Then, I used a mixed model approach to explore the statistical significance of these observed differences. The mixed model illustrates a two-group experimental design with repeated measures. Adapting the standard linear model to a mixed model in matrix form: $\mathbf{y} = \mathbf{X}\boldsymbol{\beta} + \mathbf{Z}\mathbf{u} + \boldsymbol{\varepsilon}$; where \mathbf{y} is the known vector of observations (outcome variable), $\boldsymbol{\beta}$ is an unknown vector of fixed effects, \mathbf{u} is an unknown vector of random effects, $\boldsymbol{\varepsilon}$ is an unknown vector of random errors (residuals) or part of the variance unexplained by the model, and \mathbf{X} and \mathbf{Z} are known matrices of the observations relating to the respective vectors (predictor variables). I used the following model to assess main effects and interaction effect between the independent and dependent variables:

$$y_{ijk} = \mu + \tau_i + \alpha_j + \gamma_{ij} + d_{k(i)} + \varepsilon_{ijk}$$

The model reflects y_{ijk} , a continuous outcome variable measured of the k^{th} subject, in i^{th} treatment group, at j^{th} time point or phase. Where μ is the overall mean, τ_i is the main effect for group, α_j is the main effect for phase, and γ_{ij} is the interaction effect for group and phase. $d_{k(i)}$ is the random effect estimate for the k^{th} subject in the i^{th} treatment group. ε_{ijk} is the random error for the k^{th} subject in the i^{th} treatment group on the j^{th} phase.

Residual Maximum Likelihood was used to compute the estimates of the variance parameters. I then reviewed the iteration history for model convergence displaying the results of the numerical optimization of the residual likelihood. Next, I reviewed the fixed main effects for the

independent variables on the dependent variable. Upon observing a statistically significant effect between variables, I further explored the difference among groups by computing the least squares means and partitioning out for simple effects. For this study, I leveraged a mixed model in PROC MIXED. I reported only the fixed effects in the results section but examined the relaxed covariance matrix assumptions that a traditional mixed ANOVA requires (i.e. assumption of sphericity through specifying a compound symmetry covariance structure). The random effects are reported in Appendix H. The supporting code for the analysis using SAS v 9.4 is provided in Appendix I.

Power Analysis

I ran a power analysis for a repeated measures ANOVA to estimate the sample size needed. Effect size is used to convey the magnitude of differences or relationship between group means (Glass & Hopkins, 1996). AT research appears to have inconsistent reported effect size estimates making it difficult to determine the appropriate effect size required for this study. Cohen (1988) identified f as a common measure of effect size as the ratio of variation among the group means to the average variation (standard deviations) among subjects within each group. Using Cohen's (1988) guidelines for effect size estimates, Cohen's f statistic considers .10 as a small effect size, .25 as a medium effect size, and .40 as a large effect size.

In order to determine the number of participants needed for this study I conducted an a priori power analyses using G*Power (Faul et al., 2009). Power is the probability of rejecting a false null hypothesis ($1-\beta$), where Beta (β) is the probability of a type-II error (Glass & Hopkins, 1996). A type-II error occurs when there is a failure to reject the null hypothesis of equal means when in fact the means are different (Glass & Hopkins, 1996). Cohen (1988) suggests a power of .80 ($\beta = .20$) is sufficient for most statistical analyses. I ran a power analysis for a repeated

measures ANOVA where $\alpha = .05$, power $(1-\beta) = .90$, for 2 groups with 5 points of measurement, and the effect size (f) ranges from .10, .25, and .40, resulting in approximately 22, 26, and 32 participants are necessary for this study to generate the respective effect sizes. A prospective power analysis using the sample obtained yielded a power of .94 for the current study with a sample of 30 participants with a medium effect size, $f = .25$, and a power of .99 for a large effect size. However, the power dropped significantly (.32) for a small effect size. However, this analysis is the best case scenario using the most restrictive assumptions covered in a repeated measures ANOVA.

Threats to Internal & External Validity

External validity refers to the generalizability of the study to different settings and populations (Creswell, 2019). There are three common threats to external validity: selection biases, constructs and methods, and history or maturation (Cook & Campbell, 1979; Creswell, 2019). To control for selection bias I used random assignment, compare equal group sizes, and consider individual differences and how representative participants are to the population (Shadish et al., 2002). It was difficult to control for volunteer bias, as participants may self-select decreasing the homogeneity of characteristics between sample and population (Cook & Campbell, 1979; Shadish et al., 2002). To control for threats related to constructs and methodology I used multiple constructs, well-defined operational definitions, and appropriate analysis procedures (Cook & Campbell, 1979; Shadish et al., 2002). To control for history and maturation, it is proposed that the study is replicated (Creswell, 2019).

Internal validity refers to the inferences that can be made based on the causal relationship between the independent and dependent variables being studied (Creswell, 2019). Threats to internal validity occur when making inferences about how the variation in one variable

contributes to the variation in another (covariation) between the independent and dependent variables causal relationship (Shadish et al., 2002). There are many threats to internal validity: history effects, maturation, statistical regression, selection biases, experimental mortality, selection interactions, diffusion of treatments, compensatory equalization and/or rivalry, demoralization, testing effects, and instrumentation (Creswell, 2019). To account for internal validity, using an experimental research design and following a standardized protocol for the implementation of an intervention provides a strong claim for the causal relationship between variables (Cook & Campbell, 1979; Shadish et al., 2002).

Selection interaction and repeated testing propose the greatest threats to validity (Tabachnik & Fidell, 2013). Selection interaction includes maturation, history, selection bias, and diffusion of treatment to name a few (Creswell, 2019). Whereas repeated testing includes, but is not limited to maturation, statistical regression, compensation, testing effects and instrumentation (Creswell, 2019). To control for many of these threats, each group received the same activities over the duration of the program. Participant maturation should have little impact considering the assessments time span is over the course of one school semester consisting of 16 weeks from pre- to follow-up. Reducing the administration of instruments to several time points over a 16 week time span was used to help reduce maturation, testing effects, regression, and instrumentation.

Summary

This chapter reviews the proposed methodology for the current study of the effects of an AT mountain bike and non-AT mountain bike program in the school setting for transitioning 7th graders from 6th grade and 8th graders preparing to transition into out of middle school as a preventative intervention program to facilitate developmental and social adjustment by means of

well-being, group climate, and resiliency. I have provided further details regarding the research design and procedures for a 9-week program following a school calendar, participant sampling criteria, rationale for the use of the *GCQ-S*, *RSCA-MAS*, and detailed description of mixed model analysis. This chapter concluded with further insight of conducting a power analysis and consideration for threats to validity.

CHAPTER IV

RESULTS

I present the results of the statistical analyses performed in this chapter. I utilized the set of procedures to explore if, how, and to what degree participants assigned to a 9-week, 14 session adventure therapy mountain bike program changed in comparison to the participants assigned to the non-adventure therapy mountain bike program. First, I present the reliability coefficients for internal consistency and stability for the instruments. Next, in order to address the research questions, I present the descriptive statistics of the dependent variables. Then I provide the visual profile plots and initial pretests to assess the effects for each independent variable on the dependent variable followed by the post hoc results for each of the seven composite variables using the differences in least squares means. This information is then used to interpret the results of the seven mixed model analyses to assess the change in group climate and resiliency factors between groups and over the course of the program and answer my research questions. Last, I conclude the section by presenting the clinical significance of the results.

Reliability

First, I computed an overall Cronbach's α to assess the internal consistency of the measures for this sample of the population. Table 2 presents the coefficients of the composite scores for the variables across time points and at each individual time point. A Cronbach's α is considered acceptable when the coefficient is greater or equal to .70 (Heppner et al., 1999). All scales met this threshold except the Engagement and Avoidance sub-scales of the *GCQ-S*. Engagement was low at specific measurement points, but is overall close to .70. The low coefficient for Avoidance across time points and overall indicates this is a problematic measure because the 3 items in the scale are uncorrelated and potentially measuring different aspects of

Avoidance. This low coefficient in Avoidance is consistent with previous studies (Johnson et al., 2006; Young et al., 2013). Despite the acknowledged psychometric limitations of the *GCQ-S*, it continues to be the most-used measure in group psychotherapy literature to explore the group process (Johnson, 2015). Researchers commonly calculate the reliability of items for the subscales comprising of a composite scale (Tavakol & Dennick, 2011). The *RSCA-MAS* subscales combine to create the composite for Total Sense of Mastery, therefore assessing the reliability of the subscales is a better indicator of how well the items work together. Combining these scales will enhance the reliability of the overall scale.

Table 2

Internal Consistency Reliability of Composite Measures

Instrument	Variable	Overall	Pre	Mid1	Mid2	Post	Follow-Up
GCQ-S	Engagement	0.69	0.56	0.57	0.65	0.52	0.65
	Conflict	0.81	0.86	0.91	0.92	0.92	0.92
	Avoidance	0.17	-0.09	0.30	0.22	0.32	0.46
RSCA-MAS	Optimism	0.86	0.86	0.85	0.82	0.86	0.89
	Self-Efficacy	0.88	0.91	0.85	0.87	0.87	0.88
	Adaptability	0.74	0.82	0.57	0.80	0.75	0.81

Note: Reliability for Total Sense of Mastery is .93

Second, I computed the reliability for stability using intraclass correlation coefficients (ICC) to assess the test-retest reliability for each composite measure across the five time points (Table 3). An ICC value greater or equal to .70 is an acceptable level of test-retest reliability (SACMOT, 2002). However, because this coefficient is not sensitive to error it tends to over-estimate reliability (Heppner et al., 1999); meaning, each scale measured at the time of the original administration will continue to measure the same characteristic at each additional administration of the instrument. Therefore, reliabilities of the measures are expected to be high when the construct is intended to be stable overtime. Based upon the reliabilities below, the constructs have acceptable stability.

Table 3*Test-Retest Reliability of Composite Measures*

Instrument	Variable	Reliability Coefficient
GCQ-S	Engagement	0.83
	Conflict	0.91
	Avoidance	0.69
RSCA-MAS	Optimism	0.97
	Self-Efficacy	0.94
	Adaptability	0.92

Note: The reliability for Total Sense of Mastery is .96.

Descriptive Statistics

The following descriptive statistics report the mean and standard deviation for each group on the dependent variables across time points for the GCQ-S (see Table 4) and RSCA-MAS (see Table 5).

Table 4*Descriptive Statistics for GCQ-S*

Group	Measure	Pre		Mid-1		Mid-2		Post		Follow-Up	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
AT MTB	Engagement	2.57	1.10	2.36	0.71	2.73	0.93	2.80	0.82	3.17	1.20
	Conflict	1.36	1.02	1.40	1.12	1.43	1.23	1.68	1.35	1.44	1.42
	Avoidance	2.88	0.81	2.96	0.97	3.29	0.94	3.17	0.99	3.53	1.39
MTB only	Engagement	2.41	0.85	2.53	1.05	2.73	1.14	2.77	0.98	2.65	0.94
	Conflict	1.36	0.88	0.91	0.91	0.71	0.66	0.75	0.76	1.02	0.97
	Avoidance	2.95	0.75	2.95	0.60	3.00	0.89	3.29	0.81	3.00	0.65

Note: n = 14 to 15 from Pre to Post; n = 12 at Follow-Up.

An initial review of the group means for the GCQ-S indicate that groups appeared to have similar means at pre-test, with the treatment group reporting more variability across measures as indicated by the *SD*. Both groups reported an increase in Engagement during the course of the program that fell in the somewhat to moderate range. As the program continued, there is an increase in perceived Conflict for the treatment group until follow-up where it returns

to a similar mean at mid-2. Interestingly, the comparison group reported a decrease in Conflict from pre to mid-2, then an increase. However, these scores were minimal and ranged from *Not At All* to *A Little Bit* of perceived Conflict. Both groups reported an increase in Avoidance during the course of the program ranging from *Somewhat* to *Quite A Bit*. However, due to the reliability of these variables, these constructs need to be interpreted with caution and highlight the need for additional exploration of the psychometric properties of the item-responses.

Table 5

Descriptive Statistics for RSCA-MAS using Scaled and T Scores

Group	Measure	Pre		Mid-1		Mid-2		Post		Follow-Up	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
AT MTB	Optimism	9.00	3.57	8.47	3.89	9.27	3.94	8.86	4.33	10.08	4.79
	Self-Efficacy	9.14	3.01	9.33	3.39	9.87	3.94	9.86	3.82	10.75	3.67
	Adaptability	9.50	4.31	9.67	3.72	10.17	3.86	10.21	4.59	10.08	4.81
	Total	45.93	10.91	46.00	12.45	48.27	13.86	47.71	14.57	50.25	14.69
MTB only	Optimism	7.38	2.84	7.07	3.06	8.50	2.79	8.64	3.37	7.67	3.82
	Self-Efficacy	8.54	3.48	7.67	2.72	9.00	2.04	7.43	2.41	7.92	2.15
	Adaptability	7.77	3.83	7.27	3.13	7.71	2.73	7.00	2.63	8.08	2.54
	Total	41.77	10.89	39.20	9.48	44.57	7.70	41.14	7.60	41.33	8.05

Note: n = 13 to 15 from Pre to Post; n = 12 at Follow-Up.

An initial review of the group scaled score and *T* score means for the RSCA-MAS indicates the groups appeared to have different scores at pre-test. However, according to the statistical analysis presented later in this chapter they are statistically the same. Overall, the treatment group reported higher averages across scales with similar standard deviations when compared to the comparison group. Optimism appears to fluctuate over the course of the program by only a small margin for both groups with both groups having similar average scores at post before largely diverting at follow-up. At follow-up the treatment groups reported an increase whereas the comparison group fell back towards pre-test scores. Self-efficacy and Adaptability are of particular interest, because the treatment and comparison group differ. The

treatment group appears to have a steady increase in average scores for both Self-Efficacy and Adaptability scores. However, the comparison group reported more volatility in average scores for Self-Efficacy and a relatively stable average for Adaptability. Overall, the total sense of mastery for resiliency appears to highlight a stable increase for the treatment group compared to the comparison group, which showed a decrease from pre to mid-1, an increase at mid-2, then a decrease to follow-up. Using the descriptive statistics, I included a visual analysis of the means to help illuminate the trends in average scores over the course of the groups.

Mixed Model Analysis

I opted to use a mixed model analysis for this study because it identifies the effects for one between-subjects factor, one within-subjects factor, and a covariate. Several advantages to using a mixed model is the ability to specify the variance-covariance structure, assume an unequal group variance, eliminate problems caused by missing data in repeated measures, and greater flexibility in modeling covariates. According to my research questions, the dependent variables being assessed are factors impacting perception of group climate (i.e. Engagement, Conflict, Avoidance) and factors measuring perception of resiliency (i.e. Optimism, Self-Efficacy, Adaptability), which account for overall Sense of Mastery.

Group Climate Questionnaire

Engagement. Figure 4 provides the visual profile plot for the group mean Engagement scores across time points.

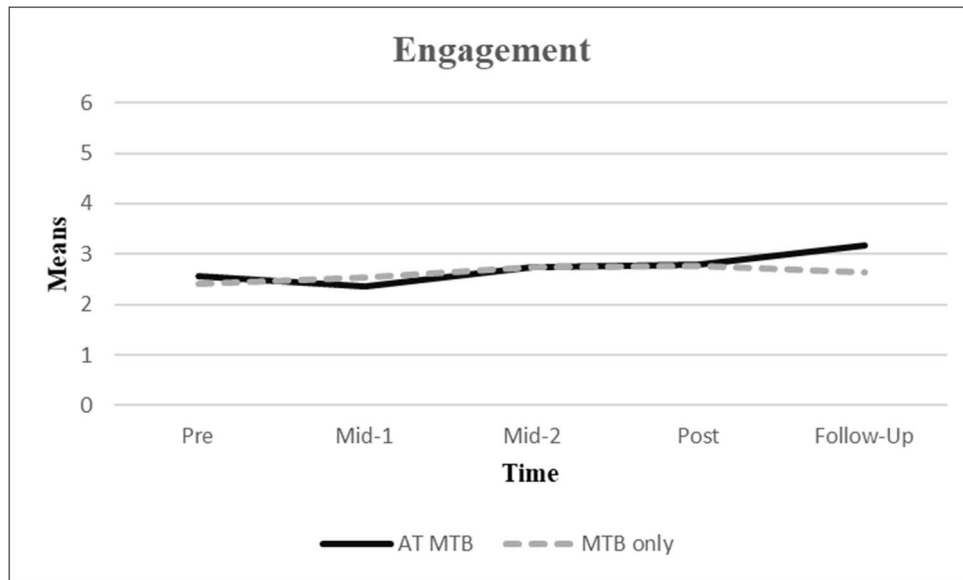


Figure 4. Visual profile for GCQ-S Engagement mean scores by group.

Although the visual analysis indicates differences for the three effects, I explored the statistical significance of these plots using a mixed model approach (see Table 6). The results of the between subject test of the group effect on Engagement was non-significant, $F(1, 28) = .01, p = .93$. Additionally, there was not a statistically significant difference on the interaction effect between groups and time on Engagement, $F(4, 28) = .24, p = .91$. There was a statistically significant difference within groups over time on Engagement with a medium effect size, $F(4, 28) = 3.36, p = .02, \eta_p^2 = 0.076$; indicating a significant difference in engagement scores between phases. However, Engagement accounted for very little variance in the model effects and resulted in an extremely small effect size for group effect and the interaction effect ($\eta_p^2 < 0.01$).

Table 6
Summary Table for Engagement

	<i>df</i>	<i>F</i>	<i>p</i>	η_p^2
Group	(1, 28)	0.01	0.93	<0.01
Phase	(4, 28)	3.36	0.02	0.08
Group*Phase	(4, 28)	0.24	0.91	<0.01

In order to explore the simple effects of phase, the cell means were compared. There are statistically significant differences between Pre and Follow-Up, Mid-1 and Post, Mid-1 and

Follow-Up, and Post and Follow-Up. Table 7 displays the differences between time points on Engagement. The results indicate the largest difference existed between mid-1 and follow-up on average by -0.62, followed by an average difference between pre and follow-up of -0.57.

Table 7
Differences of Least Squares Means for Engagement by Phase

Phase	Phase	Estimate	Error	<i>df</i>	<i>t</i>	<i>p</i>
1	5	-0.57	0.21	28	-2.70	0.01
2	4	-0.33	0.13	28	-2.47	0.02
2	5	-0.62	0.19	28	-3.35	<0.01
4	5	-0.29	0.14	28	-2.02	0.05

The profile plot shows an overall difference between group scores that fall between *Somewhat* to *Moderately* engaged. Each group's perceived Engagement scores begin in this range and remain relatively stable with a minimal increase until post-test. At follow-up, the treatment group increased to a *Moderately* perceived level Engagement, whereas the comparison group remained relatively the same. Despite these observations in the profile plot, the groups were not statistically significantly different. There were statistically significant phase differences, but no statistically significant interaction between group differences by phase.

Conflict. Figure 5 provides the visual profile plot for the group mean Conflict scores across time points.

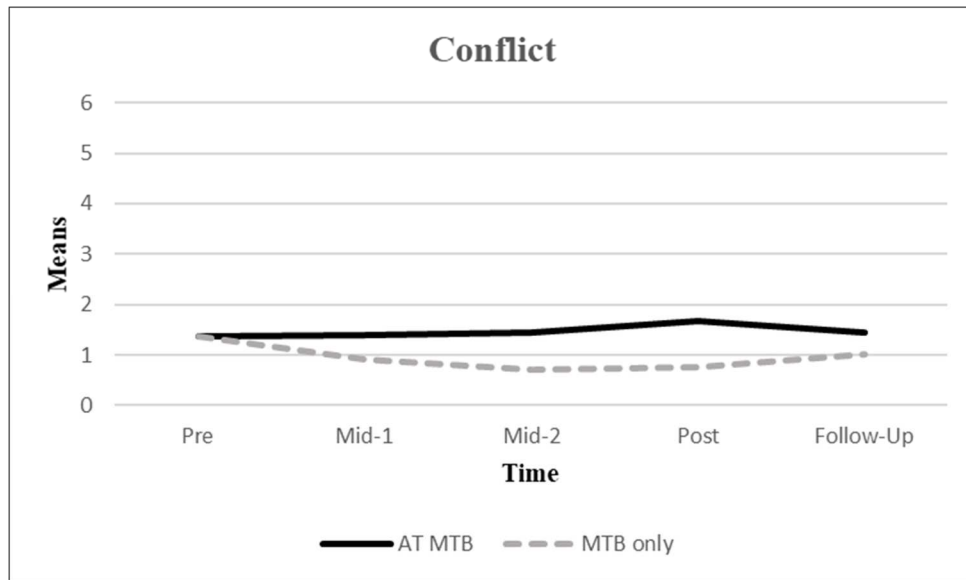


Figure 5. Visual profile for GCQ-S Conflict mean scores by groups

Although the visual analysis indicates differences for the three effects, I explored the statistical significance of these plots using a mixed model approach (see Table 8). The results of the between subject test of the group effect on Conflict was non-significant, $F(1, 28) = 2.28, p = .14$. Additionally, there was not a statistically significant difference on the simple effect of time on Conflict, $F(4, 28) = 1.32, p = .28$. There was a statistically significant difference for the interaction effect between groups over time on Conflict, $F(4, 28) = 3.42, p = .02$, indicating a difference between groups at particular phase(s) exists. However, Conflict accounted for little variance in the simple model effects and resulted in an extremely small effect size. The interaction effect accounted for a medium effect size ($\eta_p^2 = 0.079$).

