Improving the Study Habits of Adolescents with ADHD

Michael Peter Mesa
IMPROVING THE STUDY HABITS OF ADOLESCENTS WITH ADHD

By

MICHAEL PETER MESA

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The members of the supervisory committee were:

Susan Losh
Professor Directing Thesis

Jeannine Turner
Committee Member

Angela Canto
Committee Member

The Graduate School has verified and approved the above-named committee members, and certifies that the thesis has been approved in accordance with university requirements.
This thesis is dedicated to my family.
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ABSTRACT

The Summer Treatment Program for Adolescents (STP-A) is a summer long intensive treatment for adolescents with Attention Deficit Hyperactivity Disorder (ADHD) that uses several components of applied behavior analysis. The participants in this secondary data analysis were adolescents ranging from 10 to 16 years of age entering grades six and nine. This study assessed changes in observable behavior related to improvement in the self-regulatory behavior, learning strategy usage, and academic achievement of the adolescents (e.g., time spent on-task during study hall, flashcard accuracy, and quiz scores), when controlling for grade level. The results suggest that the treatment components of the STP-A are helpful in improving the study habits and academic achievement of the participants.

Keywords: STP-A, ADHD, self-regulation, on-task behavior, study hall, adolescents
CHAPTER 1

INTRODUCTION

Over 5 million children are diagnosed with Attention Deficit Hyperactivity Disorder (ADHD; APA, 2013). Children and adolescents with ADHD experience serious academic impairment due to their symptomatology (Kent et al., 2010). There is limited research on improving the academic functioning of adolescents with ADHD. The most empirically effective treatment for individuals with ADHD appears to be a multimodal approach combining the use of medication with applied behavior analysis (Jensen et al., 2001). Differing behavioral approaches have been explored in the past in an attempt to increase the positive behaviors of adolescent students with the disorder, including the use of treatments to improve self-regulatory behaviors of students (Norvilitis, 2012; Reid, Trout, Schwartz, 2005).

This study analyzed data from the Summer Treatment Program for Adolescents (STP-A) that were collected during the summer of 2013. The data analysis focused on data collected during study hall and Academic Learning Center (ALC). This study assessed changes related to improvement in self-regulation, learning strategy usage, and achievement of adolescents with ADHD. A secondary goal of the study was to determine if the improvement differed between middle school and high school students.

The STP-A is an eight-week treatment program directed at adolescents with ADHD that includes the use of applied behavior analysis and a strong parental involvement component (Pelham, Sibley, Evans, Smith, Gnagy, & Greiner, 2010). The STP-A was adapted from the Summer Treatment Program (STP), a nationally recognized child directed intervention for ADHD (Sibley, Smith, Evans, Pelham, and Gnagy, 2012). Sibley, Pelham, Evans, Gnagy, and Ross (2011) conducted a pilot study to assess the effectiveness of the STP-A. This empirical
research focused primarily on assessing treatment effectiveness of the STP-A through the use of rating scales. However research has not been published to date on the effects of the STP-A through the use of behavioral data collected throughout the duration of the program. This study adds to the field of knowledge by assessing the observable behaviors related to treatment effectiveness.

This study analyzed existing data from the Summer Preparatory Program for Adolescents (SPP), which is an ongoing study examining the effect of the STP-A on adolescents transitioning to middle school and high school. The present study analyzed existing data, specifically on-task behavior, learning strategy usage, and academic achievement. It was expected that the percentage of on-task behavior during study hall, flashcard accuracy, and quiz scores would increase throughout treatment. Analysis was also conducted to assess whether grade level impacted the changes in dependent variables. In particular, this study had two research questions:

1. Does the treatment components of the STP-A improve the study habits and academic achievement of adolescents with ADHD?
2. Does improvement in study habits and academic achievement differ between grade levels?

The following chapters will include a review of the literature relevant to this study including a description of the STP-A and its most relevant treatment components. A description of the methodology and analysis used in this study will be provided. The results of this study will be presented and discussed in the context of the research already conducted on the STP-A.
CHAPTER 2
LITERATURE REVIEW

This literature review focuses on the STP-A and the treatment components most relevant to this study, which include applied behavior analysis, self-monitoring, and goal setting. The symptomatology, impairment, and treatment related to ADHD are briefly discussed. A review of the current research conducted on the STP-A is provided.