Table 8
Summary Table for Conflict

	<i>df</i>	<i>F</i>	<i>p</i>	η_p^2
Group	(1, 28)	2.28	0.14	0.02
Phase	(4, 28)	1.32	0.29	0.03
Group*Phase	(4, 28)	3.42	0.02	0.08

In order to explore the interaction effects of phases between groups on Conflict, the cell means were compared. There are statistically significant differences between groups at Post, $F(1, 28) = 5.42, p = .03$, indicating the groups perceived Conflict differ at this time point (see Table 9). Table 10 shows that the comparison group and treatment group on average differ by -0.92 and the difference is statistically significant ($p = 0.03$), indicating that Conflict was higher in the AT group than the comparison group at post-test.

Table 9

Differences between Groups by Phase on Conflict

	Phase	<i>df</i>	<i>F</i>	<i>p</i>
Group*Phase	1	(1, 28)	0.01	0.9215
Group*Phase	2	(1, 28)	1.14	0.2956
Group*Phase	3	(1, 28)	3.52	0.0712
Group*Phase	4	(1, 28)	5.42	0.0274
Group*Phase	5	(1, 28)	1.69	0.2047

Table 10

Differences of Least Squares Means for Conflict by Group and Phase Interaction

	Group, Phase	Group, Phase	Estimate	Error	<i>df</i>	<i>t</i>	<i>p</i>
Group*Phase	1, 4	2, 4	-0.92	0.40	28.00	-2.33	0.03

Note: Groups reported statistically significant differences for Conflict at post.

The profile plot shows an overall difference between group scores that fall between *A Little Bit* to *Somewhat* perceived Conflict within the groups. Each group's perceived conflict scores begin in this range. The treatment group's perceived Conflict scores remain relatively stable with a minimal increase until post-test. Interestingly, the comparison group perceived Conflict scores decrease towards no perceived Conflict within the group and remain relatively stable until post. At follow-up, the treatment group decreased back towards pre-test scores, whereas the comparison group increased towards *A Little Bit* of perceived Conflict. Despite these observations in the profile plot, the groups and phases were not statistically significantly

different. There was a statistically significant difference between groups at post, where the treatment scores were higher than the comparison group.

Avoidance. Figure 6 provides the visual profile plot for the group mean Avoidance scores across time points.

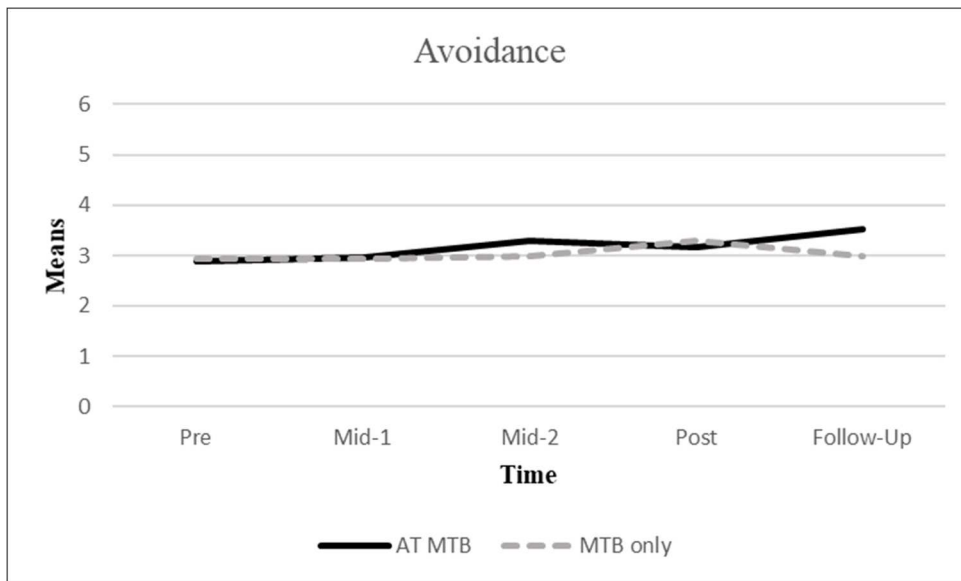


Figure 6. Visual profile for GCQ-S Avoidance mean scores by groups

Although the visual analysis indicates differences for the three effects, I explored the statistical significance of these plots using a mixed model approach (see Table 11). The results of the analysis are displayed in table 11, which indicate there are no statistically significant differences between or within groups for the simple or interaction effects on Avoidance. Further, Avoidance accounted for very little variance in the model effects and resulted in small effect sizes.

Table 11
Summary Table for Avoidance

	<i>df</i>	<i>F</i>	<i>p</i>	η_p^2
Group	(1, 28)	0.20	0.66	<0.01
Phase	(4, 28)	1.56	0.21	0.04
Group*Phase	(4, 28)	0.78	0.55	0.02

The profile plot shows an overall difference between group scores that fall close to a *Moderately* perceived level of Avoidance among participants within the groups. Each group's perceived Avoidance scores begin in this range and remain relatively stable with a minimal increase until post-test. At follow-up, the treatment group continued to increase towards *Quite A Bit* of perceived Avoidance, whereas the comparison group decreased towards pre-test scores of perceived Avoidance. Despite these observations in the profile plot, there were no statistically significant differences between groups and phases on perceived Avoidance. Due to the psychometrics of this measure (i.e., reliability < .70), these results should be interpreted with caution and the items of this measure will be further explored in the discussion section.

RSCA-MAS

Optimism. Figure 7 provides the visual profile plot for the group mean Optimism scores across time points.

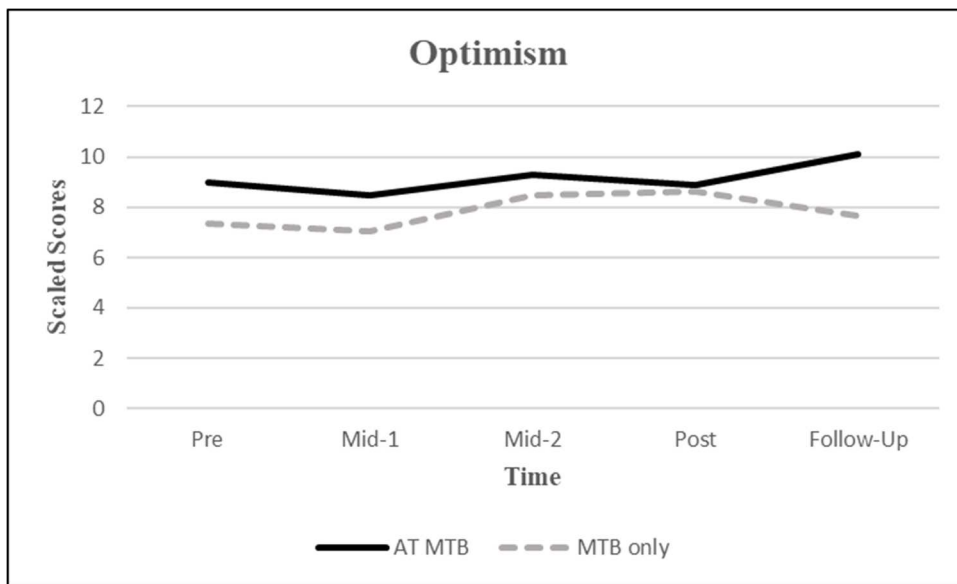


Figure 7. Visual profile for RSCA-MAS Optimism mean scores by groups

Although the visual analysis indicates differences for the three effects, I explored the statistical significance of these plots using a mixed model approach (see Table 12). The results of

the analysis indicates there are no statistically significant differences between or within groups for the simple or interaction effects on Optimism. Further, Optimism accounted for very little variance in the model and resulted in small effect sizes for the group main effect and interaction effect. However, there is a medium effect size for the variance accounted for in the main effect for Phase ($\eta_p^2 = 0.058$).

Table 12
Summary Table for Optimism

	<i>df</i>	<i>F</i>	<i>p</i>	η_p^2
Group	(1, 28)	0.90	0.35	<0.01
Phase	(4, 28)	2.56	0.06	0.06
Group*Phase	(4, 28)	0.77	0.55	0.02

The profile plot shows an overall difference between group scores, with treatment scores falling within the average range and the comparison scores in-between below average to average range of Optimism. Both groups exhibit a decrease from pre-test and vary over the course of the program until post-test where they share similar scores within the average range. At follow-up, the treatment group increased, whereas the comparison group decreased, but remained within average range. Despite these observations in the profile plot, there were no statistically significant differences between groups and phases on Optimism.

Self-Efficacy. Figure 8 provides the visual profile plot for the group mean Self-Efficacy scores across time points.

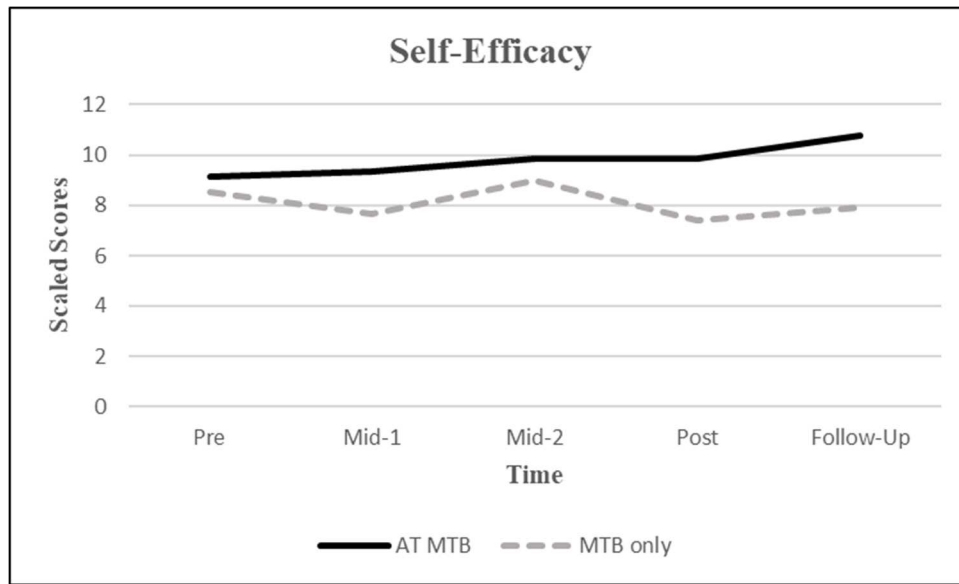


Figure 8. Visual profile for RSCA-MAS Self-Efficacy mean scores by groups

Although the visual analysis indicates differences for the three effects, I explored the statistical significance of these plots using a mixed model approach (see Table 13). Results of the analysis indicate there are no statistically significant differences between or within groups for the simple or interaction effects on Self-Efficacy. Further, each effect for Self-Efficacy resulted in small effect sizes.

Table 13

Summary Table for Self-Efficacy

	<i>df</i>	<i>F</i>	<i>p</i>	η_p^2
Group	(1, 28)	2.96	0.09	0.02
Phase	(4, 28)	1.83	0.15	0.04
Group*Phase	(4, 28)	1.32	0.29	0.03

The profile plot shows an overall difference between group scores, with both groups' scores falling within the average range for Self-Efficacy. The treatment group reported a continuous increase in Self-Efficacy from pre-test to follow-up. Whereas the comparison group reported fluctuations in Self-Efficacy scores, with follow-up scores being lower than pre-test, but still falling within the average range. Despite these observations in the profile plot, there were no statistically significant differences between groups and phases on Self-Efficacy.

Adaptability. Figure 9 provides the visual profile plot for the group mean Adaptability scores across time points.

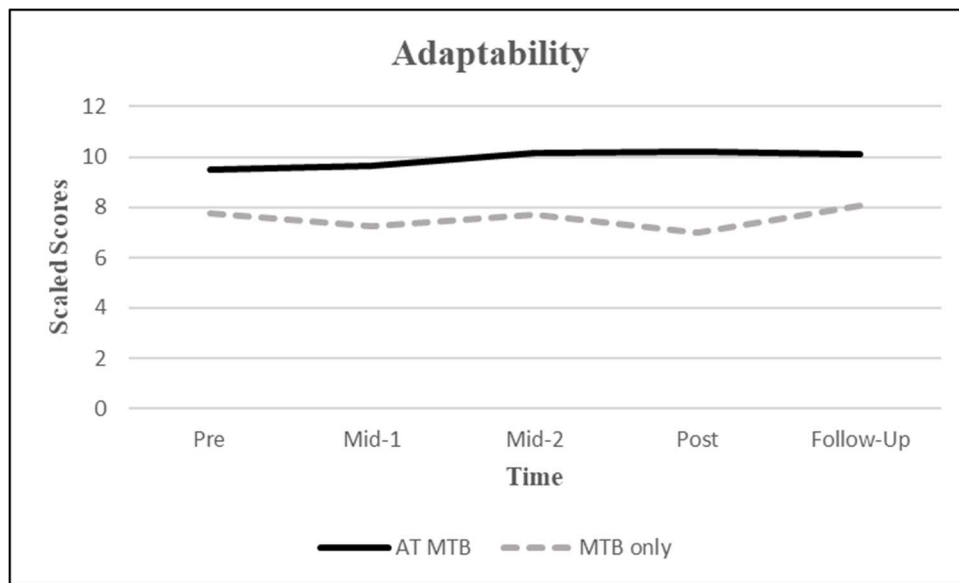


Figure 9. Visual profile for RSCA-MAS Adaptability mean scores by groups

Although the visual analysis indicates differences for the three effects, I explored the statistical significance of these plots using a mixed model approach (see Table 14). The results of the between subject test of the group effect on Adaptability were statistically significant, $F(1, 28) = 4.61, p = .04$; indicating the AT group had significantly higher scores on Adaptability compared to the MTB only group. There was not a statistically significant difference for the simple effect of time on Adaptability, $F(4, 28) = .18, p = .95$. Additionally, there was not a statistically significant difference for the interaction effect for groups over time on Adaptability, $F(4, 28) = .50, p = .74$. Further, Adaptability accounted for very little variance in the model and resulted in small effect sizes for the main effects and interaction.

Table 14
Summary Table for Adaptability

	<i>df</i>	<i>F</i>	<i>p</i>	η_p^2
Group	(1, 28)	4.61	0.04	0.03
Phase	(4, 28)	0.18	0.95	<0.01
Group*Phase	(4, 28)	0.50	0.74	0.01

The profile plot shows an overall difference between group scores, with the treatment groups' scores falling within the average range for Adaptability and the comparison group scores between below average and average scaled scores. The treatment group reported a continuous increase in Adaptability from pre-test to follow-up, with marginal differences. Whereas the comparison group reported slight fluctuations in Adaptability scores, with follow-up scores being higher than pre-test and falling within the average range. Overall, the results of the profile plots indicate relative stability in Adaptability scores between groups over time. Despite these observations in the profile plot, the difference between groups on Adaptability scores was the only statistically significant effect. There were no statistically significant differences within groups across time or between groups over time.

Total Sense of Mastery. Figure 10 provides the visual profile plot for the group mean total scores across time points.

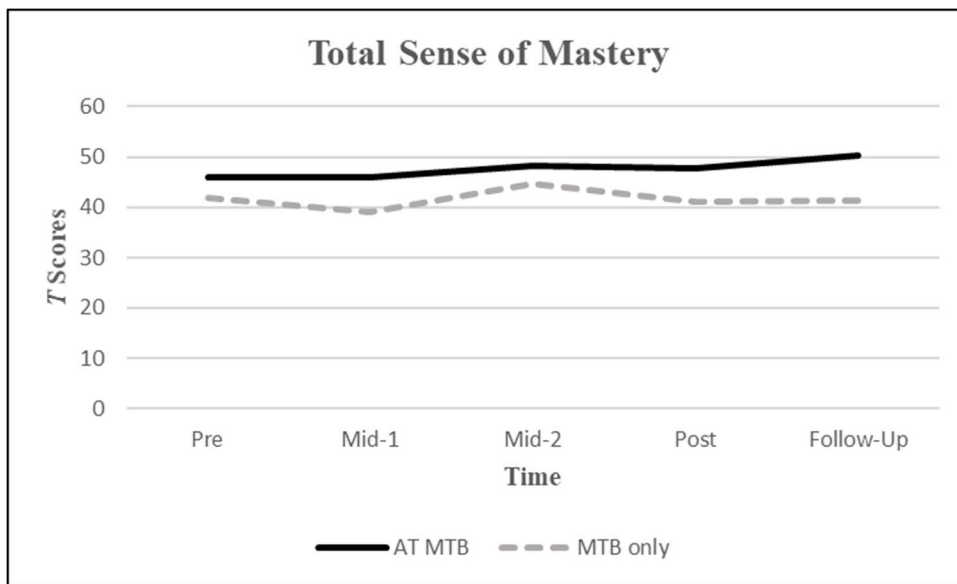


Figure 10. Visual profile for RSCA-MAS Total mean scores by groups.

Although the visual analysis indicates differences for the three effects, I explored the statistical significance of these plots using a mixed model approach (see Table 15). The results of

the analysis indicate there are no statistically significant differences between or within groups for the simple or interaction effects on total sense of mastery. Further, total sense of mastery accounted for a small amount of the variance in the model and resulted in small effect sizes.

Table 15
Summary Table for Total Sense of Mastery

	<i>df</i>	<i>F</i>	<i>p</i>	η_p^2
Group	(1, 28)	2.74	0.11	0.02
Phase	(4, 28)	1.60	0.20	0.04
Group*Phase	(4, 28)	0.57	0.69	0.01

The profile plot shows an overall difference between group scores, with the treatment groups' *T* scores falling within the average range for total sense of mastery and the comparison group *T* scores in the below average range. The treatment group reported a continuous relatively stable increase in sense of mastery from pre-test to follow-up, with initial pre-test scores falling in between the below average to average range then reaching and maintaining scores within the average range to follow-up. Whereas the comparison group reported fluctuations in total sense of mastery scores, with follow-up scores being similar to pre-test and falling within the below average range. Despite these observations in the profile plot, there were no statistically significant differences between groups and phases on total sense of mastery.

Summary

In summary, I synthesize the results presented above in relation to each research question. After answering each research question, I follow-up with the clinical and practical significance of the results. The clinical and practical significance pertains to each group and participants' scores on the *Sense of Mastery Total* score and subscales.

First Research Question

Regarding the first research question, I hypothesized there would be significant group differences between the AT MTB group from the non-AT MTB group on perception of group

climate factors over time. An initial analysis of the profile plots and means indicates there are differences between the treatment and comparison group on perception of group climate over time. However, upon further analyses, there is not a statistically significant difference between groups for a majority on the group climate variables across time points. There is a statistically significant difference within-group effect for phase on Engagement, $F(4, 28) = 3.36, p = .02$. Further, Engagement mean scores were statistically significantly different from pre to follow-up, ($t = -2.70, p = .01$); mid-1 to post, ($t = -2.47, p = .02$); mid-1 to follow-up, ($t = -3.35, p < .01$); and post to follow-up, ($t = -2.02, p = .05$). A significant interaction effect exists between groups over time on Conflict, $F(4, 28) = 3.42, p = .02$. Further exploration of the interaction effect indicated in differences between groups at post, $F(1, 28) = 5.42, p = .03$. The comparison group and treatment group on average differ by -0.92 at post on Conflict and the difference is significant ($t = -2.33, p = 0.03$).

Second Research Question

Regarding the second research question, I hypothesized there would be significant group differences between the AT MTB group from the non-AT MTB group on participants' resiliency factors over time. An initial analysis of the profile plots and means indicates there are differences between the treatment and comparison group on sense of mastery over time. However, upon further analyses, there is not a statistically significant difference between groups for a majority of the resiliency variables across time points. The only statistically significant differences between groups existed for Adaptability, $F(1, 28) = 4.61, p = .04$. The comparison group and treatment group on average differ by -2.43 and the difference is significant ($t = -2.15, p = .04$).

Clinical Significance

Counseling literature is increasingly focusing on the real-world application of research to

explore the changes participants experience as a result of an intervention (Lenz, 2020; Thompson, 2002). Although studies may not result in large effect sizes, sufficient power, or non-significant p-values due to sample restrictions, the methods and intervention employed may still have practical and clinical significance (Thompson, 2002). Therefore, there is a need to consider the practical or clinical significance of these studies and how they potentially have impacted participants' quality of life.

In order to assess the clinical significance of the mountain bike program on sense of mastery, I reviewed both treatment and comparison group composite scores on the RSCA-MAS to identify clinically significant scores. Prince-Embury (2007) has established normed cutoffs to clearly identify students who are at a significant risk of a clinical disorder (i.e., depressive, anxiety, conduct, bipolar, and nonspecific). Prior to the analysis, I converted the total raw scores into scaled scores for the subscales and *T* scores for the total sense of mastery. Table 16 provides the rankings based upon the range of scaled and *T* scores (Prince-Embury, 2007).

Table 16
RSCA-MAS Score Rankings Based on Resiliency Scaled and T Score Ranges

Ranking	Scaled Score Ranges	<i>T</i> Score Ranges
High	≥ 16	≥ 60
Above Average	13-15	56-59
Average	8-12	46-55
Below Average	5-7	41-45
Low	≤ 4	≤ 40

Total Sense of Mastery

Both groups fell into the below average range at pre-test. However, the treatment group moved to the average ranking at both mid-points, post and follow-up. The comparison group fell to low at mid-1 and returned to below average at post and follow-up. Following the suggested approach for reporting percent improvement (Lenz, 2020), there was an overall 9.41% increase

in the treatment group total sense of mastery scores from pre-test to follow-up, compared to a 1.05% decrease for the comparison group.