Adolescents with ADHD

All of the adolescents who participated in the STP-A had an ADHD diagnosis. ADHD is a neurodevelopmental disorder that presents in childhood and results in restless, inattentive, and impulsive behavior (APA, 2013). The estimated prevalence of the disorder is 5% in children and 2.5% in adults. One must show at least six symptoms of inattention or hyperactivity/impulsivity as having persisted and negatively impacted functioning for at least six months to meet diagnostic criteria in the DSM-5, (APA, 2013). Further diagnostic criteria requires that symptoms must have been present prior to the age of twelve years and symptoms must be present in at least two settings (e.g., school, work, and other activities).

Impairment

Adolescents with ADHD often experience significant academic impairment due to the symptomatology of the disorder. Multiple studies have examined the experience of students with ADHD in high school. Kent et al. (2010) studied a sample of 326 males with a diagnosis of ADHD and 213 controls with similar demography. The study assessed participants once during each grade of high school (grades 9, 10, 11, 12). The results of the study indicated that the participants with ADHD experience significantly more academic impairment when compared to control students, including lower overall grade point average, lower levels of class placement,
and higher rates of course failure. The results indicated that children with ADHD continue to experience academic difficulties during adolescence. Thus, interventions focused specifically on adolescents with ADHD, as in the present study, are considered warranted and necessary to treat their ADHD-related symptomatology in the academic context.

Students with ADHD experience negative academic outcomes for multiple reasons; one reason may be deficits in executive functioning. Barkley’s (1997) model of ADHD focuses on executive functioning deficits related to behavioral inhibition that negatively affect the self-regulatory behaviors of individuals with ADHD. Barkley considers ADHD to be a disorder that affects an individual’s executive functioning and results in the use of poor self-regulatory behaviors (Barkley, 1997).

**Treatment**

The Multimodal Treatment Study of ADHD (MTA) study was a National Institute of Mental Health (NIMH) study designed to evaluate the effectiveness of multiple treatments for ADHD, including medications, behavioral treatments, and the combination of both (Jensen et al., 2001). The MTA study is the largest treatment study for ADHD ever conducted. The results suggest that the most effective treatment for individuals with ADHD is the use of both applied behavior analysis and medication (Jensen et al., 2001). Although both applied behavior analysis and medication improved outcomes when used separately, the most positive results were seen with the use of applied behavior analysis and medication in unison.

Several current treatments focus on improving the self-regulatory behaviors of students with ADHD. Reid et al. (2005) conducted a meta-analysis of the literature on self-regulation interventions for children with ADHD and determined the use of self-monitoring and self-monitoring with reinforcement were effective treatments to increase the self-regulatory behaviors
of students with ADHD. The treatment in this study included the use of self-monitoring with reinforcement while the adolescents are in study hall.

**STP-A**

The Summer Treatment Program for Adolescents (STP-A) is an intensive adolescent-directed treatment program that includes a strong parental involvement component. A similar child-directed treatment program, Summer Treatment Program (STP), has been taking place for over 30 years in multiple locations nationwide with very positive results (Pelham, Gnagy, Greiner, Waschbusch, Fabiano, & Burrows-MacLean, 2010). The STP-A was developed out of the same framework but as an intensive treatment program targeting adolescents with ADHD (Pelham, Sibley, Evans, Smith, Gnagy, & Greiner, 2010).

The program consists of multiple, integrated treatment components including: behavior therapy in a camp setting, academic skills training in a classroom setting, social skills training, and behavioral parent training. The program includes the use of a behavior tracking system that provides immediate feedback delivered by the counselors. The behavior tracking system used in the STP-A is a modification of the behavior tracking system that is used in the STP elementary program. Privileges are contingent upon the behavior of the adolescents. Counselors notify adolescents of the loss of privilege when a negative behavior occurs. Adolescents receive privileges and rewards upon exhibiting positive behaviors (Pelham, Sibley, et al., 2010). Therefore, adolescents are constantly receiving consistent feedback and consequences throughout the treatment.

The program employs a block schedule that includes academic and social skills modules. Classroom activities that are in the daily schedule focus on improving organization, task completion, and time management (Pelham, Sibley, et al., 2010). Other components of the STP-
A include the use of recreational activities to improve social skills and job training. Parental involvement is strongly encouraged and required through participation in weekly parent meetings and upholding reward contingencies at home. An example of the daily schedule can be seen in Appendix A.

**ALC.** The STP-A contains multiple treatment components targeting academic and social behavior, but the data used in this study was solely collected in the science block of ALC and study hall. The ALC was a classroom used for the academic periods of the STP-A. ALC consisted of classes on history, science, creative writing, and health. “The purpose of the adolescent’s participation in the learning center is to: develop strategies that will enhance his/her academic progress, develop appropriate classroom behaviors, and enhance current academic skills” (Pelham, Sibley, et al., 2010, p. 14). The history, science, and creative writing classes each focused on teaching a distinct study skill or learning strategy. The adolescents were also taught how to self-monitor their behavior while in ALC. Adolescents completed in-class assignments and quizzes multiple times a week to assess their academic achievement.

Science class was a 50-minute block that adolescents attended every other day. The science block of ALC focused on improving the study skills and test-taking abilities of the students (Pelham, Sibley et al., 2010). The teacher gave a brief lecture each day about new vocabulary terms and definitions that were later used to create the flashcards during study hall. During ALC, the adolescents completed a quiz on the same vocabulary terms for which they heard a lecture the previous class and created flashcards. The teacher administered the quiz during the science period after the terms were introduced and the flashcards were created. The teacher permitted the students to look over their flashcards prior to taking the quiz. The teacher would collect the flashcards prior to administering the quiz to the adolescents. The quiz
consisted of matching the definition and the correct vocabulary term. The teacher would score the quiz and flashcards according to the rubric provided in the STP-A Manual (Pelham, Sibley et al., 2010). The rubric can be seen in Appendix B.

Adolescents received homework assignments each class period to be completed during study hall. Adolescents were responsible for writing their assignments in their planner and subsequently in their study hall schedule. The homework for the science class always consisted of the creation of flashcards for science terms and definitions that were discussed in class. The flashcards were created during study hall and used by the adolescents to prepare for the science quiz that was given at the beginning of the next class.

Study hall. As part of the daily schedule, adolescents participated in study hall for 30 minutes a day. Adolescents were required to complete assignments, prepare for upcoming quizzes, and self-monitor their behavior on their study hall schedule (Pelham, Sibley et al., 2010). The study hall schedule was created by the adolescent with assistance from the counselor and used to self-monitor their behavior. The schedule created by the students had to have specific tasks to complete during study hall, such as “Complete making all science flashcards.” Adolescents were also required to write exactly how long they would be working on the assignment in their study hall schedule. An example of a study hall schedule can be seen in Appendix C. Counselors reviewed the schedule to assure that it was written appropriately and that the correct assignments were written from the planner.

Adolescents monitored their achievement on their study hall schedule. Adolescents would mark when they had completed a task and move on to the next task on their schedule without the use of cues. Adolescents were also required to have a counselor’s initial on the study hall schedule after the completion of each task prior to moving on to the next task. The
counselor checked to make sure that the task had been completed and that the adolescent was following the schedule correctly. Adolescents were responsible for making sure that they moved on to the next task on the study hall schedule when the allotted amount of time had passed. Although the counselors monitored on-task behavior through the use of a study hall monitoring sheet, the adolescents were unaware of the intervals used by the counselor and were unaware of their overall on-task percentage until study hall was over.

The counselors used the study hall schedule to establish whether the adolescent was on-task or not during study hall. The adolescent had to be actively working on the task that was specified in the study hall schedule to be considered on-task. A counselor was walking around the classroom with the study hall monitoring sheet at all times during study hall. Counselors were responsible for monitoring on-task behavior through random checks at least five times during study hall (Pelham, Sibley et al., 2010). The counselors gave adolescents a raffle ticket for each time they were found to be on-task during the random checks performed by the counselors during the study hall. The raffle tickets were not distributed until study hall had ended. If a student was on-task the entire period, he/she would receive five raffle tickets. At the end of each week, each group would pick a raffle winner that would receive a reward, such as a gift card or candy of his/her choosing.