Prince-Embury (2007) provides further context to the clinical implications of adolescents' resiliency profiles in regard to diagnostic risks. Participant scores that fall between 40 and 45 are at risk of anxiety and conduct related disorders. Scores below 40 indicate an increased risk for bipolar and depressive disorders. Looking into the participants' reported scores, I tracked their individual changes in total sense of mastery. At pre-test, the comparison group comprised of five participants with low *T* scores, three were below average, three within average, two above average, and none at high (see Table 17).

Table 17
Comparison Group Reported Ranking Percentages by Phase

	Pre		Mid-1		Mid-2		Post		Follow-Up	
	%	n	%	n	%	n	%	n	%	n
Low	33.33%	5	53.33%	8	13.33%	2	20%	3	26.67%	4
Below Avg.	20%	3	13.33%	2	40%	6	53.33%	8	20%	3
Avg.	13.33%	2	33.33%	5	33.33%	5	20%	3	33.33%	5
Above Avg.	13.33%	2	-	-	6.67%	1	-	-	-	-
High	-	-	-	-	-	-	-	-	-	-
No Report	13.33%	2	-	-	6.67%	1	6.67%	1	13.33%	2

Note: Percentages reflect participants reported sense of mastery.

At post, the comparison group had a decrease in low scores (n=3), an increase in below average (n=8), a maintained average range (n=3), and none in the above average or high ranges. At follow-up, the scores stayed within the range of low to average, with four, three, and five participants respectively in each range. Overall, four individual participants (26.67%) reported an increase in post-test ranking from their pre-test *T* score ranking.

The treatment group had a similar breakdown as the comparison group at pre-test (see Table 18). The treatment group saw an overall increase in scores at post, with five participants still reporting in the low range, two in below average and average ranges, one in above average,

and four in the high range. At follow-up, the treatment group saw little change, with only one participant reporting a change, moving from average to above average. Overall, eight (53.33%) of the individual participants reported an increase in their ranking from their pre-test *T* score ranking.

Table 18
Treatment Group Reported Ranking Percentages by Phase

	Pre		Mid-1		Mid-2		Post		Follow-Up	
	%	n	%	n	%	n	%	n	%	n
Low	33.33%	5	46.67%	7	26.67%	4	33.33%	5	26.67%	4
Below Avg.	20%	3	6.67%	1	20%	3	13.33%	2	6.67%	1
Avg.	20.00%	3	6.67%	1	20.00%	3	13.33%	2	6.67%	1
Above Avg.	13.33%	2	13.33%	2	6.67%	1	6.67%	1	13.33%	2
High	6.67%	1	20%	3	26.67%	4	26.67%	4	26.67%	4
No Report	6.67%	1	6.67%	1	-	-	6.67%	1	13.33%	2

Note: Percentages reflect participants reported sense of mastery.

The results of these changes imply the treatment group maintained changes in resiliency scores one-month after the program's conclusion. Where the comparison group saw minimal change with similar results to pre-test scores. Although group scores changed over the course of the program, I considered the changes at post and follow-up from pre-test for participants to see what percentage of participants scores improved or declined (see Table 19).

Table 19
Participants Reported Changes in Sense of Mastery Scores

	AT MTB						MTB Only					
	Improvement			Decline			Improvement			Decline		
	n	%	range	n	%	range	n	%	range	n	%	range
Post	8	53.33	5.13-18.52%	5	33.33	2.44-21.95	8	53.33	6.38-29.41	6	40	6.38-26.32
Follow-Up	8	53.33	5.26-36.36%	4	26.67	4.08-31.71	6	40	2.13-41.18	6	40	2.38-25.53

Note: Percentages reflect change in scores from pre-test scores

Table 19 indicates both groups contained eight participants who saw an improvement in total sense of mastery scores at post when compared to pre-test. Five participants in the treatment group reported a decline in sense of mastery at post when compared to pre-test and one

participant reported no change. One participant was missing data. The treatment group maintained eight improved scores at follow-up when compared to pre-test and saw an increase in percent improved meaning participants continued to improve in scores at follow-up compared to post. Two participants were missing data at follow-up. Six of the comparison group participants reported a decline at post from their pre-test scores with one participant missing data. At follow-up, six of the comparison group participants reported improved scores compared to pre-test, and also exhibited a higher percent of improvement in range when compared to post with two participants missing data.

Sense of Mastery Subscales

The total sense of mastery scale is comprised of three subscales (i.e. Optimism, Self-Efficacy, Adaptability). The subscales also provide clinical inference when scaled as highlighted in Table 16 above. In order to explore the participants changes within the groups, I calculated the percent change in reported scaled scores at post-test and follow-up from pre-test for each participant (see Table 20). The comparison group appeared to have the most notable improvement on participant sense of Optimism at post-test and follow-up. However, the treatment group reported stability at post-test and similar levels of Optimism to the comparison group at follow-up. Six of the comparison participants moved up in Optimism ranking, where only 3 of the treatment participants improved in ranking. Most of the treatment participants (n = 9) reported no change in Optimism. Most of the comparison group participants reported deterioration or no change in Self-Efficacy scores, whereas the treatment group reported higher levels of improvement in Self-Efficacy at post-test and follow-up. In fact, seven of the treatment participants moved up in Self-Efficacy ranking compared to three of the comparison group participants. The comparison group participants were fairly split between improvement and

deterioration on Adaptability scores at post-test and follow-up, whereas the treatment group participants reported either no change or improved scores in Adaptability. Only four comparison group participants moved up in ranking for Adaptability compared to six of the treatment group participants.

Table 20
Participant Reported Changes in Subscale Scores

	AT MTB					MTB Only				
	Improvement		Decline		No Change	Improvement		Decline		No Change
	n	%	n	%	n	n	%	n	%	n
Optimism										
Post	5	33.33%	3	20%	6	8	53.33%	4	26.67%	2
Follow-Up	7	46.67%	4	26.67%	1	7	46.67%	3	20%	2
Self-Efficacy										
Post	6	40%	3	20%	5	3	20%	5	33.33%	6
Follow-Up	6	40%	3	20%	3	5	33.33%	7	46.67%	0
Adaptability										
Post	7	46.67%	3	20%	4	6	40%	8	53.33%	0
Follow-Up	4	26.67%	2	13.33%	6	4	26.67%	4	26.67%	3

Overall, based on the total sense of mastery score ranking, eleven comparison group participants still fell within the ranking (i.e. low to below average) of significant risk of meeting diagnostic criteria of a clinical disorder compared to seven of the treatment group participants. Although the comparison group saw the greatest change in Optimism scores, they also reported a larger disparity in Self-Efficacy and Adaptability when compared to the treatment group. These percentages must be interpreted with caution since they were calculated with a relatively small number of participants. However, it appears that participating in the AT mountain bike program had greater clinical significance on resiliency outcomes as indicated by the participant reported changes on total sense of mastery and subscales.

CHAPTER V

DISCUSSION

In this chapter I discuss the implications of the results presented in the previous chapter regarding the effectiveness of an AT mountain bike program as a short term, small-group, peer-based intervention. I begin by discussing a summary of the previous results, followed by the results as they relate to the research questions. I review the statistical procedures in relation to the previous literature. Next, I discuss implications for practice and future research. Then, I present the methodological implications. Last, I end the chapter by reviewing the limitations associated with the current study.

Summary of Findings

According to the findings in this study, 7th and 8th grade middle school students who participated in a mountain bike program experienced changes in their perception of group climate and factors of resiliency. More specifically, participants who engaged in the AT mountain bike program differed from those who participated in the mountain bike only program. Although these effects are visually present, it is important to note the effects between group and phase differences were not statistically significant for a majority of the variables. In fact, the only variable found to be statistically significantly different between groups over time was on the perception of group conflict at the end of the program (post). Additionally, the only statistically significant difference between groups was on adaptability and within group phase differences on engagement (see Table 21).

Table 21
Summary of Findings

	Group	Phase	Group*Phase
Engagement	0.01 (<0.01)	3.36* (0.08)	0.24 (<0.01)
Conflict	2.28 (0.02)	1.32 (0.03)	3.42* (0.08)
Avoidance	0.2 (<0.01)	1.56 (0.04)	0.78 (0.02)
Optimism	0.9 (<0.01)	2.56 (0.06)	0.77 (0.02)
Self-Efficacy	2.96 (0.02)	1.83 (0.04)	1.32 (0.03)
Adaptability	4.61* (0.03)	0.18 (<0.01)	0.5 (0.01)
Total	2.74 (0.02)	1.6 (0.04)	0.69 (0.01)

Note: Statistically significant results are indicated by “*” and bolded; η_p^2 are in parentheses.

First Research Question

My first research question sought to explore how participating in a mountain bike program impacted students’ perception of the group factors between the two groups over the course of the program and at one-month follow-up. I hypothesized the treatment group, a mountain bike program with a formalized psychotherapeutic processing component, would have statistically higher scores of Engagement while exhibiting lower perceived Conflict and Avoidance as the group develops compared to the comparison group. Further, the Engagement scores would continuously increase, while Conflict scores would follow previously observed and reported trends of increasing and then decreasing, and Avoidance scores would drop over the course of the group.

A visual inspection of the group means indicated a difference in perceptions of group climate on Engagement, Conflict, and Avoidance with the treatment group reporting overall higher perceptions of group factors. Further statistical analysis indicated there were no significant differences between the groups on any of the group climate measures. The results of the statistical analysis are contrary to my hypothesis. Although I hypothesized the treatment group would result in higher Engagement scores, I hypothesized the treatment group would have lower scores compared to the comparison group on Conflict and Avoidance.

Engagement. The reported Engagement scores for both groups remained relatively stable until follow-up, where the treatment group scores continue to increase even after the intervention has been removed. However, despite this increase there were no statistically significant difference between the groups over time. Interestingly, without the group factor, the results indicate the changes in phases had a significant effect on reported Engagement scores. Comparing these findings to prior literature reveal similar trends among the group climate variables. Engagement, which has been cited as a similar construct to group cohesion, is an influential factor to AT group development and functioning (Bringman et al., 2007; Christian et al., 2019; Clem et al., 2012; Glass, 2008). Individuals participating in physical or AT group activities often report higher levels of engagement or sense of cohesion among members (Kleinstäuber et al., 2017; Luttenberger et al., 2015; Sutherland & Stroot, 2010; Widmer et al., 2014).

Despite there not being statistically significant differences between the groups, both groups reported an overall increase in Engagement over the duration of the program. Further, there is a statistically significant difference between follow-up scores from the pre and mid-1 points. The shared increase and lack of statistical difference between groups is supported by prior findings (Burke et al., 2014; Elbe et al., 2016; McLaren et al., 2017). Burke et al. (2014) characterized engagement or group cohesion by participants' affiliation with a group that shares common social interests and goals defined by participants' perceptions of the group task. Therefore, there is an increase in engagement when the group aligns on both social and goal dimensions. In terms of this study, both the intervention and comparison groups participated in an activity of shared interest and although the goals of the two groups differed, the within group goals were shared. Both groups inevitably required group members to communicate and

cooperate to manage the goals defined by the groups, thus likely enhancing group engagement for both (Glass & Benshoff, 2002).

Conflict. Interestingly, overall Conflict scores were low for both groups which is consistent with the results of Christian et al.'s (2019) study. Further, the visual analyses and statistical difference in scores at post for perceived Conflict between groups was higher for the treatment group. Although I hypothesized the treatment group to have lower scores than the comparison, the findings are consistent with current literature results highlighting an increase in Conflict scores among psychotherapy groups (Johnson, 2013). In fact, conflict might not be detrimental, but rather supportive of group outcomes depending on the group's objectives. Yalom and Leszcz (2020) allude to conflict being a necessary and integral part of the group experience that challenges the group to process and develop resolutions to successfully navigate the group process. Based upon the overall low scores of Conflict, the treatment group maintained their perceived level of Conflict, while the comparison group's level of conflict dropped, highlighting both groups' apparent attempt to avoid conflict. Developmentally, Bandura (1977) supported perceived avoidance of conflict as adolescents rely upon peers for feedback to inform their behaviors in order to be accepted by the group. Engaging in conflict has the potential to lead to the creation of cliques and individual's becoming an outcast, so to avoid rejection its likely participants avoided conflict.

Avoidance. There was not a statistically significant difference between groups over the duration of the group on avoidance. A visual review of group means indicates the groups remained relatively stable over the course of the program with a minimal increase in avoidance until post. However, an interesting finding is that both groups reported higher levels of perceived avoidance compared to the prior two scales. Prior researchers suggested adolescents tend to have

higher levels of avoidance when interacting with peers (Bandura, 1977). Group work researchers have highlighted that as the group progresses, and engagement increases, avoidance tends to decrease (Christian et al., 2019). However, theoretically, although avoidance may be perceived as a maladaptive behavior, it is also cited among research as an adaptive characteristic to promote coping and self-preservation especially when a stimuli provokes the participant's anxiety response (Hoffman & Hay, 2018). One form of avoidance is characterized by disengagement. Hoffman and Hay (2018) stated that "disengagement coping is often emotion-focused, because it includes attempts to avoid the unpleasant feelings associated with the threat, such as through escape, denial, and distancing" (p. 18). Therefore, from this theoretical perspective higher levels of avoidance align with participants engaging in a high-risk physical activity where participants face challenging and threatening tasks with real and perceived risks. Participants are encouraged and empowered to behave in a safe manner with consideration for self and others. The treatment group AT concepts that promote participants assessing their levels of comfort and ability to engage in the activity while abiding by the group norms that promote safety, respect, care for self and others is a primary example. However, it is imperative that the results of this study are approached with caution and consider the item measures due to its psychometric properties.

Similar to prior reliability results (Johnson, 2013; Johnson, et al., 2006; Young et al., 2013), Avoidance has psychometric limitations which require further consideration of the items. The three items being considered are stated as: (3) "The members avoided looking at important issues going on between themselves"; (5) "The members depended upon the group leader(s) for direction"; (9) "The members appeared to do things the way they thought would be acceptable to the group". According to the reliability results, item 3 was uncorrelated to items 5 and 9, and

items 5 and 9 were moderately positively correlated. Looking at participant responses, item 3 responses averaged in the “somewhat” avoidant, where items 5 and 9 averaged between “moderately” and “quite a bit” for both groups. Due to the nature of the program and activity, higher scores on item 5 are appropriate. The participants had to rely upon instruction to learn skills and attend to safety and risk management due to the high-risk nature of injury in mountain biking. Item 9 highlights a potential limitation in the item readability. The interpretation of item 9 might be perceived as a positive or negative connotation, which could emphasize group participants’ desires to conform or choices to abide by program rules or AT concepts (i.e. full value contract) to promote group safety.

The results of this study reflect an interesting finding in regards to avoidance. Upon further exploration and interpretation of the items and how the construct of avoidance is measured, it appears participating in a higher risk activity and program infused with instructional components might not accurately reflect participant avoidance, as measured by the GCG-S. Rather, participants who may appear and report “higher” avoidance are potentially engaging with the curriculum and activity in order to learn and practice risk management and safety harmoniously with the group.

Second Research Question

My second research question sought to explore how participating in a mountain bike program impacted students’ perception of resiliency factors between the two groups over the course of the program and at one-month follow-up. I hypothesized the treatment group, a mountain bike program with a formalized psychotherapeutic processing component, would have statistically higher scores of resiliency (i.e. Optimism, Self-Efficacy, Adaptability) that would result in an overall higher score of Sense of Mastery from the comparison group.

Optimism. Although there were no statistically significant differences between the groups over time on Optimism, the treatment group reported higher levels of Optimism and maintained throughout the program, where the comparison group participants reported improvement in Optimism scores. The clinical significance of this result suggests that engaging in a physical activity alone may improve levels of Optimism, however by engaging in an AT program with the psychotherapeutic process empowers group participants to reflect and identify strengths to foster, maintain, and increase their level of Optimism.

Optimism has long been associated with psychological and mental health phenomena, such as decrease in symptoms of depression, anxiety, and suicidal ideation; instillation of hope, meaning, and purpose as well as improved physical well-being and pursuit of an active lifestyle (Carver et al., 2010; Conversano et al., 2010; Gillham & Reivich, 2004). Interestingly, although high levels of optimism are considered an adaptive coping mechanism, unrealistic optimism can lead to involvement in high risk activity, lower levels of avoidance, and higher levels of engagement in risky behaviors (Carver et al., 2010; Conversano et al., 2010). This engagement is related to the self-perception of invulnerability. However, researchers universally agree optimism is primarily deemed a protective factor (Short & Russell-Mayhew, 2009; Sirkorska, 2017). Similar to prior research, AT programs have provided participants opportunities to recognize their strengths, foster optimism, and overcome challenges related to AT activities (Stevens et al., 2004). Children and adolescents' optimism is stimulated by successfully engaging in challenging physical activities, highlighting problem-solving as a foundational component of AT (Reivich et al., 2013; Gillham & Reivich, 2004; Sirkorska, 2017). Additionally, goal setting, a core value to establishing group norms in AT, is a necessary component to establishing optimism or 'hopefulness' (Gillham & Reivich, 2004).

Self-Efficacy. Although there were no statistically significant differences between groups over time on Self-Efficacy, the treatment group had similar scores at pre-test to the comparison group and saw a steady increase in Self-Efficacy throughout the program. Further, treatment group participants saw a greater increase in individual scores compared to comparison group participants. The comparison group reported varying average scores throughout the course of the program and reported an overall decline in Self-Efficacy at follow-up.

Self-Efficacy is a highly researched outcome by AT researchers (Clem et al., 2012; Cordle et al., 2016; Beightol et al., 2012; Davis-Berman & Berman, 1994; Deane et al., 2017; Furness, 2017; Margalit & Ben-Ari, 2014; Mutz & Müller, 2016; Mygind et al., 2019; Richmond et al., 2018; Widmer et al., 2014). Consensus among AT researchers is that participating in an AT program has a positive impact on participant's self-efficacy. Further, participants who engage in kinesthetic activities have shown to improve in self-efficacy (Powrie et al., 2015). However, I did not find any literature that specifically reported the results comparing an AT program to a solely kinesthetic activity. Therefore, these findings are relatively novel to exploring the different effects of AT components beyond the kinesthetic activity alone on participant self-efficacy.

Adaptability. There was an overall difference in reported Adaptability scores between groups, however this effect was not significant over time. The treatment group reported statistically significant higher scores of Adaptability than the comparison group. The treatment group shows a slight increase in scores that remain relatively stable over the course of the group, whereas the comparison group reported slight variations in their Adaptability scores over time. Adaptability is often associated with resiliency in literature and difficult to partition out from resiliency. However, previous theoretical literature (Allan et al., 2012; Booth & Neill, 2017;

Kemp & McCarron, 1998) and empirical research (Blakenship, 2019; Hinds et al., 2008; Opper et al., 2014) related to the effects of AT on adaptability have reported similar findings. Opper et al. (2014) reported early-adolescents participating in an outdoor adventure education program demonstrated an increase in adaptability at post and follow-up from pre-test scores, indicating participants engaging in an outdoor adventure education program not only increased in adaptability but were able to sustain this characteristic. Hinds et al. (2008) provided an applicable comparison to the current study as they similarly measured adaptability between a treatment and control group across four time points with adolescents using a teen leadership and experiential activity program. Results of their study reflect an overall difference between group scores on adaptability, with the treatment group outperforming the control group (Hinds et al., 2008). Further, the treatment group reported scores continued to increase, while the control group scores varied and remained relatively unchanged. The results indicate participants engaging in an AT program report an increased ability to adapt and respond to change to effectively problem-solve. Therefore, there is evidence for the inclusion of AT programs in schools to support students in developing and maintaining effective problem-solving skills and learning how to adapt to the challenges faced in the middle school environment.

Sense of Mastery. Despite the visual inspection of means indicating group differences in scores over time, there were no statistically significant differences between groups over time on total Sense of Mastery. The treatment group was characterized by a relatively stable subtle increase over the duration of the group, while the comparison group varied. Sense of Mastery is a global scale and considered the most recognized by experts as a core characteristic of resiliency in children and adults (Prince-Embury, 2007). A Sense of Mastery provides adolescents the opportunity for them to interact with and enjoy the cause and effect of relationships in the

environment. Therefore, I use this scale interchangeably to reflect participants' resiliency. There is an abundance of AT literature reporting the effects of AT on participants' resiliency, and in many cases combined or used interchangeably with self-efficacy (Beightol et al., 2012; Bowen & Neill; 2013; Koni et al., 2019; Furness, 2017; Mygind et al., 2019; Scarf et al., 2017). Consensus among these studies is by participating in an outdoor or adventure program, participants improved in resiliency. In several of these studies, the researchers utilized control groups to find support that although both groups experienced increased resilience, the increase was consistent and higher for the treatment group (Koni et al., 2019; Scarf et al., 2017). Further, increased accessibility to and engagement with nature has been shown to be associated with increased resiliency (Chawla, et al., 2014; Malberg et al., 2018) and engaging in leisure or kinesthetic activities (Chapple et al., 2018; Clough et al., 2016; Kelly 2019). The results of the current study align with that of prior literature, both groups experienced positive impacts on resiliency, but participants in the AT program on average reported a continued increase and overall improvement in resiliency.

Subjective Evaluations

Before discussing the implications this study has for research and future practice, it would be worthwhile to explore the participants' subjective evaluations of the impact and reported experience the AT program and MTB Only program had on participants. As part of the instrument administration, participants completed an open-response questionnaire regarding their experiences at four of the five time points. They did not complete a questionnaire at Mid-2. Additionally, I maintained a weekly journal of the group sessions including what I observed and participant's reported in session.