**STP-A Treatment Components**

**Applied behavior analysis.** The treatment components of the STP-A most relevant to this study include applied behavior analysis, self-monitoring, and goal-setting. Behaviorism is a theoretical perspective that arose in the early 1900s and focuses on studying observable behaviors. Early theories of behaviorism focused on conditioning and reinforcement. Reinforcement is any consequence occurring after a behavior that increases the likelihood of the
behavior occurring again in the future (Miltenberger, 2011; Skinner, 2011). The basis of the theory is that individuals will perform a behavior more often if they are provided with a consequence that they consider positive.

Adolescents with ADHD may be approached with many possible stimuli when in an academic context. The presence of competing stimuli can make it difficult to purposefully attend to those of importance. An individual is more likely to respond to a stimulus if it is followed by a consequence that is reinforcing. Therefore, if an individual receives reinforcement after performing a behavior, then he/she will be more likely to perform the behavior again in the future. However, an individual is less likely to perform a behavior if it does not yield a rewarding consequence (Skinner, 2011). An effective behaviorist treatment to increase the frequency of a behavior would provide reinforcement when a behavior is performed after the presentation of the stimulus. This process of changing an individual’s behavior through the use of a treatment or intervention is called applied behavior analysis or behavior modification (Bandura, 1969).

One way that the STP-A attempts to increase the frequency of positive behaviors is by controlling the antecedents and consequences of behavior. The antecedents of the behavior are controlled through the use of consistent rules, schedules, and procedures. The antecedents of a behavior are controlled through the use of a behavioral tracking system and token economy, which allows for immediate feedback and consequences to be given. The structure of the behavioral tracking system in the STP-A provides consistent consequences and feedback to the adolescents. Rewards are contingent on behaviors tracked through the behavioral tracking system thus increasing incentive and motivation to perform positive behaviors. Applied behavior analysis has been used to increase the social and academic behaviors of students with
ADHD in many studies. Most relevant to this study, research has focused on the use of positive reinforcement to increase the positive academic behaviors of students with ADHD (Graham-Day, Gardner III, & Hsin, 2010).

**Self-monitoring.** Treatment for students with ADHD often uses self-monitoring to improve self-regulatory behaviors. Self-monitoring consists of an individual assessing his/her own behavior through the use of self-observation and self-recording. Research associated with self-monitoring is categorized into two separate areas: self-monitoring of performance and self-monitoring of attention (Harris, Friedlander, Saddler, Frizzelle, & Graham, 2005). In self-monitoring of performance, an individual assesses a certain aspect of their academic performance, such as the number of items completed or the amount of time spent on a task. In self-monitoring of attention, individuals assess their behavior and determine whether they are paying attention. Although both types of self-monitoring include self-assessment and self-recording, the strategies have differing underlying rationale and focus. While self-monitoring of performance assumes that increasing academic achievement will increase on-task behavior, self-monitoring of attention assumes that increasing on-task behavior will increase academic achievement.

Self-monitoring with reinforcement consists of the self-monitoring procedures plus the delivery of reinforcement from another individual if the target or goal is reached. The results of the meta-analysis conducted by Reid et al. (2005) showed that both self-monitoring and self-monitoring with reinforcement produced positive outcomes for participants. The analyses of data of this study provide corroboratory findings about the effectiveness of self-monitoring with reinforcement for students with ADHD.
The treatment in this study used self-monitoring of achievement with reinforcement. Adolescents were taught how to self-monitor their behavior while they were in ALC as part of the academic skills training. Adolescents were provided with a study hall schedule to self-monitor their behavior while they were in study hall. The adolescents had goals and tangible rewards related to their self-monitoring and on-task behavior.

**Goal-setting.** Latham and Locke (1991) developed goal-setting theory, which focuses on the use of effective goals to increase motivation and positive self-regulatory behaviors. The theory has been developed with the help of industrial/organizational psychologists and based on the results of hundreds of studies. The theory provides practical knowledge to improve the motivation and achievement of students with ADHD by changing the types of goals that they set. Goal-setting theory characterizes effective goals as those that are specific and moderately difficult (i.e., the student will be on task for at least 80% of study hall).

Individuals with ADHD are likely to set goals that are easy and quickly achieved. Although setting an easy goal may assure that an individual will be able to reach the target, it does not improve motivation. Students who set a difficult but attainable goal are more likely to show increased motivation. Furthermore, a goal should be specific in nature. Specificity will allow the student to know exactly when a goal is reached. Thus, according to Locke and Latham’s goal-setting theory, effective treatment to increase the motivation and self-regulation of students with ADHD would include the use of moderately difficult, specific goals (Locke & Latham, 2011).

Ryan and Deci’s (2000) self-determination theory also provides suggestions to improve the motivation of individuals. The theory suggests that autonomy promotes intrinsic motivation and self-regulation. Therefore, individuals will be more likely to be motivated to complete goals
that they created or have control over. In the context of the current study, autonomy is promoted by allowing the adolescents to create their study hall schedule with the assistance of a counselor.

Johnson and Reid (2001) provided further suggestions to improve executive functioning for students with ADHD. Executive function is an umbrella term used to describe the mental processes associated with self-regulation. Teachers can help ADHD students improve their planning and strategy use by providing direct instruction, consisting of clear instructions, provided in a step-by-step manner, if possible. Teachers can improve the goal setting of students with ADHD by discussing the importance of goal setting and having students set academic goals. Teachers can also provide the students with the means necessary to monitor their goals.

The treatment in the current study setting used goal setting as part of the daily procedures. All adolescents were given daily goals for social and academic behaviors as part of their daily report card. Daily treatment goals in the daily report card were developed by the treatment team with the use of behavioral, program data and information on normative rates of behaviors. Adolescents received rewards and privileges during the evening if they achieved the required number of goals in their daily report card. The study hall schedule was also used as a goal-setting mechanism. Adolescents created a study hall schedule prior to each study hall with materials provided by the counselors. If the adolescents reached their academic targets they received reinforcement. Thus, the daily report card was used for long-term goals and the study hall schedule was used for short-term goals. The multiple components of the STP-A combined highly validated treatments aimed to improve not only the self-regulatory behaviors of the adolescents, but their overall academic and social functioning.

**Treatment Response to STP-A**

Limited research exists on the treatment effectiveness of the STP-A. Sibley et al. (2011)
conducted an evaluation of a pilot study of 19 adolescents with ADHD participating in the STP-A. Exploratory analysis of the response to the STP-A has shown an increase in all target domains when using rating schools completed by adolescents, parents, and teachers. Parent ratings have shown improvement in several academic and social-cognitive domains, including task completion, cooperativeness, social skills, self-esteem, and overall improvement.

In the analysis of the pilot study, Sibley et al. (2011) analyzed whether participants improved on several variables, including on-task behavior—by comparing the mean rate during the last three weeks of the program to established benchmarks. The results showed that participants improved in reaching their treatment goals for several variables, including on-task behavior, throughout the program. However it was not determined whether on-task behavior significantly changed throughout treatment, because the analysis focused on comparing the mean rate to the normative rate.

Sibley et al. (2012) conducted exploratory analysis of parent improvement ratings from a cohort of adolescents who participated in the STP-A between 1993 and 1995 in Pittsburgh. The analysis of data collected, over a decade ago, was never conducted and is relevant due to the lack of research assessing the effectiveness of interventions for adolescents with ADHD. Furthermore, the treatment components of the STP-A used in the 1990s are still valid and consistent with the latest treatment. The sample in this analysis consisted of 36 adolescents of at least 12 years of age who reached ADHD diagnosis according to the DSM-III-R (APA, 1987). Other participation criteria included a verbal IQ higher than 80 and no conditions that would prohibit the use of stimulant medication or participation in athletic activities.

The results of the study conducted by Sibley et al. (2012) showed overwhelmingly positive results when looking at parent improvement ratings. Parents rating suggested that
adolescents had improved at least somewhat across all domains. The proportion of adolescents who saw improvement within each domain ranged from approximately 63% to 90%. This study provides additional evidence of the effectiveness of the STP-A as an intervention to improve the functioning of adolescents with ADHD. It is worth noting that nearly no worsening of behaviors was seen within the sample regardless of comorbid disorders.