Prior to the program, participants reported their motivation to participate in the program. A majority identified learning how to mountain bike and develop new skills as their primary motivation, several others indicated wanting to try new things, develop new friendships and social skills, build confidence, exercise and be outdoors. Participants reported their anticipated benefits of the program impacting their ability to focus, be more physically active and healthy, relieve stress, and increase access to nature or engagement with nature. As the program continued, several of the program outcomes were highlighted by the participants' responses including factors related to EcoWellness. Of the *GCQ-S* factors, Engagement or Cohesion, was among the most prevalent. For Resiliency, all three subscales appeared to be present. In terms of EcoWellness factors, responses emphasized *Physical Access*, *Sensory Access*, *Connection*, and *Community Connectedness*.

Participants reported building deeper more meaningful relationships, emphasizing participant engagement or cohesion among group members: "It's helped me make new friends."; "With COVID, it's made it hard to interact with my friends, but this program has helped me meet new people". Participants reported an increased connection and awareness to nature: "I've been able to be outside more."; "It's heightened my senses and awareness to things outside."; "I'm spending more time outside than inside on my phone."; "I think having a reason to get out and move has helped me focus". In terms of resiliency outcomes, participants reported: "I'm going to try it because I believe in myself."; "If you don't try and fail, then you won't learn, and I want to get better."; "It's given me more courage."; "This program has led to better focus in classes. It has helped raise my awareness of my surroundings, and in a way is a break for my brain, so I feel like I'm able to follow tasks easier". Overall, participants who participated in the treatment group reported more themes related to the outcomes and AT, such as challenge-by-

choice, level of comfort, and values compared to comparison group participants who reported more on bike safety and component knowledge.

Implications

This study sought to explore the effects of developing an AT program centered around a specific kinesthetic activity on group and individual participant outcomes. According to my literature review, this is one of the few studies that focuses on a specific kinesthetic activity, particularly mountain biking from an AT perspective. Additionally, this study informs research and clinical application for the development of an AT program with middle school students in a school setting.

Clinical

The outcomes of this program provide clinical and practical significance to inform the field of counseling and further the development of AT practices. First, the results of this study and additional information provides insight regarding client outcomes and application with a middle school aged population. As noted earlier in this manuscript, there is limited research inclusive of the effectiveness of licensed mental health professionals in schools (Lambie et al., 2019; Sanchez et al., 2018). Further, this study offers perspective for AT practitioners designing AT programs around a specific kinesthetic activity and practitioners desiring to integrate therapy into the school setting.

Clients

The results of the program indicate that participants who engaged in an AT program increased in perceived engagement, which is associated with group cohesion or connectedness. Further, by participating in an AT program resiliency outcomes tend to be maintained or enhanced even sustained after the program has concluded. It is evident from the individual

reported changes in scores and subjective reports, participating in an AT program aids in the maintenance and/or increase in adaptive outcomes that support middle school social and personal development. It is worth noting, participants who participated in the kinesthetic activity alone also reported improvements and only varied on several outcomes from the AT program. However, their individual reports varied, with more improvement in optimism scores than self-efficacy and adaptability. Also, by engaging in the mountain bike program both groups of participants learned mountain bike skills, bike maintenance and safety, and reported an increased focus and academic support.

AT Practitioners

Practitioners will benefit from having a theoretical blueprint to designing a program with a specific kinesthetic activity. This theoretical model and session template can provide purpose and intentionality towards program and participant outcomes. For example, the inclusion of EcoWellness factors were incorporated and facilitated during sessions and activities to enhance the participants processes in the AT program. Additionally, this study provides support for the effects of an AT program and adds to the research base pushing for AT to eventually become an evidenced-based practice. Finally, while this study sought to distinguish an AT mountain biking program from a non-AT mountain biking program, results did not support this distinction or provide clear evidence or explanation for any differences. However, results indicating improvement in both groups on a variety of the variables might actually be a positive for students. Specifically, while many/most schools have School Counselors, a majority likely have not been trained in AT. Based on the results of this student, these schools might consider utilizing physical education teachers to provide structured activities, like mountain biking, that appear to have the potential to increase important personal characteristics such as resiliency.

Counselor Education

This study also provides context to the development and training of future counselors and AT practitioners. As the counseling field continues to grow and AT continues to emerge as a popular and effective intervention, there is a need for AT curriculum in counselor training programs. This training would help support the development of school counselors and school-based mental health counselors to coordinate and co-facilitate with physical education teachers the implementation of AT programs centered on structured activities.

Training

The results of this program can inform counselors in training or current professionals interested in receiving certification on the effects of developing a program from an AT perspective. According to AEE (2020) certification standards, AT practitioners are knowledgeable in organizational oversight (i.e., risk management, activity protocols), licensure/certification, and professional training in the core elements of AT. The core elements include AT technical skills, facilitation and processing, organizational and administrative processes, conceptual knowledge, building therapeutic alliance, assessment, interventions, therapeutic monitoring, documentation, professionalism, and socio-cultural/environmental considerations. The current program incorporates each of these core areas and provides insight on how these core elements are addressed in the AT program.

Supervision

Additionally, the Certified Clinical Adventure Therapist credential requires 300 hours of supervised AT specific experience along with 50 hours of supervision (AEE, 2020). Supervisors can model, recreate, or use the findings of this program to illustrate supervisee expectations, how change occurs, and how to measure participants' outcomes through the identified core elements.

Therefore, supervisors can use this program as a template to adapt to their program needs, identify program goals and outcomes, align with a theoretical framework, and integrate assessments to measure outcomes.

Research

I have identified a number of implications concerning future research. Anecdotally, it is apparent that a program can be successfully designed and implemented in the school setting without disrupting the student's academics, but instead enhancing student's academic ability to focus. Further studies are needed to explore the integration of similar programs and consider the selection of the activity on outcomes. It would benefit the AT field by continuing to examine the different or similar mechanisms of change between AT and physical education and/or recreational programs. Researchers could use a similar design as employed in this study, but add a control group to more confidently determine the effectiveness of these adventure-based programs and distinguish if and how AT enhances outcomes beyond the benefits of physical education and/or recreational programs. Qualitative research exploring participant's perceived mental and physical benefits and risks associated with an activity would also be helpful in better understanding the similarities and differences between AT and physical education and/or recreational programs.

Although this study collected participant demographics, it did not explore the effects of these variables on participant outcomes due to sample size limitations. It would be advantageous to incorporate this information in future research to explore the effects for different, potentially marginalized populations such as, socioeconomic status, academic learning accommodations, female and non-binary participants, and non-white participants. As discussed in the literature review, biking is among the top activities across SES and racial groups, therefore this program

can be adapted to lower SES and urban areas to promote road readiness and safety. Further, because of the utility of biking in these environments (i.e., biking has health, recreation/leisure, and transportation potential), future researchers should consider exploring benefits of bike programs beyond health and leisure, such as their potential to provide transportation and access to education and employment.

This study highlighted aforementioned limitations of the application of the *GCQ-S* and avoidance scale. Additional research in AT and group work can explore the effect different types of groups, programs, and activities have on Engagement, Conflict, and Avoidance scales. Future research using this instrument may want to explore the Avoidance scale and how respondents respond from an item-response theory perspective.

The mixed model procedure is a useful tool to test and estimate means, compare models, estimate the variance-covariance matrix, and produce visual plots of means and repeated measures, making it easily replicable for future research, especially for practitioners in the school setting. While this methodology was appropriate to answer the research questions of this pilot study, future research can address some of the shortcomings of the current methods, such as order effects, carry-over effects, and limited sample size and enough power to assess smaller effects. Additionally, the approach to this study can be used to inform and develop future research questions and hypotheses that examine individual effects alone or in addition to group effects. To examine individual differences or effects, I would suggest future academic researchers consider a single-case research design to explore individual effects or a growth curve analysis to explore the individual and group-level effects.

Limitations

In an attempt to control for extraneous variables, I utilized randomized group assignment, a time-series design, and a control/comparison group. However, certain limitations continue to

be evident. Specifically, issues regarding setting, sample, and use of self-report instruments are limitations of this study.

The lack of statistical evidence does not support my research hypotheses. This lack of statistically significant results can be the result of several things. First, I specified the least restrictive covariance structure (i.e. unstructured) in my mixed model analysis which estimates additional parameters lowering the overall power by increasing the degrees of freedom error. Additionally, as a result of extraneous variables, I lost my control group of participants that were dissolved into my treatment and comparison group. Therefore, I am unable to determine if the AT program or mountain biking alone were effective interventions beyond traditional school counseling supports. This loss in control group also resulted in having a lower sample size. It would be beneficial to increase the sample sizes by running additional groups and potentially implementing the program at other schools to enhance the generalizability of this study.

The COVID-19 pandemic greatly impacted the recruitment, delivery, schedule, risk and safety, along with intrapersonal factors related to this study. As a result of the pandemic, the school administration elected for the delivery of classes to be remote, hybrid, and limited traditional. Therefore, a majority of students initially recruited elected to opt out of participating in the program and a significant portion of students attended classes remotely. This affected student attendance and scheduling. The program started 3 weeks after the intended start date and was altered because of the school schedule. Further, when staff or students came in contact with or tested positive for the virus, they were quarantined for 2 weeks. Four weeks into the program the school mandated a shutdown, which resulted in a halt to the program for a total of 3 weeks and students were instructed remotely. The pandemic overall created significant disruptions to the program in terms of delivery, it also created higher concern for safety and risk of exposure so

students were mandated to wear masks and social distance which would possibly affect group engagement.

Somewhat related to the pandemic, my initial sample size was adequate, although relatively small and only representative of middle school students at a regional arts charter school in northwest Arkansas. Compared to other AT studies, the sample was diverse with a higher representation of female, non-binary, Latinx, and multiracial students.

The group design and implementation has several complications beyond those presented by the pandemic. First, the researcher co-leading both groups might have impacted how the groups were facilitated. More specifically, because I have extensive AT training, and one of the goals of AT is to internalize concepts such as challenge-by-choice, the full value contract, and the experiential learning model, those concepts might have inadvertently seeped into the control group simply by me acting like my authentic self. To control for this bias, I kept a session journal with observations of the groups, my subjective interpretations, and how I interacted with the groups. I also meet weekly with a trained AT supervisor to discuss the weekly AT groups who provided feedback and advice on how to maintain treatment fidelity by attempting to compartmentalize my authentic self while leading the comparison group. Additionally, over time the co-facilitator started to adopt/internalize and include therapeutic language when working with the comparison group, inadvertently leading to some group processing as well as including some AT components such as norms and comfort zones. Second, weather would cause a disruption in planned activities, resulting in adapting the program and activity for the session. The protocol has been updated to reflect the session activities and processing prompts to enhance the transparency of this study (see Appendix E).

Lastly, the use of self-report assessments using Qualtrics, an electronic survey platform, presented several complications. Some participants either did not respond, had difficulty accessing the assessments, or submitted multiple assessments at a given data point. Further, while participants were to be provided a secluded space and monitored by the school counselor to accurately and honestly respond or receive support in answering questions based on student accommodations, it was difficult for the school counselor to locate or contact students due to the altered class schedule, space availability, and other required responsibilities. Participants' interpretation of instrument items are a potential limitation as several students verbalized confusion and ambiguity with the phrasing of items. This is also highlighted by the potential misinterpretation of the Avoidance scale items or how the scale is constructed and potentially unsuitable for use with a high-risk activity.

Conclusion

Based on a review of the current literature, it appears that this is the first pilot study to use an experimental design to examine the impact of a mountain bike specific program from an AT perspective on group climate and resiliency factors of middle school students. I have taken a step towards answering the request for further outcome research from practitioner or fieldwork perspective in the field of school-based counseling and AT. Results of the statistical analyses estimated effect sizes, and measures of clinical significance are good initial indicators that AT might be an effective short-term, small-group, peer-based intervention that AT practitioners can utilize in a school setting to enhance the development and transitional adjustment of students. Using suggestions from this study, future research is warranted to better understand the impact AT has on adolescence.

REFERENCES

- Adelman, H. S., & Taylor, L. (2010). *Mental health in schools: Engaging learners, preventing problems, and improving schools*. Thousand Oaks, CA: Corwin Press.
- Akos, P., Rose, R., & Orthner, D. (2015). Sociodemographic moderators of middle school transition effects on academic achievement. *Journal of Early Adolescence*, 35(2), 170-198. doi:10.1177/0272431614529367
- Allan, J. F., McKenna, J., & Hind, K. (2012). Brain resilience: Shedding light into the black box of adventure processes. *Journal of Outdoor and Environmental Education*, 16(1), 3-14. <https://doi.org/10.1007/BF03400934>
- Alvarez, A. G., & Stauffer, G. A. (2001). Musings on adventure therapy. *Journal of Experiential Education*, 24(2), 85-91. <https://doi.org/10.1177/105382590102400205>
- Antonelli, M., Barbieri, G., & Donelli, D. (2019). Effects of forest bathing (shinrin-yoku) on levels of cortisol as a stress biomarker: A systematic review and meta-analysis. *International Journal of Biometeorology*, 63(8), 1117-1134. doi:10.1007/s00484-019-01717-x
- Arkansas Special Nutrition Program. (2020, December 18). *National school lunch program*. <https://dhs.arkansas.gov/dcece/snp/NSLPInfoM.aspx>
- Association for Experiential Education. (2020). *Certification credentialing manual* (1st ed.). Retrieved from <https://aee.memberclicks.net/assets/Certification-AT/AEE%20Certification%20Credentialing%20Manual%201st%20Edition.pdf>
- Atkins, M., Hoagwood, K. E., Kutash, K., & Seidman, E. (2010). Toward the integration of education and mental health in schools. *Administration and Policy in Mental Health*, 37, 40-47.
- Auger, R. W. (2011). *The school counselor's mental health sourcebook: Strategies to help students succeed*. Thousand Oaks, CA: Corwin Press.
- Bacon, S. (1983). *The conscious use of metaphor in Outward Bound*. Denver, CO: Outward Bound.
- Bandoroff, S., & Newes, S. (Eds.). (2006). *Coming of age: The evolving field of adventure therapy*. Boulder, CO: Association of Experiential Education.
- Bandoroff, S., & Scherer, D. G. (1994). Wilderness family therapy: An innovative treatment approach for problem youth. *Journal of Child and Family Studies*, 3(2), 175-191.
- Bandura, A. (1977). *Social learning theory*. Prentice Hall.

- Bandura, A. (1988). Self-efficacy conception of anxiety. *Anxiety Research*, 1(2), 77-98. doi:10.1080/10615808808248222
- Becker, S. P. (2010). Wilderness therapy: Ethical considerations for mental health professionals. *Child & Youth Care Forum*, 39(1), 47-61. doi:10.1007/s10566-009-9085-7
- Becker, K. D., Buckingham, S. L., & Brandt, N. E. (2015). Engaging youth and families in school mental health services. *Child and Adolescent Psychiatric Clinics of North America*, 24(2), 385-398. doi: dx.doi.org/10.1016/j.chc.2014.11.002
- Beightol, J., Jeverson, J., Carter, S., Gray, S., & Gass, M. (2012). Adventure education and resilience enhancement. *The Journal of Experiential Education*, 35(2), 307-325. <https://doi.org/10.1177/105382591203500203>
- Berman, D., & Davis-Berman, J. (2013). The role of therapeutic adventure in meeting the mental health needs of children and adolescents: Finding a niche in the health care systems of the united states and the united kingdom. *Journal of Experiential Education*, 36(1), 51-64. doi:10.1177/1053825913481581
- Bettmann, J. E., Freeman, P. C., & Parry, K. J. (2015). Differences between adopted and nonadopted adolescents in wilderness and residential treatment. *Journal of Experiential Education*, 38(3), 245-261. doi:10.1177/1053825915569056
- Bidell, M. P. (2010). Can nature heal?: The impact of adventure-based counseling for gay/bisexual men living with HIV/AIDS. *Counseling Outcome Research and Evaluation*, 1(2), 68-79.
- Bitsko, R., Holbrook, J., Ghandour, R., Blumberg, S., Visser, S., Perou, R., & Walkup, J. (2018). Epidemiology and impact of health care provider-diagnosed anxiety and depression among US children. *Journal of Developmental and Behavioral Pediatrics*, 39(5), 395-403. doi:10.1097/DBP.0000000000000571
- Blankenship, C. A. (2019). Wilderness and Adventure Immersion Therapy. In: Laszloffy T., Twist M. (Eds.), *Eco-Informed Practice. AFTA SpringerBriefs in Family Therapy*. Springer, Cham. https://doi.org/10.1007/978-3-030-14954-3_7
- Booth, J. W., & Neill, J. T. (2017). Coping strategies and the development of psychological resilience. *Journal of Outdoor and Environmental Education*, 20(1), 47. <https://doi.org/10.1007/BF03401002>
- Bowen, D. J., & Neill, J. T. (2013). A meta-analysis of adventure therapy outcomes and moderators. *The Open Psychology Journal*, 6(1). <https://doi.org/10.2174/1874350120130802001>
- Bowen, D. J., Neill, J. T., & Crisp, S. J. (2016). Wilderness adventure therapy effects on the mental health of youth participants. *Evaluation and program planning*, 58, 49-59.

- Brass, N., McKellar, S., North, E., & Ryan, A. (2019). Early adolescents' adjustment at school: A fresh look at grade and gender differences. *Journal of Early Adolescence*, 39(5), 689-716. doi:10.1177/0272431618791291
- Brigman, G. A., Webb, L. D., & Campbell, C. (2007). Building Skills for School Success: Improving the Academic and Social Competence of Students. *Professional School Counseling*, 10(3), 279-288. doi:10.1177/2156759X0701000310
- Bringewatt, E., & Gershoff, E. (2010). Falling through the cracks: Gaps and barriers in the mental health system for America's disadvantaged children. *Child Youth Services Review*, 32, 1291-1299. doi:10.1016/j.chilcyouth.2010.04.021
- Buckley, R., Brough, P., & Westaway, D. (2018). Bringing outdoor therapies into mainstream mental health. *Frontiers in Public Health*, 6, 119. doi:10.3389/fpubh.2018.00119
- Burke, S. M., Davies, K. M., & Carron, A. V. (2014). Group cohesion in sport and exercise settings. *Group dynamics in exercise and sport psychology*, 2, 147-163. <https://doi.org/10.4324/9780203794937-9>
- Camasso, M. J., & Jagannathan, R. (2018). Improving academic outcomes in poor urban schools through nature-based learning. *Cambridge Journal of Education*, 48(2), 263-277. doi:10.1080/0305764X.2017.1324020
- Carver, C. S., Scheier, M. F., & Segerstrom, S. C. (2010). Optimism. *Clinical psychology review*, 30(7), 879-889. <https://doi.org/10.1016/j.cpr.2010.01.006>
- Center for Disease Control and Prevention. (2013). *Mental health surveillance among children - United States, 2005-2011*. Retrieved from https://www.cdc.gov/mmwr/preview/mmwrhtml/su6202a1.htm?s_cid=su6202a1_w
- Center for Disease Control and Prevention. (2015). *10 leading causes of death, United States*. Retrieved from <https://webappa.cdc.gov/cgi-bin/broker.exe>
- Center for Disease Control and Prevention. (2017). *Rural health policy briefs: Access to mental health services for children in rural areas*. Retrieved from https://www.cdc.gov/ruralhealth/docs/Rural_Childrens_Mental_Brief.pdf
- Center for Disease Control and Prevention. (2019). *Data and statistics on children's mental health*. Retrieved from <https://www.cdc.gov/childrensmentalhealth/data.html>
- Chapple N, Smith J, Wood N, Vallesi S and Wood L. (2018). *Trials to trails: Engaging at-risk young people through mountain biking*. School of Population and Global Health, The University of Western Australia. Perth, Western Australia.

- Chawla, L., Keena, K., Pevec, I., & Stanley, E. (2014). Green schoolyards as havens from stress and resources for resilience in childhood and adolescence. *Health & Place*, 28, 1-13. doi:10.1016/j.healthplace.2014.03.001
- Christian, D. D., & Brown, C. L. (2018). Recommendations for the role and responsibilities of school-based mental health counselors. *Journal of School-Based Counseling Policy and Evaluation*, 1, 26-39. Retrieved from https://www.umass.edu/schoolcounseling/JSCPE_cissue.php
- Christian, D. D., Brown, C. L., & Portrie-Bethke, T. L. (2019). Group climate and development in adventure therapy: An exploratory study. *Journal for Specialists in Group Work*, 44(1), 25. doi:10.1080/01933922.2018.1561776
- Christian, D. D., Perryman, K. L., & Portrie-Bethke, T. L. (2017). Improving the parent-adolescent relationship with adventure-based counseling: An Adlerian perspective. *Journal of Child and Adolescent Counseling*, 3(1), 44–58.
- Clem, J. M., Smith, T. E., & Richards, K. V. (2012). Effects of a low-element challenge course on abstinence self-efficacy and group cohesion. *Research on Social Work Practice*, 22(2), 151-158. doi:10.1177/1049731511423672
- Clough, P., Houge Mackenzie, S., Mallabon, L., & Brymer, E. (2016). Adventurous physical activity environments: A mainstream intervention for mental health. *Sports Medicine (Auckland)*, 46(7), 963-968. <https://doi.org/10.1007/s40279-016-0503-3>
- Coelho, V.A., Marchante, M. & Jimerson, S.R. (2017). Promoting a positive middle school transition: A randomized-controlled treatment study examining self-concept and self-esteem. *Journal of Youth and Adolescence*, 46, 558–569. <https://doi.org/10.1007/s10964-016-0510-6>
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. Lawrence Erlbaum Associates. Hillsdale, New Jersey.
- Constantine, N. A., & Bernard, B. (2001). California healthy kids survey resilience assessment module: Technical report. *Journal of Adolescent Health*, 28(2), 122–140.
- Conversano, C., Rotondo, A., Lensi, E., Della Vista, O., Arpone, F., & Reda, M. A. (2010). Optimism and its impact on mental and physical well-being. *Clinical practice and epidemiology in mental health: CP & EMH*, 6, 25–29. <https://doi.org/10.2174/1745017901006010025>
- Cook, T. D., & Campbell, D. T. (1979). *Quasi-experimentation: Design and analysis issues for field settings*. Boston: Houghton Mifflin.

- Cordle, J., Van Puymbroeck, M., Hawkins, B., & Baldwin, E. (2016). The effects of utilizing high element ropes courses as a treatment intervention on self-efficacy. *Therapeutic Recreation Journal*, 50(1), 75. doi:10.18666/TRJ-2016-V50-I1-6439
- Creswell, J.W. (2019). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research (6th ed.)*. Upper Saddle River, NJ: New Jersey.
- Crisp, S., & O'Donnell, M. (1998). Wilderness adventure therapy in adolescent psychiatry. In C. M. Itin (Ed.), *Exploring the Boundaries of adventure therapy: International perspectives* (pp. 346–359). Boulder, CO: Association of Experiential Education.
- Cumes, D. (1998). Nature as medicine: The healing power of the wilderness. *Alternative Therapies in Health and Medicine*, 4(2), 79-86.
- Danielson, M. L., Bitsko, R. H., Ghandour, R. M., Holbrook, J. R., Kogan, M. D., & Blumberg, S. J. (2018a). Prevalence of parent-reported ADHD diagnosis and associated treatment among U.S. children and adolescents, 2016. *Journal of Clinical Child & Adolescent Psychology*, 47(2), 199-212. doi:10.1080/15374416.2017.1417860
- Danielson, M. L., Visser, S. N., Chronis-Tuscano, A., & DuPaul, G. J. (2018b). A national description of treatment among united states children and adolescents with attention-Deficit/Hyperactivity disorder. *The Journal of Pediatrics*, 192, 240-246.e1. doi:10.1016/j.jpeds.2017.08.040
- Davis-Berman, J., & Berman, D. S. (1994). Research update: Two-year follow-up report for the wilderness therapy program. *Journal of Experiential Education*, 17(1), 48.
- Davis-Berman, J., & Berman, D. (2002). Risk and anxiety in adventure programming. *Journal of Experiential Education*, 25(2), 305-310.
- Dean, J. H., Shanahan, D. F., Bush, R., Gaston, K. J., Lin, B. B., Barber, E., . . . Fuller, R. A. (2018). Is nature relatedness associated with better mental and physical health? *International Journal of Environmental Research and Public Health*, 15(7), 1371.
- Deane, K. L., Harré, N., Moore, J. & Courtney, M. G. R. (2017). The impact of the project k youth development program on self-efficacy: A randomized controlled trial. *J Youth Adolescence*, 46, 516–537. <https://doi.org/10.1007/s10964-016-0463-9>
- DeKruyf, L., Auger, R. W., & Trice-Black, S. (2013). The role of school counselors in meeting students' mental health needs: Examining issues of professional identity. *Professional School Counseling*, 16(5), 271-282.
- Dobud, W. W., & Harper, N. J. (2018). Of dodo birds and common factors: A scoping review of direct comparison trials in adventure therapy. *Complementary Therapies in Clinical Practice*, 31, 16.

- Doll, B., Nastasi, B. K., Cornell, L., & Song, S. Y. (2017). School-based mental health services: Definitions and models of effective practice. *Journal of Applied Psychology*, 33(3), 179-194. doi: 10.1080/15377903.2017.1317143.
- Duchesne, S., Ratelle, C. F., & Roy, A. (2012). Worries about middle school transition and subsequent adjustment: The moderating role of classroom goal structure. *The Journal of Early Adolescence*, 32, 681–710. doi:10.1177/0272431611419506
- Eckstein, F., & R  th, U. (2015). Adventure-based experiential therapy with inpatients in child and adolescent psychiatry: An approach to practicability and evaluation. *Journal of Adventure Education and Outdoor Learning*, 15(1), 53. doi:10.1080/14729679.2013.844573
- Elbe, A., Wikman, J. M., Zheng, M., Larsen, M. N., Nielsen, G., & Krstrup, P. (2017). The importance of cohesion and enjoyment for the fitness improvement of 8-10-year-old children participating in a team and individual sport school-based physical activity intervention. *European Journal of Sport Science*, 17(3), 343-350. <https://doi.org/10.1080/17461391.2016.1260641>
- Eklund, M. L., Ruud, I., & Grov, E. K. (2016). The forest as a classroom: Preparing for mental health practice. *BMC Nursing*, 15(1), 6. doi:10.1186/s12912-016-0128-8
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41, 1149-1160.
- Fifolt, M., Morgan, A. F., & Burgess, Z. R. (2018). Promoting school connectedness among minority youth through experience-based urban farming. *Journal of Experiential Education*, 41(2), 187-203. doi:10.1177/1053825917736332
- Fletcher, T. B., & Hinkle, J. S. (2002). Adventure based counseling: An innovation in counseling. *Journal of Counseling and Development*, 80(3), 277–285. doi:10.1002/j.1556-6678.2002.tb00192.x
- Folan, N. (2012). *The hundredth monkey: Activities that inspire playful learning*. Beverly, MA: Project Adventure, Inc.
- Frumkin, H., Bratman, G. N., Breslow, S. J., Cochran, B., Kahn, J., Peter H, Lawler, J. J., Levin, P. S., Tandon, P. S., Varanasi, U., Wolf, K. L., & Wood, S. A. (2017). Nature contact and human health: A research agenda. *Environmental Health Perspectives*, 125(7), 075001-1-075001-18. doi:10.1289/EHP1663
- Furness, K. (2017). Maximising potential: The psychological effects of the youth development programme project K. *New Zealand Journal of Psychology*, 46(1), 14-23.

- Furuyashiki, A., Tabuchi, K., Norikoshi, K., Kobayashi, T., & Oriyama, S. (2019). A comparative study of the physiological and psychological effects of forest bathing (shinrin-yoku) on working age people with and without depressive tendencies. *Environmental Health and Preventive Medicine*, 24(1), 46-11. doi:10.1186/s12199-019-0800-1
- Gass, M. A. (1991). Enhancing Metaphor Development in Adventure Therapy Programs. *Journal of Experiential Education*, 14(2), 6–13. <https://doi.org/10.1177/105382599101400202>
- Gass, M. A., Gillis, H. L., & Russell, K. C. (2012). *Adventure therapy: Theory, research, and practice*. New York, NY: Routledge.
- Gerow, B. (2019a, February 26). *Three deep breaths: Exploring the mental health benefits of mountain biking*. Singletracks. <https://www.singletracks.com/uncategorized/three-deep-breaths-exploring-the-mental-health-benefits-of-mountain-biking/>
- Gerow, B. (2019b, May 8). *Mountain biking as therapy: Scottish researchers integrate trails into mental health treatment plans*. Singletracks. <https://www.singletracks.com/uncategorized/mountain-biking-as-therapy-scottish-researchers-integrate-trails-into-treatment-plans/>
- Ghandour, R. M., Sherman, L. J., Vladutiu, C. J., Ali, M. M., Lynch, S. E., Bitsko, R. H., & Blumberg, S. J. (2019). Prevalence and treatment of depression, anxiety, and conduct problems in US children. *The Journal of Pediatrics*, 206, 256-267.e3. doi:10.1016/j.jpeds.2018.09.021
- Gibbons, S., Ebbeck, V., Gruno, J., & Battey, G. (2018). Impact of adventure-based approaches on the self-conceptions of middle school physical education students. *Journal of Experiential Education*, 41(2), 220-232.
- Gillham, J., & Reivich, K. (2004). Cultivating optimism in childhood and adolescence. *The Annals of the American Academy of Political and Social Science*, 591(1), 146-163. <https://doi.org/10.1177/0002716203260095>
- Gillis, H. L., & Gass, M. A. (1993). Bringing adventure into marriage and family therapy: A innovative experiential approach. *Journal of Marital and Family Therapy*, 19(3), 275.
- Glass, J. S. (2008). Finding common ground through adventure based counseling: Race and perceptions of group cohesion. Based on a program presented at the ACA Annual Conference & Exhibition, Honolulu, HI. Retrieved January 8, 2020, from <http://counselingoutfitters.com/vistas/vistas08/glass.htm>
- Glass, J. S., & Benshoff, J. M. (2002). Facilitating group cohesion among adolescents through challenge course experiences. *Journal of Experiential Education*, 25(2), 268-277. doi:10.1177/105382590202500204

- Glass, G. V., & Hopkins, K. D. (1996). *Statistical methods in education and psychology* (Third ed.). Boston: Allyn and Bacon.
- Glass, S. & Jackson, J. M. (2008). Connecting theory to programming: Using existentialism and adventure based counselling with adolescents. *International Journal of Existential Positive Psychology*, 2(1).
- Glass, J. S., & Myers, J. E. (2001). Combining the old and the new to help adolescents: Individual psychology and adventure-based counseling. *Journal of Mental Health Counseling*, 23(2), 104–114.
- Glass, J. S., & Shoffner, M. F. (2001). Adventure-based counseling in schools. *Professional School Counseling*, 5(1), 42-48.
- Greenleaf, A. T., Greenleaf, A. T., Bryant, R. M., Bryant, R. M., Pollock, J. B., & Pollock, J. B. (2014). Nature-based counseling: Integrating the healing benefits of nature into practice. *International Journal for the Advancement of Counselling*, 36(2), 162-174. doi:10.1007/s10447-013-9198-4
- Hansen, M., Jones, R., & Tocchini, K. (2017). Shinrin-yoku (forest bathing) and nature therapy: A state-of-the-art review. *International Journal of Environmental Research and Public Health*, 14(8), 851. doi:10.3390/ijerph14080851
- Hartford, G. (2011) Practical implications for the development of applied metaphor in adventure therapy. *Journal of Adventure Education & Outdoor Learning*, 11(2), 145-160. DOI:10.1080/14729679.2011.633383
- Hatcher, L., & Stepanski, E. J. (1994). *A step-by-step approach to using the SAS system for univariate and multivariate statistics*. SAS Institute.
- Herrman, H., Stewart, D. E., Diaz-Granados, N., Berger, E. L., Jackson, B., & Yuen, T. (2011). What is Resilience? *The Canadian Journal of Psychiatry*, 56(5), 258 -265. doi:10.1177/070674371105600504
- Heppner, P. P., Kivlighan, Jr., D. M., & Wampold, B. E. (1999). *Research design in counseling*. Pacific Grove, Calif: Brooks/Cole Pub. Co.
- Hindes, Y. L., Thorne, K. J., Schwean, V. L., & McKeough, A. M. (2008). Promoting intrapersonal qualities in adolescents: Evaluation of rapport's teen leadership breakthrough program. *Canadian Journal of School Psychology*, 23(2), 206-222. <https://doi.org/10.1177/0829573508327307>
- Hofmann, S. G., & Hay, A. C. (2018). Rethinking avoidance: Toward a balanced approach to avoidance in treating anxiety disorders. *Journal of Anxiety Disorders*, 55, 14-21. <https://doi.org/10.1016/j.janxdis.2018.03.004>

- Holas, I., & Huston, A. C. (2012). Are middle schools harmful? The role of transition timing, classroom quality and school characteristics. *Journal of Youth and Adolescence*, 41, 333–345. doi:10.1007/s10964-011-9732-9.
- Holmes, C. J., Kim-Spoon, J., & Deater-Deckard, K. (2016). Linking executive function and peer problems from early childhood through middle adolescence. *Journal of Abnormal Child Psychology*, 44(1), 31–42. <https://doi.org/10.1007/s10802-015-0044-5>
- Howell, D. (2008, May 15). *Mixed models for repeated (longitudinal) data*. https://www.uvm.edu/~statdhtx/StatPages/Missing_Data/Mixed%20Models%20for%20Repeated%20Measures.pdf
- Irvine, K. N., & Warber, S. L. (2002). Greening healthcare: Practicing as if the natural environment really mattered. *Alternative Therapies in Health and Medicine*, 8(5), 76.
- Jeffery, H., & Wilson, L. (2017). New zealand occupational therapists' use of adventure therapy in mental health practice. *New Zealand Journal of Occupational Therapy*, 64(1), 32-38.
- Jo, H., Song, C., & Miyazaki, Y. (2019). Physiological benefits of viewing nature: A systematic review of indoor experiments. *International Journal of Environmental Research and Public Health*, 16(23), 4739. doi:10.3390/ijerph16234739
- Johnson, J. E. (2013). Beware of storming: Research implications for interpreting group climate questionnaire scores over time. *International Journal of Group Psychotherapy*, 63(3), 433-446. <https://doi.org/10.1521/ijgp.2013.63.3.433>
- Johnson, J. E., Pulsipher, D., Ferrin, S. L., Burlingame, G. M., Davies, D. R., & Gleave, R. (2006). Measuring group processes: A comparison of the GCQ and CCI. *Group Dynamics*, 10(2), 136-145. <https://doi.org/10.1037/1089-2699.10.2.136>
- Karbach, J., & Unger, K. (2014). Executive control training from middle childhood to adolescence. *Frontiers in psychology*, 5, 390. <https://doi.org/10.3389/fpsyg.2014.00390>
- Kamitsis, I., & Simmonds, J. G. (2017). Using resources of nature in the counselling room: Qualitative research into ecotherapy practice. *International Journal for the Advancement of Counselling*, 39(3), 229-248. doi:10.1007/s10447-017-9294-y
- Kelly, J. (2013). House subcommittee examines current mental health services in schools. *The Chronicle of Social Change*. Retrieved from <https://chronicleofsocialchange.org/featured/capitol-view-on-kids-the-latest-from-washington-on-children-and-families-3/2311>
- Kelly, J. (2019). Influence of outdoor and adventure activities on subjective measures of resilience in university students. *The Journal of Experiential Education*, 42(3), 264-279. doi:10.1177/1053825919831724

- Kemp, T., & McCarron, L. (1998). *Learning new behaviours through group adventure initiative tasks: A theoretical perspective* [Paper presentation]. Exploring the Boundaries of Adventure Therapy: International perspectives. International Adventure Therapy Conference, Perth, Australia.
- Kim, J., Chun, S., Kim, H., Han, A., & Hodges, J. S. (2018). Contribution of leisure participation to personal growth among individuals with physical disabilities. *Therapeutic Recreation Journal*, 52(3), 201-214.
- Kivlighan, D. M., & Goldfine, G. (1991). Endorsement of therapeutic factors as a function of stage of group development and participant interpersonal attitudes. *Journal of Counseling Psychology*, 38, 150–158. doi:10.1037/0022-0167.38.2.150
- Kleinstäuber, M., Reuter, M., Doll, N., & Fallgatter, A. J. (2017). Rock climbing and acute emotion regulation in patients with major depressive disorder in the context of a psychological inpatient treatment: a controlled pilot trial. *Psychology research and behavior management*, 10, 277-281. doi: 10.2147/PRBM.S143830
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Kolbert, J. B., Williams, R. L., Morgan, L. M., Crothers, L.M., & Hughes, T. L. (2017). *Introduction to professional school counseling: Advocacy, leadership, and intervention*. New York, NY: Routledge.
- Koni, E., Moradi, S., Arahanga-Doyle, H., Neha, T., Hayhurst, J., Boyes, M., . . . Scarf, D. (2019). Promoting resilience in adolescents: A new social identity benefits those who need it most. *Plos One*, 14(1), e0210521. doi:10.1371/journal.pone.0210521
- Kuo, M., Barnes, M., & Jordan, C. (2019). Do experiences with nature promote learning? Converging evidence of a cause-and-effect relationship. *Frontiers in psychology*, 10, 305. doi: 10.3389/fpsyg.2019.00305
- Lambie, G. W., Stickl Haugen, J., Borland, J. R., & Campbell, L. O. (2019). Who took “counseling” out of the role of professional school counselors in the united states? *Journal of School-Based Counseling Policy and Evaluation*, 1(3), 51-61. <https://doi.org/10.25774/7kjb-bt85>
- Lenz, A. S. (2020). Estimating and reporting clinical significance in counseling research: Inferences based on percent improvement. *Measurement and Evaluation in Counseling and Development*, 53(4), 289-296. <https://doi.org/10.1080/07481756.2020.1784758>
- Levack, H. (2003). Adventure therapy in occupational therapy: Can we call it spiritual occupation? *New Zealand Journal of Occupational Therapy*, 50(1), 22-28.

- Louv, R. (2005). *Last child in the woods: Why children need nature, how it was taken from them, and how to get it back*. Algonquin Books of Chapel Hill.
- Luttenberger, K., Stelzer, E. M., Först, S., Schopper, M., Kornhuber, J., & Book, S. (2015). Indoor rock climbing (bouldering) as a new treatment for depression: study design of a waitlist-controlled randomized group pilot study and the first results. *BMC psychiatry*, 15(1), 201. <https://doi.org/10.1186/s12888-015-0585-8>
- MacKenzie, K. R. (1983). The clinical application of a group climate measure. In R. Dies & K. R. MacKenzie (Eds.), *Advances in group psychotherapy: Integrating research and practice* (pp. 159–170). New York, NY: International Universities Press.
- Malberg Dyg, P. & Wistoft, K. (2018). Wellbeing in school gardens - the case of the Gardens for Bellies food and environmental education program. *Environmental Education Research*, 24(8), 1177–1191. <https://doi.org/10.1080/13504622.2018.1434869>
- Maller, C. M., Townsend, M., Pryor, A., Brown, P., & St Leger, L. (2005). Healthy nature healthy people: ‘Contact with nature’ as an upstream health promotion intervention for populations. *Health Promotion International*, 21, 45–54.
- Margalit, D., & Ben-Ari, A. (2014). The effect of wilderness therapy on adolescents’ cognitive autonomy and self-efficacy: Results of a non-randomized trial. *Child & Youth Care Forum*, 43(2), 181-194. doi:10.1007/s10566-013-9234-x
- McCarty, D. L. & Christian, D. D. (2019). Using an adventure therapy activity to assess the adlerian lifestyle. *Journal of Creativity in Mental Health*, 1-13.
- McIver, S., Senior, E., & Francis, Z. (2018). Healing fears, conquering challenges: Narrative outcomes from a wilderness therapy program. *Journal of Creativity in Mental Health*, 13(4), 392–404.
- McLaren, C. D., Newland, A., Eys, M., & Newton, M. (2017). Peer-initiated motivational climate and group cohesion in youth sport. *Journal of Applied Sport Psychology*, 29(1), 88-100. <https://doi.org/10.1080/10413200.2016.1190423>
- Mendez, J. L., Carpenter, J. L., LaForett, D. R., & Cohen, J. S. (2009). Parental engagement and barriers to participation in a community-based preventive intervention. *American Journal of Community Psychology*, 44, 1-14.
- Mikaels, J. (2018). Becoming a place-responsive practitioner: Exploration of an alternative conception of friluftsliv in the swedish physical. *Journal of Outdoor Recreation, Education, and Leadership*, 10(1), 3-19. doi:10.18666/JOREL-2018-V10-I1-8146
- Mutz, M., & Müller, J. (2016). Mental health benefits of outdoor adventures: Results from two pilot studies. *Journal of Adolescence*, 49, 105-114. doi:10.1016/j.adolescence.2016.03.009

- Mygind, L., Kjeldsted, E., Hartmeyer, R., Mygind, E., Bolling, M., & Bentsen, P. (2019). Mental, physical and social health benefits of immersive nature-experience for children and adolescents: A systematic review and quality assessment of the evidence. *Health & Place*, 58 doi:10.1016/j.healthplace.2019.05.014
- Ojanen, T., & Findley-Van Nostrand, D. (2014). Social goals, aggression, peer preference, and popularity: Longitudinal links during middle school. *Developmental Psychology*, 50(8), 2134–2143. doi:10.1037/a0037137
- The Outdoor Foundation. (2020). *The outdoor participation report 2019*. Retrieved from <https://outdoorindustry.org/resource/2019-outdoor-participation-report/>
- Opper, B., Maree, J. G., Fletcher, L., & Sommerville, J. (2014). Efficacy of outdoor adventure education in developing emotional intelligence during adolescence. *Journal of Psychology in Africa*, 24(2), 193-196. <https://doi.org/10.1080/14330237.2014.903076>
- Park, B. J., Park, B. J., Tsunetsugu, Y., Tsunetsugu, Y., Kasetani, T., Kasetani, T., . . . Miyazaki, Y. (2010). The physiological effects of shinrin-yoku (taking in the forest atmosphere or forest bathing): Evidence from field experiments in 24 forests across Japan. *Environmental Health and Preventive Medicine*, 15(1), 18-26. doi:10.1007/s12199-009-0086-9
- Portrie-Bethke, T., Hill, N., & Bethke, J. (2009). Strength-based mental health counseling for children with ADHD: An integrative model of adventure-based counseling and adlerian play therapy. *Journal of Mental Health Counseling*, 31(4), 323-337.
- Powrie, B., Kolehmainen, N., Turpin, M., Ziviani, J., & Copley, J. (2015). The meaning of leisure for children and young people with physical disabilities: A systematic evidence synthesis. *Developmental Medicine & Child Neurology*, 57(11), 993-1010.
- Prince-Embury, S. (2007). *Resiliency Scales for Children and Adolescents: Profiles of personal strengths*. San Antonio, TX: Harcourt Assessments.
- Prince-Embury, S. (2010). Psychometric properties of the resiliency scales for children and adolescents and use for youth with psychiatric disorders. *Journal of Psychoeducational Assessment*, 28(4), 291-302. doi:10.1177/0734282910366832
- Prince-Embury, S. (2011). Assessing personal resiliency in the context of school settings: Using the resiliency scales for children and adolescents. *Psychology in the Schools*, 48(7), 672-685. doi:10.1002/pits.20581
- Project Adventure. (2007). *Adventure based counseling training manual*. Beverly, MA: Author.
- Reback, R. (2010). Schools' mental health services and young children's emotions, behavior, and learning. *Journal of Policy Analysis and Management*, 29(4), 698–725. doi:10.1002/pam.20528