Although a large amount of program data were collected during the treatment phase of the STP-A, thorough analysis of this treatment data has not been conducted. Analysis conducted during the pilot study on the effect of participation in the STP-A focused primarily on the use of pre and post measures completed by parents, teachers, and adolescents. The current analyses also provided supplementary evidence to the results that were found in the pilot study and exploratory analysis. Secondary analysis of behavioral data provided more information about the treatment effectiveness by assessing the behavioral, program data.
CHAPTER 3

METHODS

Participants

The participants of the study were 36 adolescents who participated in the STP-A provided by the Center for Children and Families (CCF) at Florida International University (FIU) during the summer of 2013. The participants participated in the SPP, an on-going study assessing the effectiveness of the STP-A for adolescents entering middle school and high school. Therefore, all participants were adolescents who were transitioning to middle school or high school in Miami-Dade County Public Schools the following year. There were 30 males (83%) and 6 females (17%). Adolescents entering middle school ranged from 10 to 13 of age \((n=20, 56\%)\) and adolescents entering high school ranged from 13 to 16 years of age \((n=16, 44\%)\).

Seventy-two percent of the participants were Hispanic \((n=26)\). This is a unique sample size due to the large percentage of Hispanics, but is fairly representative of the south Florida community.

All participants were adolescents who were diagnosed with ADHD and experiencing significant academic impairment due to ADHD. All participants had to meet diagnostic criteria for ADHD according to the \textit{DSM-IV-R} (APA, 2000). All participants were entering their first year in middle school or high school during the upcoming year. Other eligibility requirements included a verbal IQ of at least 80 and the absence of pervasive developmental disorder and psychotic disorders. Parents signed informed consent forms and adolescents signed assent forms prior to participation in the treatment program.

Participants were recruited through the use of advertisements that were given to faculty at Miami-Dade County Public Schools. The faculty were informed about the study and provided with forms to be given to parents to nominate their child to participate in the program. The
faculty was asked to give the information to the parents of adolescents with academic impairment stemming from problems with inattention and hyperactivity/impulsivity. Parents who were interested in having their child participate in the program called the CCF at FIU to complete a phone screening. At this point it was determined whether the participant met the requirements to be eligible for the study. Parents and teachers of the adolescent completed behavioral rating scales to assure ADHD diagnosis. Adolescents were administered multiple assessments to obtain IQ scores. If eligibility requirements were met, adolescents were randomly assigned to a treatment group that would participate in the STP-A during the summer of 2013 or a control group that would receive treatment at a later point. The participants in this study were all from the treatment group that participated in the SPP during the summer of 2013.

Procedure

The primary investigator of the SPP provided written approval to use the data for use to fulfill requirements of my thesis. The Human Subjects Committee of Florida State University approved this study on December 2, 2014. The HSC number is 2014.11236 and can be seen in Appendix D. The parental consent and adolescent assent letters that were approved by FIU and used in the recruitment process can be seen in Appendix E and F.

All participants completed the screening process and consented to participate in the STP-A during the summer of 2013. All academic activities in the program took place in the classrooms of a Florida middle school that was used solely by STP-A and other treatment programs from the CCF. The majority of the participants were transported to and from the middle school through the use of a bus system hired by the program. The setting of the program was similar to what the adolescents would experience during the following school year when they enter middle school or high school.
The data used for this study were collected while students were in science class and study hall. All of the data in this study was program data that were collected as part of the daily procedures during the STP-A in the summer of 2013. Counselors recorded on-task percentage while students were in study hall. The teacher of the students’ science class recorded flashcard accuracy scores and quiz scores. Counselors and teachers entered all program data into a database daily. It is expected that within-student data would show a large amount of variability. In order to reduce within-subject variation, weekly aggregations of program data were used in the study. All dependent variables were aggregated to weekly means.