- Reese, R. F. (2016). EcoWellness & guiding principles for the ethical integration of nature into counseling. *International Journal for the Advancement of Counselling*, 38(4), 345-357. doi:10.1007/s10447-016-9276-5
- Reese, R. F., & Lewis, T. F. (2019). Greening counseling: Examining multivariate relationships between ecowellness and holistic wellness. *The Journal of Humanistic Counseling*, 58(1), 53-67. doi:10.1002/johc.12089
- Reese, R. F., & Myers, J. E. (2012). EcoWellness: The missing factor in holistic wellness models. *Journal of Counseling and Development*, 90(4), 400-406.
- Reese, R. F., Myers, J. E., Lewis, T. F., & Willse, J. T. (2015). Construction and initial validation of the Reese EcoWellness Inventory. *International Journal for the Advancement of Counselling*, 37, 124–142. doi:10.1007/s10447-014-9232-1
- Reese, R. F., Webster, L. C., & Biles, K. (2019). School counselor roles and opportunities in promoting EcoWellness: Integrating nature connection in K–12 settings. *Professional School Counseling*, 22(1), 2156759. doi:10.1177/2156759X19839651
- Reivich K., Gillham J.E., Chaplin T.M., Seligman M.E.P. (2013) *From Helplessness to Optimism: The Role of Resilience in Treating and Preventing Depression in Youth*. In: Goldstein S., Brooks R. (eds) *Handbook of Resilience in Children*. Springer, Boston, MA. https://doi.org/10.1007/978-1-4614-3661-4_12
- Richards, K., Carpenter, C., & Harper, N. (2011). Looking at the landscape of adventure therapy: Making links to theory and practice. *Journal of Adventure Education and Outdoor Learning*, 11(2), 83-90.
- Richmond, D., Sibthorp, J., Gookin, J., Annarella, S., & Ferri, S. (2018). Complementing classroom learning through outdoor adventure education: Out-of-school-time experiences that make a difference. *Journal of Adventure Education and Outdoor Learning*, 18(1), 36. doi:10.1080/14729679.2017.1324313
- Ritchie, S. D., Wabano, M. J., Russell, K., Enosse, L., & Young, N. L. (2014). Promoting resilience and wellbeing through an outdoor intervention designed for Aboriginal adolescents. *Rural Remote Health*, 14, 2523.
- Roberts, L., Jones, G., & Brooks, R. (2018). Why do you ride?: A characterization of mountain bikers, their engagement methods, and perceived links to mental health and well-being. *Frontiers in Psychology*, 9, 1642. doi:10.3389/fpsyg.2018.01642
- Rohnke, K. (1989). *Silver bullets: A guide to initiative problems, adventure games, and trust building activities*. Dubuque, IA: Kendall/Hunt Publishing Company.
- Rogers, A. A., Rogers, A. A., DeLay, D., DeLay, D., Martin, C. L., & Martin, C. L. (2017). Traditional masculinity during the middle school transition: Associations with depressive

- symptoms and academic engagement. *Journal of Youth and Adolescence*, 46(4), 709-724. doi:10.1007/s10964-016-0545-8
- Roll, J. M., Kennedy, J., Tran, M., & Howell, D. (2013) Disparities in unmet need for mental health services in the United States, 1997-2010. *Psychiatric Services*, 64(1), 80-82. doi:10.1176/appi.ps.201200071
- Russell, K. C., & Farnum, J. (2004). A concurrent model of the wilderness therapy process. *Journal of Adventure Education & Outdoor Learning*, 4(1), 39-55.
- Russell, K. C., & Gillis, H. L. (2017). Experiential therapy in the mental health treatment of adolescents. *Journal of Therapeutic Schools and Programs*, 4(1), 47-79.
- Russell, K. C., Gillis, H. L., & Kivlighan, D. M. (2017). Process factors explaining psycho-social outcomes in adventure therapy. *Psychotherapy*, 54(3), 273–280. doi:10.1037/pst0000131
- Rutko, E. A., & Gillespie, J. (2013). Where's the wilderness in wilderness therapy? *The Journal of Experiential Education*, 36(3), 218-232. doi:10.1177/1053825913489107
- Ryan, A. M., Shim, S. S., & Makara, K. A. (2013). Changes in academic adjustment and relational self-worth across the transition to middle school. *Journal of Youth and Adolescence*, 42, 1372–1384. doi:10.1007/s10964-013-9984-7
- Sackett, C. R. (2010). Ecotherapy: A Counter to Society's Unhealthy Trend?. *Journal of Creativity in Mental Health*, 5(2), 134-141.
- Sanchez, A. L., Cornacchio, D., Poznanski, B., Golik, A., Chou, T., & Comer, J. (2018). The effectiveness of school-based mental health services for elementary-aged children: A meta-analysis. *Journal of the American Academy of Child & Adolescent Psychiatry*, 57,153-165.
- Scarf, D., Hayhurst, J., Riordan, B., Boyes, M., Ruffman, T., & Hunter, J. (2017). Increasing resilience in adolescents: The importance of social connectedness in adventure education programmes. *Australasian Psychiatry*, 25(2), 154-156. doi:10.1177/1039856216671668
- Schoel, J., & Maizell, R. S. (2002). *Exploring islands of healing: New perspectives on adventure based counseling*. Beverly, MA: Project Adventure, Inc.
- Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston: Houghton Mifflin.
- Short, J. L., & Russell-Mayhew, S. (2009). What counselors need to know about resiliency in adolescents. *International Journal of Counseling*, 31, 213–227. <https://doi.org/10.1007/s10447-009-9079-z>

- Sikorska, I. (2017). Resilience in the light of positive psychology adventure education and adventure therapy. *PSYCHOTERAPIA*, (2), 75-86.
- Simon, A. E., Pastor, P. N., Reuben, C. A., Huang, L. A., & Goldstrom, I. D. (2015). Use of mental health services by children ages six to 11 with emotional or behavioral difficulties. *Psychiatric Services*, 66(9), 930-937. doi: 10.1176/appi.ps.201400342
- Song, C., Ikei, H., & Miyazaki, Y. (2016). Physiological effects of nature therapy: A review of the research in japan. *International Journal of Environmental Research and Public Health*, 13(8), 781. doi:10.3390/ijerph13080781
- Song, C., Ikei, H., & Miyazaki, Y. (2018). Physiological effects of visual stimulation with forest imagery. *International Journal of Environmental Research and Public Health*, 15(2), 213. doi:10.3390/ijerph15020213
- Stephan, S. H., Sugai, G., Lever, N., & Connors, E. (2015). Strategies for integrating mental health into schools via a multitiered system of support. *Child and Adolescent Psychiatric Clinics of North America*, 24(2), 211-231. doi: 10.1016/j.chc.2014.12.002
- Stevens, B., Kagan, S., Yamada, J., Epstein, I., Beamer, M., Bilodeau, M., & Baruchel, S. (2004). Adventure therapy for adolescents with cancer. *Pediatric Blood & Cancer*, 43(3), 278-284. <https://doi.org/10.1002/pbc.20060>
- Sutherland, S., & Stroot, S. (2010). The impact of participation in an inclusive adventure education trip on group dynamics. *Journal of Leisure Research*, 42(1), 153-176. <https://doi.org/10.1080/00222216.2010.11950199>
- Swank, J. M., & Daire, A. P. (2010). Multiple family adventure-based therapy groups: An innovative integration of two approaches. *The Family Journal (Alexandria, Va.)*, 18(3), 241-247. <https://doi.org/10.1177/1066480710372123>
- Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (Sixth ed.). Boston: Pearson Education.
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International journal of medical education*, 2, 53-55. <https://doi.org/10.5116/ijme.4dfb.8dfd>
- Thompson, B. (2002). "Statistical," "Practical," and "Clinical": How many kinds of significance do counselors need to consider? *Journal of Counseling and Development*, 80(1), 64-71. <https://doi.org/10.1002/j.1556-6678.2002.tb00167.x>
- Tippey, K. G., & Longnecker, M. T. (2016). *An ad hoc method for computing pseudo-effect size for mixed models*. Retrieved from http://www.scsug.org/wp-content/uploads/2016/11/Ad-Hoc-Method-for-Computing-Effect-Size-for-Mixed-Models_PROCEEDINGS-UPDATE-1.pdf

- Tracey, D., Gray, T., Truong, S., & Ward, K. (2018). Combining acceptance and commitment therapy with adventure therapy to promote psychological wellbeing for children at-risk. *Frontiers in Psychology, 9*, 1-9.
- Truong, S., Ward, K., Tracey, D., & Gray, T. (2018). *ACT in the Outdoors: A program based on acceptance commitment therapy and adventure therapy*. Facilitator manual. <https://doi.org/10.4225/35/5a961c4140818>
- Tsunetsugu, Y., Tsunetsugu, Y., Park, B., Park, B., Miyazaki, Y., & Miyazaki, Y. (2010). Trends in research related to “Shinrin-yoku” (taking in the forest atmosphere or forest bathing) in Japan. *Environmental Health and Preventive Medicine, 15*(1), 27-37. doi:10.1007/s12199-009-0091-z
- Tucker, A. R., & Norton, C. L. (2013). The use of adventure therapy techniques by clinical social workers: Implications for practice and training. *Clinical Social Work Journal, 41*(4), 333-343.
- Tucker, A. R., Norton, C. L., Itin, C., Hobson, J., & Alvarez, M. A. (2016). Adventure therapy: Nondeliberative group work in action. *Social Work with Groups, 39*(2-3), 194. doi:10.1080/01609513.2015.1048416
- Tuckman, B. W. (1965). Developmental sequence in small groups. *Psychological Bulletin, 63*(6), 384-399. doi:10.1037/h0022100
- Vander Stoep, A., Weiss, N. S., Kuo, E. S., Cheney, D., & Cohen, P. (2003). What proportion of failure to complete secondary school in the US population is attributable to adolescent psychiatric disorder? *The Journal of Behavioral Health Services & Research, 30*(1), 119-124. doi:10.1007/BF02287817
- Vankanegan, C., Tucker, A. R., Mcmillion, P., Gass, M., & Spencer, L. (2019). Adventure therapy and its impact on the functioning of youth in a community setting. *Social Work with Groups, 42*(2), 127. doi:10.1080/01609513.2018.1478761
- Vlami, E., Bell, B. J., & Gass, M. (2011). Effects of a college adventure orientation program on student development behaviors. *Journal of Experiential Education, 34*(2), 127-148. doi:10.1177/105382591103400203
- Walker, J. R., & Shafer, C. S. (2011). Mode of experience on a recreational trail: An examination of how hikers and mountain bikers focus their attention. *Journal of Park and Recreation Administration, 29*(2).
- Whalen, J. K. (2018, July 16). *I tried mountain bike therapy-and it's awesome: How riding with a therapist helped me unpack my issues-and learn to love mountain bikes*. Bicycling. <https://www.bicycling.com/health-nutrition/a22131996/i-tried-mountain-bike-therapyand-its-awesome/>

- Whiston, S. C., Tai, W. L., Rahardja, D., & Eder, K. (2011). School counseling outcome: A meta-analytic examination of interventions. *Journal of Counseling & Development*, 89(1), 37-55.
- Widmer, M. A., Duerden, M. D., & Taniguchi, S. T. (2014). Increasing and generalizing self-efficacy: The effects of adventure recreation on the academic efficacy of early adolescents. *Journal of Leisure Research*, 46(2), 165-183.
doi:10.1080/00222216.2014.11950318
- Wood, N., Smith, J. W. N., & Wood, L. J. (2017, October). *Breaking the cycle: Mountain biking as a way of engaging at-risk and disengaged youth*. DOI: 10.13140/RG.2.2.34098.09922
- Xu, F., Han, Y., Sabbagh, M. A., Wang, T., Ren, X., & Li, C. (2013). Developmental differences in the structure of executive function in middle childhood and adolescence. *PLoS ONE* 8(10): e77770. doi:10.1371/journal.pone.0077770
- Young, T. L., Reysen, R., Eskridge, T., & Ohrt, J. H. (2013). Personal growth groups: Measuring outcome and evaluating impact. *The Journal for Specialists in Group Work*, 38(1), 52-67. <https://doi.org/10.1080/01933922.2012.745915>

APPENDICES

APPENDIX A:

Participant Demographics Questionnaire

MTB Questionnaire Pre-program

Start of Block: Default Question Block

Please answer the following questions genuinely about yourself and involvement with the Intro to Mountain Biking class.

What is your name? (can use initials)

What is your birthdate? (mm/dd/year)

What is your age?

What is your sex/gender?

What grade are you currently in?

How many years of experience do you have riding a bicycle?

How many years of experience do you have riding a mountain bike (including unpaved/dirt paths)?

Please answer with you current level of comfort in your ability to ride skillfully:

	Extremely uncomfortable	Somewhat uncomfortable	Neither comfortable nor uncomfortable	Somewhat comfortable	Extremely comfortable
How would you rate your current level of comfort riding a bicycle?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How would you rate your current level of comfort riding a mountain bike?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Why did you sign up to take this class?

What makes you most nervous about this class?

What makes you most excited about this class?

What are you hoping to gain from this class?

How do you see the Intro to Mountain Biking class helping you in other classes?

How do you see the Intro to Mountain Biking class helping you outside of school?

End of Block: Default Question Block

MTB Questionnaire Mid-program

Start of Block: Default Question Block

Please answer the following questions genuinely with detailed responses.

What is your name? (can use initials)

What is your birthdate? (mm/dd/year)

Please answer with you current level of comfort in your ability to ride skillfully:

	Extremely uncomfortable	Somewhat uncomfortable	Neither comfortable nor uncomfortable	Somewhat comfortable	Extremely comfortable
How would you rate your current level of comfort riding a bicycle?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How would you rate your current level of comfort riding a mountain bike?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What have you gained so far from this class?

What has made you most nervous during this class?

What has excited you the most during this class?

How has this program helped you with other activities in school?

How has this program helped you with other activities outside of school?

How has the COVID-19 pandemic impacted you?

How has the COVID-19 pandemic affected your progress in school?

End of Block: Default Question Block

MTB Questionnaire Post-program

Start of Block: Default Question Block

Please answer the following questions genuinely with detailed responses.

What is your name? (can use initials)

What is your birthdate? (mm/dd/year)

Please answer with you current level of comfort in your ability to ride skillfully:

	Extremely uncomfortable	Somewhat uncomfortable	Neither comfortable nor uncomfortable	Somewhat comfortable	Extremely comfortable
How would you rate your current level of comfort riding a bicycle?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How would you rate your current level of comfort riding a mountain bike?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What has made you most nervous during this class?

What has excited you the most during this class?

How has this program helped you with other activities in school?

How has this program helped you with other activities outside of school?

What have you gained from taking this class?

How has the COVID-19 pandemic impacted you overall?

How was the COVID-19 pandemic impacted your experience in school?

End of Block: Default Question Block

MTB Questionnaire Follow-up

Start of Block: Default Question Block

Please answer the following questions genuinely with detailed responses.

What is your name? (can use initials)

What is your birthdate? (mm/dd/year)

Please answer with you current level of comfort in your ability to ride skillfully:

	Extremely uncomfortable	Somewhat uncomfortable	Neither comfortable nor uncomfortable	Somewhat comfortable	Extremely comfortable
How would you rate your current level of comfort riding a bicycle?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How would you rate your current level of comfort riding a mountain bike?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How would you rate your overall improvement in riding a mountain bike as a result of this class?

	1	2	3	4	5	6	7	8	9	10
1 (being NO improvement) and 10 (being significant improvement)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What have you learned overall as a result of this class (e.g. skills, comfort zones, values, communication, bike mechanics, resilience, etc)?

What knowledge will you apply from this class in the future?

How has this program helped you with other activities in school?

How has this program helped you with other activities outside of school?

How has the COVID-19 pandemic impacted you outside of school?

How was the COVID-19 pandemic impacted your experience in school?

End of Block: Default Question Block

APPENDIX B:
IRB Approval Letter

To: Cian L Brown
BELL 4188

From: Douglas J Adams, Chair
IRB Full Board

Date: 07/23/2020

Action: **Approval**

Action Date: 07/23/2020

Protocol #: 2005266571

Study Title: An Adventure Therapy Mountain Bike Program for Middle School Students: A Pilot Study

Expiration Date: 07/09/2021

Last Approval Date:

Risk Level:

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

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

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

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

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

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

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

Correspondence Notes:

- The board finds that this protocol complies with the requirements of 45 CFR 46.404 - Research not involving greater than minimal risk. a) No greater than minimal risk to children is presented; and b) Adequate provisions are made for soliciting the assent of the children and the permission of their parents or guardians, as set forth in 45 CFR 46.408.

cc: David D Christian, Investigator

APPENDIX C:
Informed Consent

Heather Wright
Principal
Email: hwright@artsk12.org

Calvin Clark
School Counselor
Email: cclark@artsk12.org

Arkansas Arts Academy
506 Poplar St
Rogers, AR 72756
Phone (479) 631-2787 -- Fax (603)
883-1252

Rachel Carpenter
Assistant Principal
Email: rcarpenter@artsk12.org

Eddie Smith
Mountain Biking Instructor
Email: esmith@artsk12.org

Informed Consent Form for Adventure Therapy Mountain Bike Program

Before agreeing to your child's participation in group counseling at AAA, it is important that you read and understand the following explanation of the purpose, benefits and risks of the group process and how it will be conducted.

Group: Adventure Therapy Mountain Bike Group.

Lead facilitator: Cian Brown, Licensed Professional Counselor, doctoral candidate at the University of Arkansas.

Other facilitators:

Purpose: You are being asked to allow your child to participate in an adventure therapy mountain bike group at Arkansas Arts Academy. Adventure Therapy is a type of counseling process that uses activities to facilitate personal growth as well as behavior change in participants.

Group Procedures: The group involves 90-minute group sessions that will meet approximately twice a week for 17 weeks. The groups will consist of 10-15 students. The sessions will take place during either 3 or 4 period. Teachers, students, and the school counselor will consult as to how to enroll your student and maintain academic progress. Half of the students will participate in the group during the fall 2020 and the other half will participate in the group during spring 2021.

University of Arkansas: Throughout the group process, some data collected from students will be shared with the University of Arkansas and Cian L. Brown, MS, LPC, NCC (Principal Investigator). David Christian, PhD, professor of counselor education and supervision at the University of Arkansas is serving as Mr. Brown's advisor. Cian Brown is currently researching the efficacy of Adventure Therapy Mountain Biking in schools with students as part of a collaboration with AAA and Bike NWA to meet requirements for dissertation. The following information will be provided:

- Attendance records
- Academic reports
- Behavior/disciplinary reports
- Student survey results

If you have questions or concerns about this study, you may contact Cian L. Brown at [REDACTED] or by e-mail at clb061@uark.edu. For questions or concerns about your rights as a research participant, please contact Ro Windwalker, the University's IRB Coordinator, at (479) 575-2208 or by e-mail at irb@uark.edu.

ALL INFORMATION will be kept anonymous by using a confidential coding system and will be kept confidential to the extent allowed by law and University policy. All information provided in surveys will

be kept private from faculty/staff at Hudson Memorial School with the exception of the administration in case of an emergency or should we gain knowledge of a safety risk. This may include, but is not limited to, a student who is in danger or who is aware of another person in danger or concerning statements including suspicion of abuse/neglect, risk for suicide, or bullying.

Foreseeable Risks: Due to the nature of the activities, your child will face physical risks comparable to participation in physical education. Although caution will be taken to ensure the safety of all participants, it is possible for students to experience a wide range of injuries due to the physical nature of what also naturally occurs in settings similar to physical education. Activities in this group have been limited to those which will minimize risk to physical well-being. To further reduce risk, safety will be discussed before each activity and included as a rule for participation. In addition, psychological risks include experience of and reaction to the typical stressors experienced during group counseling when personal disclosures are shared with up to 15 group members.

Benefits to group members: We expect the project to benefit your child by providing him/her with the opportunity to increase social emotional learning skills, build social relationships, gain leadership skills, make new friends, and increase resiliency. Your child will also have the opportunity to explore and express feelings, implement new behaviors, and practice making positive choices. Finally, participating in this group may help your child adapt to school by creating a positive peer support group and improving adaptive functioning.

Procedures for Maintaining Confidentiality: Students will be completing surveys, intake and feedback forms, but any information shared by students on said forms will be kept confidential to the extent allowed by law and University policy. Teachers will know who is missing class, but any information in regards to the group will be kept private from faculty/staff. Exceptions to confidentiality include all safety concerns in regards to self and others. This may include, but is not limited to, a student who is in danger or who is aware of another person in danger or concerning statements including suspicion of abuse/neglect, risk for suicide, or bullying.

Participants' Rights: Your signature below indicates that you have read or have had read to you all of the above and that you confirm all of the following:

- You understand the possible benefits and the potential risks and/or discomforts of the group.
- You understand that you do not have to allow your child to take part in this group. The facilitator may choose to stop your child's participation at any time.
- You understand the logistics in regards to the operation of the group (time, dates, etc.)
- You have been told you will receive a copy of this form.

Student name

Printed Name of Parent/Guardian

Signature of Parent/Guardian

Date

APPENDIX D:
Participant Assent Form

Heather Wright
Principal
Email: hwright@artsk12.org

Calvin Clark
School Counselor
Email: cclark@artsk12.org

Arkansas Arts Academy
506 Poplar St
Rogers, AR 72756
Phone (479) 631-2787 -- Fax (603)
883-1252

Rachel Carpenter
Assistant Principal
Email: rcarpenter@artsk12.org

David Myrick
Mountain Biking Instructor
Email: dmyrick@artsk12.org

Student Assent Form for Adventure Therapy Mountain Bike Program

You are being invited to participate in Adventure Therapy Mountain Bike program at Arkansas Arts Academy as part of a research project done by the University of Arkansas Counselor Education and Supervision Program. These groups are being conducted during the fall semester of the 2020-2021 school year by Mr. Myrick as a way to help students be more successful in school while improving mountain bike skills.

Participating in an adventure therapy program is meant to be fun, but also allow time for students to learn about themselves and grow as individuals. During these group sessions, we will be doing fun activities that will allow students to work with others to complete a task. We will also have times where we will talk about how well our group is working together and how we can work better to achieve our goal.

If you wish to participate, sessions will occur during 7th or 8th period for approximately 18 weeks, depending on your schedule as part of your course. Each group will consist of 15-20 students, Mr. Myrick, and myself. The sessions will last 90 minutes. If you have difficulty enrolling or wanting to enroll in another course at any time a school counselor will assist you with this process, if necessary.

Students enrolled in the course will be randomly selected to participate in one of two groups: one section will receive mountain bike only instruction, the other section will receive mountain bike instruction with additional processing related to adventure therapy. Students will receive similar mountain bike program instruction in both groups. Students in the mountain bike group with additional processing will reflect on what skills they learned during the session and transfer the newly learned knowledge to school and real-life scenarios. Once the courses are full, students will have the option to be in a wait-listed group and participate in the program at the conclusion of the current groups (starting after Fall break).

Students who choose to participate will be asked to complete electronic questionnaires a few times during the course of the program. These results along with behavior, academic, and attendance reports will be shared with the University of Arkansas and myself, Cian Brown, M.S. (Principle Investigator) as well as Professor David Christian, Ph.D. I am currently researching the efficacy of an Adventure Therapy Mountain Bike program in schools with students like yourself as part of my dissertation requirements. If you have questions or concerns about this study, you may contact me at [REDACTED] or by e-mail at clb061@uark.edu. For questions or concerns about your rights as a research participant, please contact Ro Windwalker, the University's IRB Coordinator, at (479) 575-2208 or by e-mail at irb@uark.edu.

Participants should understand that during our meetings, what you choose to say or do will remain private and only the other group members will know about it. I will not be reporting to parents what happens during group unless there is an issue involving someone's safety. Data provided will be kept confidential to the extent allowed by law and University policy.

Students should also understand that if they choose to participate in this group, they may also change their mind at any time to end their participation. Participation will have no impact on your academic standing.

If you would like to be part of this group, please sign your name below.

Printed Name of Student

Signature of Student Date

Signature of Facilitator Date

APPENDIX E:
Dissertation Program

Week: 1

Session: 1 (September 1, 2020)

EcoWellness Factors: Physical Access & Sensory Access

Briefing: Establish procedures with getting bikes and helmets out, labeled, and fitted. Make sure helmets and bikes fit each student. Explanation and demonstration of bicycle sizing and fitting.

Students work together to go through bike and helmet fit procedure, document on check-list.

Mark proper seat height. Determine a way for students to carry water and make sure anyone in need of a clothing or shoe change or a bathroom break has time. Explanation and demonstration of pre-ride inspection (ABC quick check). Check air and tire pressure; front and rear brakes; chain, gears, and cranks; quick releases. Students work together to perform ABC quick check on assigned bicycles. Students then consult with facilitator/teacher to assess completion of safety and pre-ride tasks.

Treatment group engaged in initial activities following a sequence to introduce group norms (FVC & CBC) and learn participant names.

Group:	Non-AT Mountain Bike Group	AT Mountain Bike Group
Activity:	Safety (equipment check); Ride together, rider assessment	Group Norms: FVC, CBC; Ride together, rider assessment
Goals:	Procedures, rules, and assessing riders	Establish full value contract, challenge-by-choice, procedures, and assessing riders, get acquainted
Debrief:	Clean up, return bikes	Recreational: What did we go over today? What did you notice during the ride? Educational: So at what point did you feel out of your comfort zone/in your stretch zone? Panic zone? So what did you do to return back to your comfort zone? Therapeutic: When/where else do you feel challenged and pushed outside your comfort zone?

Week: 1**Session: 2** (September 4, 2020)**EcoWellness Factors:** Physical Access & Sensory Access

Briefing: Participants preform previously established procedures for getting bikes and helmets out, labeled, and fitted appropriately. Make sure helmets and bikes fit each student. Mark proper seat height. Determine a way for students to carry water and make sure anyone in need of a clothing or shoe change or a bathroom break has time. Participants perform pre-ride inspection (ABC quick check). All participants are evaluated prior to challenge ride. Roll away only after hearing the all-clear to do so. Begin rider assessment by creating a “pit stop” and allow students to attempt riding the bike.

Treatment group processed the tasks performed and recalled what information they learned and how they applied to the values: “be here”, “be safe”, “care for self and others”.

Group:	Non-AT Mountain Bike Group	AT Mountain Bike Group
Activity:	Application and rider assessment	Application and rider assessment
Goals:	Revisit and continue session 1 activities	Revisit and continue session 1 activities
Debrief:	Clean up, return bikes	Recreational: What value stuck out to you? What did you notice about yourself, others, surroundings during the ride? Educational: So what about this value stood out? So what did you learn about yourself, others, and surroundings when you became aware of them? Therapeutic: No what are you taking away from today before we meet next session/week? What do you see yourself applying from today this week? How will you try to apply this value?

Week: 2

Session: 3 (September 8, 2020)

EcoWellness Factors: Physical Access, Sensory Access, Protection

Briefing:

- Review ABC quick check (Air, Brakes, Chain, quick release levers)
- Review safety equipment and procedures
- Go over bicycle components and purpose (see Bike NWA manual, p. 23 - 25)
- Go over cleaning and repair (see Bike NWA manual, p. 39 – 40)
- Explain and demonstrate starting, stopping, and balancing curriculum

Groups demonstrate proper starting and stopping through the established “pit stop”. Participants then engage in “slow/snail race” activity to demonstrate balance and control.

Treatment group revisited FVC. Debrief included: What did the group do/accomplish today?

What did you notice in your speed and balance? Despite already knowing how to ride students reflected the differences of speed and difficulty staying on the pedals.

1. Which brake does what?

- Position students in a line facing you dismounted with their bikes on their right side.
- Ask them to hold up the hand that operates REAR brake. (some of them will not know)
- Correct them and remind RIGHT=REAR LEFT=FRONT Have students pull the rear brake and walk forward. Note the bike still moves, but the wheel drags. Pull the front brake and walk forward and note that the bike tips forward.

2. Braking Drill Challenge

- Set up a runway with the cones in a grassy area. Place a STOP sign in the last cone on the right.

- Demonstrate riding in a big circle and coasting through the cones and gently firmly squeezing brakes to come to a full stop.
- Students take turns riding through coming to a full stop in the cones without skidding.
- Add another cone for a progression and see if they can stop with their front wheel JUST touching that cone.
- Add another progression to see if they can come to a full stop and start again without putting a foot down. (This is for fun only and should not be practiced when riding in a group on the road)

Group:	Non-AT Mountain Bike Group	AT Mountain Bike Group
Activity:	Start/Stopping; Snail Race (balance/control)	Start/Stopping; Snail Race (balance/control)
Goals:	Safety, Protection, Bicycle Care	FVC: Be safe, CBC, Bicycle Care
Debrief:	Clean up, return bikes	Recreational: What role did you play in your group? What did you find supportive from your team? How did you support your team? Educational: So what helped your team move faster/slower? So what helped you remember the components of the bicycle? Therapeutic: How can you work together this week outside of group? How can you be supportive of someone else this week? What can you do to get support from others this week?

Week: 2

Session: 4 (September 11, 2020)

EcoWellness Factors: Physical Access, Sensory Access, Protection

Briefing:

- Review ABC quick check; review safety equipment and procedures
- Explain and demonstrate weaving and turning protocol
- Treatment group revisited Circles of Comfort to address ‘challenge by choice’ or ‘choose your level of challenge’. Participants reflected FVC during debrief, elected to change “care for self and others” to “be respectful”. Group processed difficulty of adhering to “be here”, “be safe”, and “be respectful” during session and set goal for next session to adhere to values in order to move forward with the program. This facilitator readdressed how group was currently in stretch zone and observed the groups feelings of being down and opportunity to apply a value. Group members identified “let go and move on”. Issues and appreciations were shared – issue with running into one another and behaving carelessly, not honoring values. Appreciation – the group was able to attempt the task and engage in activity when outside of their comfort zone.

Group:	Non-AT Mountain Bike Group	AT Mountain Bike Group
Activity:	Weaving/Turning Activity	Weaving/Turning Activity
Goals:	Safety, Protection, Bicycle Care	FVC: Be safe, Set goals, CBC
Debrief:	Clean up, return bikes	Recreational: What was the goal for today? Educational: So what goal did you set for yourself? How did your goal change? How did you take care for self and others? Therapeutic: Now what goals did you have set for yourself this week? How might you change your goals? Is there something you would like to take more slowly and controlled? More quickly?

Week: 3

Session: 5 (September 15, 2020)

EcoWellness Factors: Physical Access, Sensory Access, Protection, Preservation

Briefing:

- Explain and demonstrate “ready position”. Demonstrated and performed “ready position” with finger on brakes, level pedals, off the seat, slight bend in elbows and knees.

- Explain and demonstrate road readiness - Roll away only after hearing the all-clear to do so.

Pair and ride with a buddy (2 by 2) on group rides when room allows. Be aware, be safe (use signals, call out stopping and slowing, avoid running into others, don’t try to do “tricks”). One leader, one sweeper, and volunteers throughout as floaters, students may ride 2 x2 where there is room. This establishes a protocol for group rides, 2x2 ok in some cases (greenway or paved trail) but single file on neighborhood roads. Students should never pass the leader or fall behind the sweep. Students learn to watch ahead and follow precisely where the leader goes. Include stop signs and objects to maneuver around or over and make sure all riders are doing the same. Call out slowing and stopping. Watch for students having issues stopping or shifting.

- Explain and demonstrate proper cadence and gear shifting – after practicing on flat surface, participants attempted to shift gears going uphill (repeated exercise until achieving set goal).

Group:	Non-AT Mountain Bike Group	AT Mountain Bike Group
Activity:	Follow the leader; Road etiquette; Gear shifting	Follow the leader; Road etiquette; Gear shifting
Goals:	Braking Control	FVC: Set goals, care for self and others; Braking control
Debrief:	Clean up, return bikes	Recreational: What did you learn about shifting? What happened if you shifted improperly? If you were in the wrong gear? Educational: So what does shifting allow us to do? Therapeutic: How might you need to shift gears this week outside of group?

Week: 3

Session: 6 (September 18, 2020)

EcoWellness Factors: Physical Access, Sensory Access, Protection, Preservation

Briefing:

- Review “ready position”. Demonstrated and performed “ready position” with finger on brakes, level pedals, off the seat, slight bend in elbows and knees.
- Review road readiness - Roll away only after hearing the all-clear to do so. Pair and ride with a buddy (2 by 2) on group rides when room allows. Be aware, be safe (use signals, call out stopping and slowing, avoid running into others, don’t try to do “tricks”). One leader, one sweeper, and volunteers throughout as floaters, students may ride 2 x2 where there is room. This establishes a protocol for group rides, 2x2 ok in some cases (greenway or paved trail) but single file on neighborhood roads. Students should never pass the leader or fall behind the sweep. Students learn to watch ahead and follow precisely where the leader goes. Include stop signs and objects to maneuver around or over and make sure all riders are doing the same. Call out slowing and stopping. Watch for students having issues stopping or shifting.
- Review proper cadence and gear shifting – after practicing on flat surface, participants attempted to shift gears going uphill (repeated exercise until achieving their personal set goal).

Treatment group frontloaded with recalling prior session difficulties and conditions to be able to go off-campus. Treatment group members identified “be here”, “be respectful”, “set goals”, “be safe” as values representative of prior and current session needs. Treatment group processed session by overviewing the ready position and gear shifting, several students identified feeling in their stretch zone.

Group:	Non-AT Mountain Bike Group	AT Mountain Bike Group
Activity:	Follow the leader; Group ride	Follow the leader; Group ride
Goals:	Braking Control; Gear shifting	FVC: Set goals, care for self and others; Braking Control; Goal setting; Gear shifting
Debrief:	Clean up, return bikes	Recreational: What did you learn about shifting? What happened if you shifted improperly? If you were in the wrong gear? Educational: So what does shifting allow us to do? Therapeutic: How might you need to shift gears this week outside of group?

Week: 4**Session: 7** (September 22, 2020)**EcoWellness Factors:** Physical Access, Sensory Access, Protection, Preservation**Briefing:**

Due to light rain and shared space both groups rode the greenway around the lake instead of dirt trails. Addressed road etiquette and maintaining trails by not riding when wet/muddy. The treatment group revisited prior session – Acknowledged shifting gears and ready position, reported learning to shift prior to engaging the hill and only while pedaling, what gear to properly shift towards when ascending and descending; having level pedals and slight bend to ride over terrain. Upon reaching the lake the group set a goal to maintain social distancing, ride around the lake twice, and as a group make it in 45 minutes. The group accomplished their goals and made time in 30 minutes. Processed with the group with what stood out to them, what they observed/noticed. Students began to share different animals they saw, the sounds of crickets and birds chirping, tapping of the raindrops on leaves, the coolness of the hair and the body warming up.

Group:	Non-AT Mountain Bike Group	AT Mountain Bike Group
Activity:	Group ride	Group ride
Goals:	Shifting	FVC: Let go and move on; Shifting
Debrief:	Clean up, return bikes	Recreational: What sounds, sites, smells did you notice during the ride? What part(s) of the bike were easiest/hardest to recall? What did you notice about your bike as we rode? Educational: So what helped you remember components of the bike? So what about the <i>sensory</i> did you notice? Therapeutic: Now what about this process will you take away into the weekend? How can this help you before we meet next?

Week: 5

Session: 8 (October 23, 2020)

EcoWellness Factors: Physical Access, Sensory Access, Protection, Preservation

Briefing:

- Review bike parts and maintenance
- Review gear shifting; Call out a gear number (rear shifter only) 1-7.
- Review trail etiquette.
- Explain and demonstrate scanning and signaling

1. Scanning

- Set up a runway with the cones in a grassy area. Place a STOP sign in the last cone on the Set up a large oval course
- Position one volunteer at one end and one at the other
- One at a time as students pass you riding at a moderate pace call out “Scan!” to prompt them to look over their shoulder at you. Hold up 1, 2 or 0 arms. They must scan quickly and then report how many arms you have up. The goal is to report accurately on both ends 2 times around the course.

2. Signaling

- Set up a mock street course either in a grassy area or a large parking area.
- Course should include both right and left-hand turns with stop signs
- Course should be large enough so that students have ample time to start gathering speed, signal and come to a full stop before proceeding through the intersection
- Practice several times until students begin to feel comfortable then reverse or change the course.
- Note: left turns require a scan and signal early to move to the left-most part of the lane.

Treatment group went over FVC and identified areas that were challenging and set goals to remain in stretch zone.

Group:	Non-AT Mountain Bike Group	AT Mountain Bike Group
Activity:	Bike maintenance, shifting, anticipation	Bike maintenance, shifting, anticipation
Goals:	Shifting	FVC: Let go and move on; Shifting; Awareness/Foresight
Debrief:	Clean up, return bikes	Recreational: What did you learn about potential obstacles? What happened if you noticed a potential hazard? Educational: So what does foresight allow us to do? Therapeutic: How might you need to scan and be aware of potential challenges or obstacles in the week ahead?

Week: 6

Session: 9 (October 27, 2020)

EcoWellness Factors: Physical Access, Sensory Access, Protection, Preservation, Connection

Briefing:

- Object avoidance – demonstration of scanning and signaling
 - Choose flat terrain either smooth grass or ideally parking lot
 - Set up one, two then three cones side by side and 10 feet apart
 - Demonstrate how to avoid the cones by swinging wide left then rolling right up next to the right side of the cone then flicking the wheel left to let the cone pass between the front and back wheels
 - Challenge students to pass up to level 3
 - Keep adding more cones to increase the challenge
 - Treatment group reviewed prior processing of ‘foresight’, planning, predicting, and preparation
- Half of control group participants elected not to ride due to weather conditions and inappropriate attire, students without gloves who elected to ride decided to return after half the ride. Treatment group revisited “be safe” value which included preparation and protection from weather elements, accountability to group members to ensure they have proper gear before coming to school. Group member “set goal” as group to ride around the lake twice before returning. Half the group made it around twice, while the other half waited and cheered on the group finishing.

Group:	Non-AT Mountain Bike Group	AT Mountain Bike Group
Activity:	Group ride; Safety	Group ride; Safety
Goals:	Balance and avoiding obstacles	Parallel processing/metaphor, support
Debrief:	Clean up, return bikes	Recreational: What was difficult about balancing? What was easy about balancing? Avoiding obstacles? Educational: So what would allow you to be more balanced? So what helps you avoid obstacles? Therapeutic: What obstacles or challenges are you currently facing outside of group? What would help you create or feel more balanced this week?

Week: 6

Session: 10 (October 29, 2020)

EcoWellness Factors: Physical Access, Sensory Access, Protection, Preservation, Connection

Briefing:

- Participants reviewed scanning and signaling
- Reviewed trail etiquette and road safety
- Group ride on paved trail and roadway to demonstrate reviewed material.

Trails still closed due to recent rain.

- Reviewed buddy system and road readiness/etiquette with comparison group.
- One student ran into parked car upon returning to school. Treatment group went over etiquette, set goals, scanning, briefed foresight, planning, predicting, preparedness to see upcoming obstacles, shifting gears, unpredictable events (people and animals).

Group:	Non-AT Mountain Bike Group	AT Mountain Bike Group
Activity:	Application ride	Application ride
Goals:	Balance and avoiding obstacles	Parallel processing/metaphor, support
Debrief:	Clean up, return bikes	Recreational: What did you notice about yourself, others, surroundings? What did you discover by doing? Educational: So what did your advisor say and what did you listen to? So what risks did you take? Therapeutic: Now what could your advisor tell you that is helpful/unhelpful? Now what can you challenge your discover to do this week?

Week: 7

Session: 11 (November 3, 2020)

EcoWellness Factors: Physical Access, Sensory Access, Protection, Preservation, Connection

Briefing:

Application ride

- Review all previously learned skills
- Both groups went on dirt trail ride of beginner/intermediate difficulty
- Treatment group revisited comfort zones and reflected on trail experience; problem solve to increase flow and cohesion. Members demonstrated problem solving skills by reflecting comfort zones of skills on the trail and organized themselves based on level of comfort to enhance the flow of the ride.

Group:	Non-AT Mountain Bike Group	AT Mountain Bike Group
Activity:	Scan and signal; musical bicycles; group ride	Scan and signal; musical bicycles; group ride
Goals:	Road rules	FVC: Be here; Parallel Process: Communication; problem solving
Debrief:	Clean up, return bikes	Recreational: What happened when someone called out scan? Educational: So what made it challenging to identify the signal? What would have made it easier? Harder? How easy was it to signal? Therapeutic: When might you need to signal? What signals have you been giving your friends, family? How might you be more attentive this week outside of group?

Week: 8

Session: 12 (November 10, 2020)

EcoWellness Factors: Physical Access, Sensory Access, Protection, Preservation, Connection

Briefing:

- Trails closed due to rain
- Participants performed bike maintenance and chain cleaning
- Application group ride on paved trail once rain cleared

Group:	Non-AT Mountain Bike Group	AT Mountain Bike Group
Activity:	Bike maintenance; group ride	Bike maintenance; group ride
Goals:	Road rules	FVC: Be here; Parallel Process: Communication
Debrief:	Clean up, return bikes	Recreational: What did you notice about the bikes you were responsible for? Educational: So what procedures did you follow to maintain the bike mechanics? How might maintaining the bike affect its performance? Therapeutic: When might you need to maintain school, relationship, or home life? What are you responsible for this week? How might you be more attentive this week outside of group?

Week: 8

Session: 13 (November 13, 2020)

EcoWellness Factors: Physical Access, Sensory Access, Protection, Preservation, Connection, Community Connectedness

Briefing:

Application ride

- Review all previously learned skills
- Both groups went on dirt trail ride of beginner/intermediate difficulty

Group:	Non-AT Mountain Bike Group	AT Mountain Bike Group
Activity:	Slow Race; Bike relays; Green light, Red light	Slow Race; Bike relays; Green light, Red light
Goals:	Control	FVC: Be here, be honest
Debrief:	Clean up, return bikes	Recreational: What was the objective of today's trail ride? What happened during the ride? Educational: So what made it easier/difficult to ride? To maintain your pace? So what made you want to go faster/slower? Therapeutic: Now what can help you maintain a steady pace this week? Now what supports will help you listen to your adviser?

Week: 9

Session: 14 (November 17, 2020)

EcoWellness Factors: Physical Access, Sensory Access, Protection, Preservation, Connection, Community Connectedness

Briefing: Green Light, Red Light:

Application ride

- Review all previously learned skills
- Both groups went on new local all-weather bike park with multiple trails ranging from beginner to advanced difficulty

Students rode the new railyard and new mountain bike trail. Students demonstrated proper spacing and bike skills learned.

Treatment group processed end of group, zones of comfort and when they felt challenged and how they overcame and the sensations after successfully accomplishing a task or route. Students reflected choosing their challenge level and pushing beyond their comfort zone to be in their stretch zone. Student's reflected feeling joy and excitement for applying the skills they've learned on the new trails, feeling fear when attempting the tabletops and mountain bike trail, but relief, support, and encouraged when they successfully overcame the increased perceived risk. Students who initially reported feeling nervous chose to attempt the trail again.

Group:	Non-AT Mountain Bike Group	AT Mountain Bike Group
Activity:	Application ride	Application group (adjourning)
Goals:	Control	FVC: Be here, be honest
Debrief:	Clean up, return bikes	Recreational: What happened during the activity? When did you feel most comfortable? Nervous? Educational: So what helped you be successful? So what helped you stay cool, calm, and collected? So what made you decide when to toss the tube? Therapeutic: Now what will you do this week to help you when you feel anxious or nervous? Now what types of risks will you take this week to be successful?

APPENDIX F:
Model Fit Comparison

Variable	Covariance Structure	AIC
Engagement	Compound Symmetry	339.4
	Unstructured	347.4
Conflict	Compound Symmetry	321.7
	Unstructured	326.3
Avoidance	Compound Symmetry	347.1
	Unstructured	363.2
Optimism	Compound Symmetry	717.1
	Unstructured	727.7
Self-Efficacy	Compound Symmetry	770.6
	Unstructured	782.4
Adaptability	Compound Symmetry	560.7
	Unstructured	572.7
Total	Compound Symmetry	926.2
	Unstructured	942.2

APPENDIX G:
Covariance Matrices

Engagement Covariance Matrix

Row	Col1	Col2	Col3	Col4	Col5
1	1.0000	0.3383	0.5174	0.4377	0.4882
2	0.3383	1.0000	0.4954	0.6770	0.5951
3	0.5174	0.4954	1.0000	0.7440	0.5944
4	0.4377	0.6770	0.7440	1.0000	0.7862
5	0.4882	0.5951	0.5944	0.7862	1.0000

Conflict Covariance Matrix

Row	Col1	Col2	Col3	Col4	Col5
1	1.0000	0.8509	0.7003	0.6360	0.7030
2	0.8509	1.0000	0.6831	0.6752	0.7466
3	0.7003	0.6831	1.0000	0.5613	0.8041
4	0.6360	0.6752	0.5613	1.0000	0.7908
5	0.7030	0.7466	0.8041	0.7908	1.0000

Avoidance Covariance Matrix

Row	Col1	Col2	Col3	Col4	Col5
1	1.0000	0.1705	0.2748	0.2846	0.1390
2	0.1705	1.0000	0.2602	0.4930	0.4338
3	0.2748	0.2602	1.0000	0.5545	0.4545
4	0.2846	0.4930	0.5545	1.0000	0.3608
5	0.1390	0.4338	0.4545	0.3608	1.0000

Optimism Covariance Matrix

Row	Col1	Col2	Col3	Col4	Col5
1	1.0000	0.8159	0.5654	0.7949	0.7668
2	0.8159	1.0000	0.6569	0.8525	0.8039
3	0.5654	0.6569	1.0000	0.7312	0.6280
4	0.7949	0.8525	0.7312	1.0000	0.8392
5	0.7668	0.8039	0.6280	0.8392	1.0000

Self-Efficacy Covariance Matrix

Row	Col1	Col2	Col3	Col4	Col5
1	1.0000	0.4789	0.6708	0.7549	0.6840
2	0.4789	1.0000	0.5925	0.6677	0.6809
3	0.6708	0.5925	1.0000	0.7661	0.7485
4	0.7549	0.6677	0.7661	1.0000	0.8788
5	0.6840	0.6809	0.7485	0.8788	1.0000

Adaptability Covariance Matrix

Row	Col1	Col2	Col3	Col4	Col5
1	1.0000	0.5575	0.7061	0.5861	0.7669
2	0.5575	1.0000	0.4806	0.4557	0.6452
3	0.7061	0.4806	1.0000	0.6523	0.6281
4	0.5861	0.4557	0.6523	1.0000	0.7560
5	0.7669	0.6452	0.6281	0.7560	1.0000

Total Covariance Matrix

Row	Col1	Col2	Col3	Col4	Col5
1	1.0000	0.5897	0.7039	0.7912	0.7378
2	0.5897	1.0000	0.6533	0.7346	0.7349
3	0.7039	0.6533	1.0000	0.7958	0.7462
4	0.7912	0.7346	0.7958	1.0000	0.8744
5	0.7378	0.7349	0.7462	0.8744	1.0000

APPENDIX H:
Random Effects Results

Engagement Random Effects

Cov Parm	Subject	Estimate
UN(1,1)	id	0.9501
UN(2,1)	id	0.2906
UN(2,2)	id	0.7765
UN(3,1)	id	0.5160
UN(3,2)	id	0.4467
UN(3,3)	id	1.0471
UN(4,1)	id	0.3847
UN(4,2)	id	0.5379
UN(4,3)	id	0.6865
UN(4,4)	id	0.8131
UN(5,1)	id	0.5465
UN(5,2)	id	0.6022
UN(5,3)	id	0.6985
UN(5,4)	id	0.8142
UN(5,5)	id	1.3191

Conflict Random Effects

Cov Parm	Subject	Estimate
UN(1,1)	id	0.8961
UN(2,1)	id	0.8358
UN(2,2)	id	1.0767
UN(3,1)	id	0.6556
UN(3,2)	id	0.7010
UN(3,3)	id	0.9781
UN(4,1)	id	0.6453
UN(4,2)	id	0.7509
UN(4,3)	id	0.5950
UN(4,4)	id	1.1488

Conflict Random Effects

Cov Parm	Subject	Estimate
UN(5,1)	id	0.8053
UN(5,2)	id	0.9374
UN(5,3)	id	0.9623
UN(5,4)	id	1.0257
UN(5,5)	id	1.4643

Avoidance Random Effects

Cov Parm	Subject	Estimate
UN(1,1)	id	0.6139
UN(2,1)	id	0.1091
UN(2,2)	id	0.6677
UN(3,1)	id	0.1957
UN(3,2)	id	0.1933
UN(3,3)	id	0.8261
UN(4,1)	id	0.2005
UN(4,2)	id	0.3624
UN(4,3)	id	0.4533
UN(4,4)	id	0.8092
UN(5,1)	id	0.1165
UN(5,2)	id	0.3793
UN(5,3)	id	0.4420
UN(5,4)	id	0.3472
UN(5,5)	id	1.1449

Optimism Random Effects

Cov Parm	Subject	Estimate
UN(1,1)	id	21.4924
UN(2,1)	id	19.6285
UN(2,2)	id	26.9286
UN(3,1)	id	12.8522
UN(3,2)	id	16.7133
UN(3,3)	id	24.0375
UN(4,1)	id	20.7945
UN(4,2)	id	24.9629
UN(4,3)	id	20.2297
UN(4,4)	id	31.8387
UN(5,1)	id	20.7601
UN(5,2)	id	24.3620
UN(5,3)	id	17.9797
UN(5,4)	id	27.6522
UN(5,5)	id	34.1003

Self-Efficacy Random Effects

Cov Parm	Subject	Estimate
UN(1,1)	id	39.1549
UN(2,1)	id	17.5638
UN(2,2)	id	34.3476
UN(3,1)	id	25.3365
UN(3,2)	id	20.9601
UN(3,3)	id	36.4404
UN(4,1)	id	29.2266
UN(4,2)	id	24.2119
UN(4,3)	id	28.6127
UN(4,4)	id	38.2842

Self-Efficacy Random Effects

Cov Parm	Subject	Estimate
UN(5,1)	id	24.2098
UN(5,2)	id	22.5725
UN(5,3)	id	25.5556
UN(5,4)	id	30.7544
UN(5,5)	id	31.9918

Adaptability Random Effects

Cov Parm	Subject	Estimate
UN(1,1)	id	7.1381
UN(2,1)	id	3.4401
UN(2,2)	id	5.3333
UN(3,1)	id	4.0967
UN(3,2)	id	2.4103
UN(3,3)	id	4.7153
UN(4,1)	id	4.1151
UN(4,2)	id	2.7654
UN(4,3)	id	3.7222
UN(4,4)	id	6.9059
UN(5,1)	id	5.0872
UN(5,2)	id	3.6993
UN(5,3)	id	3.3862
UN(5,4)	id	4.9323
UN(5,5)	id	6.1640

Total Random Effects

Cov Parm	Subject	Estimate
UN(1,1)	id	125.91
UN(2,1)	id	77.6592
UN(2,2)	id	137.76
UN(3,1)	id	93.2105
UN(3,2)	id	90.4805
UN(3,3)	id	139.25
UN(4,1)	id	106.87
UN(4,2)	id	103.79
UN(4,3)	id	113.04
UN(4,4)	id	144.89
UN(5,1)	id	95.7835
UN(5,2)	id	99.7904
UN(5,3)	id	101.88
UN(5,4)	id	121.78
UN(5,5)	id	133.85

APPENDIX I:

SAS Code

```

data mtblong;
INPUT id phase group eng con avoid opt se adapt total;
CARDS;
3208 1 1 3 3 3 14 20 6 40
3208 2 1 3 3 3 14 20 6 40
3208 3 1 2.2 0.25 2.666666667 18 22 7 47
3208 4 1 2.8 1 3 20 20 9 49
3208 5 1 2.6 1 3.666666667 21 25 9 55
4908 1 2 4.8 0 3.333333333 25 26 11 62
4908 2 2 3.4 0.25 3 25 29 12 66
4908 3 2 4.6 1.25 3.666666667 23 34 12 69
4908 4 2 4.6 0.25 4 26 35 12 73
4908 5 2 4.8 0.25 5.666666667 27 34 12 73
9606 1 1 2.2 2.5 3 15 21 9 45
9606 2 1 2.2 2 2.666666667 16 19 7 42
9606 4 1 2.8 0.75 3 19 23 7 49
9606 5 1 2.6 1.25 3.333333333 18 19 5 42
9807 2 1 3.2 0.5 4 18 25 11 54
9807 3 1 3 0.25 3.666666667 19 27 7 53
9807 4 1 3 0.25 5 15 21 6 42
10807 1 1 2.4 0.5 3.666666667 19 35 11 65
10807 2 1 1.4 0.75 3.333333333 13 29 10 52
10807 3 1 2.4 0.25 3 17 30 8 55
10807 4 1 2.2 1 4.333333333 12 32 6 50
10807 5 1 2.2 0.5 2 16 31 10 57
11008 1 2 3.4 0 3.666666667 20 34 12 66
11008 2 2 3.8 0 5.333333333 24 35 12 71
11008 3 2 3.2 0 5.333333333 22 38 12 72
11008 4 2 3 0 5 25 38 12 75
11008 5 2 3.6 0 5.666666667 26 37 12 75
12806 1 1 0.4 2.25 1.333333333 5 14 3 22
12806 2 1 2 2 3.333333333 4 18 7 29
12806 3 1 2.8 2.25 2.666666667 7 18 5 30
12806 4 1 2.6 2 3.333333333 4 15 5 24
12806 5 1 1.6 1.75 3 5 16 5 26
11207 1 1 3 0.5 4 17 36 12 65
11207 2 1 2.4 0.5 3 14 20 6 40
11207 3 1 2 0.5 2.666666667 16 31 12 59
11207 4 1 1.8 0.5 3 16 24 9 49
11207 5 1 3 1 3.333333333 21 24 9 54
51106 1 1 1.6 1.25 3.333333333 20 26 8 54
51106 2 1 1.6 1 3.333333333 18 28 8 54
51106 3 1 1 0.75 2.333333333 14 26 7 47
51106 4 1 1.6 1 3.666666667 17 27 7 51
51106 5 1 2 0.75 3 15 24 8 47
51208 1 1 2.6 2 3 . . .
51208 2 1 . . . 5 13 8 26
51208 3 1 4.8 1.5 5.333333333 21 32 10 63
51208 4 1 2.6 2.75 3 . . .
51208 5 1 2.2 3.75 2.666666667 11 23 8 42
62207 1 1 1.8 0.25 2.333333333 20 26 8 54
62207 2 1 2.2 0 3 21 30 8 59
62207 3 1 2.2 0.25 2.333333333 21 28 8 57
62207 4 1 2.6 0 3.333333333 23 27 7 57
62207 5 1 2.4 0 2.666666667 23 24 8 55
81007 1 1 2.2 0.25 3 18 24 6 48
81007 2 1 2.4 0.25 2.666666667 18 24 6 48

```

81007	3	1	3.2	0	2.666666667	19	26	6	51
81007	4	1	3.4	0.25	2.333333333	21	24	9	54
81007	5	1	4	0.75	3.666666667	17	23	7	47
102406	1	1	3	1.5	3.333333333	14	20	6	40
102406	2	1	2.6	0	3	16	20	3	39
102406	3	1	3.2	0.25	3.666666667	16	25	8	49
102406	4	1	3	0	3.333333333	16	24	9	49
102406	5	1	3.8	0.5	3.333333333	17	25	7	49
112707	1	1	3.4	1.75	2.666666667	18	23	7	48
112707	2	1	4.8	1	2.666666667	20	26	7	53
112707	3	1	4	1.75	2.666666667	21	24	7	52
112707	4	1	3.8	0.75	2.333333333	24	15	2	41
121106	1	1	2.4	0.5	3.333333333	11	37	10	58
121106	2	1	0.6	0	1.333333333	11	24	7	42
121106	3	1	0.6	0.75	2.333333333	14	25	7	46
121106	4	1	0.8	0.25	3.333333333	14	27	8	49
121106	5	1	1.2	0.5	1.666666667	7	28	10	45
121406	1	1	2	1.25	1.666666667	17	25	8	50
121406	2	1	3.2	0.25	2.666666667	19	32	10	61
121406	3	1	2.8	0.5	2	20	33	8	61
121406	4	1	3.8	0.25	2	17	27	9	53
121406	5	1	4.2	0.5	3.666666667	18	29	7	54
121807	1	1	3.8	1.5	3.666666667	14	23	4	41
121807	2	1	3.8	1.5	3.333333333	18	24	5	47
121807	3	1	4	0.75	4	21	23	6	50
121807	4	1	4.8	0.5	4.333333333	23	22	6	51
8607	1	2	1.6	1	2.666666667	15	23	7	45
8607	2	2	3	1.25	3.333333333	15	21	6	42
8607	3	2	2	1	3	15	25	9	49
8607	4	2	2.8	1.5	3	15	24	8	47
12508	2	2	2.6	0.25	4.333333333	13	33	11	57
12508	3	2	1.8	0.75	2	24	33	9	66
12508	4	2	2.4	0.75	2.666666667	14	36	12	62
12508	5	2	2.8	1	3	11	32	11	54
22608	1	2	2.2	1.75	3.666666667	18	20	9	47
22608	2	2	1.2	2	2.666666667	13	20	9	42
22608	3	2	2.4	3	2.666666667	10	17	6	33
22608	4	2	2.8	3.25	2.333333333	17	22	7	46
22608	5	2	2	3	2.666666667	13	21	9	43
41808	1	2	2	0.25	3.333333333	20	31	10	61
41808	2	2	2.4	0.25	3	21	29	9	59
41808	3	2	1	0.5	1.666666667	23	26	10	59
41808	4	2	1.6	0.25	1.666666667	23	31	12	66
41808	5	2	1	0.25	2	25	31	9	65
42807	1	2	2	2	2	10	27	4	41
42807	2	2	2	1.25	1.666666667	12	26	4	42
42807	3	2	3	1.25	2.666666667	9	23	4	36
42807	4	2	1.6	2.25	2	7	23	4	34
42807	5	2	2	1	2	9	24	4	37
42808	1	2	2.8	1.5	2.666666667	27	36	12	75
42808	2	2	2.8	1.75	4	26	36	11	73
42808	3	2	4	0.5	4	28	39	12	79
42808	4	2	4	3	4.666666667	27	37	11	75
42808	5	2	4.6	1.5	4.333333333	28	40	12	80
42908	1	2	2	0.5	1.666666667	16	24	12	52
42908	2	2	1.6	1.5	2.666666667	12	19	9	40
42908	3	2	2.2	1.25	2.666666667	19	21	12	52

52106	1	2	1.8	2.75	3	15	16	8	39	
52106	2	2	2	2.5	2.3333333333	13	21	7	41	
52106	3	2	2.2	3.25	3.6666666667	10	15	6	31	
52106	4	2	2.4	3	2.3333333333	12	16	6	34	
52106	5	2	4.8	4.5	5.3333333333	21	23	8	52	
61907	1	2	2.8	1	4	23	33	8	64	
61907	2	2	2.2	0.25	2	22	33	11	66	
61907	3	2	2.6	0.5	3.6666666667	23	34	10	67	
61907	4	2	3	0.25	4	23	34	11	68	
61907	5	2	3.6	0.5	3.6666666667	24	32	11	67	
72407	1	2	1.4	1.5	1.3333333333	18	23	6	47	
72407	2	2	2.4	3	2.3333333333	14	20	6	40	
72407	3	2	3.2	1.5	3.6666666667	15	22	6	43	
72407	4	2	3.2	1.5	3.6666666667	14	18	6	38	
72407	5	2	3.4	2	3	15	15	4	34	
91507	1	2	1.6	1.25	2.3333333333	16	31	11	58	
91507	2	2	2.4	1	2	13	27	8	48	
91507	3	2	2.2	0.75	2.6666666667	16	30	9	55	
91507	4	2	2.8	1	3.3333333333	18	31	12	61	
91507	5	2	2.6	0.25	2.6666666667	19	33	12	64	
122607	1	2	4.8	3.5	3	13	22	6	41	
122607	2	2	1.4	3.75	3	20	36	11	67	
122607	3	2	3.8	4.5	4.3333333333	19	30	9	58	
122607	4	2	3	2.25	2.6666666667	14	23	10	47	
1302007	1	2	2.8	2	3.6666666667	12	24	4	40	
1302007	2	2	2.2	2	2.6666666667	12	20	6	38	
1302007	3	2	2.8	1.5	3.6666666667	17	34	9	60	
1302007	4	2	2	4.25	3	13	22	4	39	
1302007	5	2	2.8	3	2.3333333333	15	25	5	45	

;

run;

proc print data=mtblong (obs=10);

run;

proc means data=mtblong;

class phase group;

var eng con avoid opt se adapt total;

run;

proc contents data=mtblong;

run;

/*Model Fit Comparison*/

Proc mixed data=mtblong plots=all;

class group phase id;

model total = group phase group*phase;

repeated phase / subject=id type=un;

run;

Proc mixed data=mtblong plots=all;

class group phase id;

model total = group phase group*phase;

repeated phase / subject=id type=cs;

run;

```

/*proc mixed*/
ods output lsmeans=engl;
Proc mixed data=mtblong plots=all;
class group phase id;
model eng = group phase group*phase /s;
repeated phase / subject=id type=un rcorr;
lsmeans phase / diff;
run;

/*Conflict*/
Proc mixed data=mtblong plots=all;
class group phase id;
model con = group phase group*phase /s;
repeated phase / subject=id type=un rcorr;
lsmeans group*phase / slice=phase diff;
run;

/*Avoidance*/
Proc mixed data=mtblong;
class group phase id;
model avoid = group phase group*phase /s;
repeated phase / subject=id type=un rcorr;
run;

/*Optimism*/
Proc mixed data=mtblong;
class group phase id;
model opt = group phase group*phase /s;
repeated phase / subject=id type=un rcorr;
run;

/*Self-Efficacy*/
Proc mixed data=mtblong;
class group phase id;
model se = group phase group*phase /s;
repeated phase / subject=id type=un rcorr;
run;

/*Adaptability*/
Proc mixed data=mtblong plots=all;
class group phase id;
model adapt = group phase group*phase /s;
repeated phase / subject=id type=un rcorr;
lsmeans group / diff;
run;

/*Total*/
Proc mixed data=mtblong;
class group phase id;
model total = group phase group*phase /s;
repeated phase / subject=id type=un rcorr;
run;

```

```

/*partial eta*/

Proc mixed data=mtblong;
class group phase id;
model eng = group phase group*phase/outpm=outpml solution ddfm=kr;
repeated phase / subject=id type=un ;
ods output tests3=tests3;
run;

PROC MEANS DATA=outpml nonobs noprint FW=12
PRINTALLTYPES CHARTYPE VARDEF=N VAR N ;
VAR total Resid;
OUTPUT OUT=var3 VAR()= N()= / ;
RUN;

data var4; set var3; id=_n_;
run;

data test_eta;
set tests3;
id=_n_;
Run;

PROC SQL; CREATE TABLE test_eta_2 AS SELECT t1.*, t2.*
FROM WORK.TEST_ETA t1 , WORK.VAR4 t2 ;
quit;

data total; set test_eta_2;
mse =resid*(_freq_-1)/_freq_;
ss_effect = numdf*Fvalue*mse; ss_total = (_freq_ -1)*total; ss_error =
mse*(_freq_-numdf);
eta_2=ss_effect/ss_total; omega_2 = (ss_effect-(numdf*mse))/(ss_total+mse);
partial_eta_2=ss_effect/(ss_effect+ss_error);
run;

proc print data=total;
var effect eta_2 omega_2 partial_eta_2 ;
run;

```