**Measures**

**On-task behavior.** The construct of self-regulation was assessed through the on-task behavior of the adolescents while they were in study hall. Adolescents completed the academic tasks written in their study hall schedule during the 30-minute period. A counselor directly monitored the on-task behavior of the adolescents during study hall. On-task behavior was operationalized as quietly sitting in a desk and actively completing the task that was written in the study hall schedule. If the adolescent completed all the tasks on his/her study hall schedule with time still remaining, he/she had to continue to work on an academic task the remainder of the time to be considered on-task. If an adolescent did not complete a study hall schedule or did not use it during the study hall period, then he/she was not counted as on-task for any interval. Thus correct implementation of the self-monitoring procedures was required in order for the adolescents to be considered on-task during study hall in this study.

The counselors continuously measured time on-task through direct observation and the use of an on-task tracking sheet. A counselor would discreetly make random checks five times during the study hall. Counselors calculated the total percentage of time spent on-task daily by
dividing the time period into multiple intervals and measuring as a percentage. These were recorded and stored for analysis throughout the summer (Pelham, Sibley et al., 2010). The procedure used to measure on-task behavior is similar to the methodology used in other studies (Mahar, Murphy, Rowe, Golden, Shields, & Raedeke, 2006). All student data were aggregated to weekly averages.

**Flashcard accuracy.** Flashcard accuracy scores were used to measure learning strategy usage of adolescents. Adolescents completed flashcards while in study hall for vocabulary terms that were reviewed in the science class. The adolescents wrote the vocabulary words and definitions in their notebook while in class and were provided with the materials to complete the flashcards while in study hall. Adolescents completed the flashcards of the science vocabulary terms while in study hall and turned them in to the teacher at the next science class. Adolescents were required to summarize the definition into five or less words on their flashcards. It is expected this would increase meaningful encoding of the terms.

Teachers scored flashcard accuracy according to the rubric in the STP-A Manual. Adolescents were required to write the vocabulary word on one side of the flashcard and a brief definition consisting of five or less words on the other. Teachers gave complete credit if flashcards were correctly written, 50% if it was not written correctly, and 0% if it was not completed (Pelham, Sibley et al., 2010). Flashcard accuracy scores were aggregated to weekly totals. Weekly means of flashcard accuracy scores were calculated.

**Quiz scores.** Quiz scores were used to measure the achievement of adolescents. Adolescents completed science quizzes on vocabulary terms every science class. The quiz consisted of matching the definition with the term. Adolescents completed the quiz at the beginning of science class after being given 10 minutes to look over their flashcards.
Teachers graded the quizzes according to the rubric provided in the STP-A Manual. Teachers gave each correct answer a score of one and incorrect answers a score of zero. Quiz score comprised of the quotient of correct answers over number of items (Pelham, Sibley et al., 2010). Quiz scores were aggregated to weekly totals. Weekly means of flashcard accuracy scores were calculated.

**Design**

The goal of this study was to assess changes in observable behavior related to improvement in the self-regulation of adolescents with ADHD during participation in the STP-A. The hypotheses for this study included the following:

1. The percentage of time-spent on-task during study hall would increase over the eight-week treatment period.

2. The quiz scores of the adolescents would increase over the eight-week treatment period.

3. The flashcard accuracy scores of the adolescents would increase over the eight-week treatment period.

4. There would be a significant difference in the effect of treatment due to grade level.

The analysis consisted of the use of repeated measures analysis of variance (RM-ANOVA) on IBM SPSS Statistics (Version 20). The within-subjects factor of time and the between-subjects factor of grade level were the independent variables in this study. The between subjects variables of gender and ethnicity were also included in analysis because of their possible effects. On-task percentage during study hall, quiz scores, and flashcard accuracy were the dependent variables.

The use of RM-ANOVA is appropriate in this study because data was collected throughout several points for all participants. It was expected that repeated measures from the same
participant would be correlated with each other. Calculation of \( \rho \), intraclass correlation, allows for control of the correlation within subjects among the repeated measures. This would allow one to use RM-ANOVA to assess a within-subjects difference in means over multiple time points.

The structure of the data collected during ALC and study hall allowed for the use of RM-ANOVA. Counselors assessed on-task percentage daily for each participant throughout the eight-week program. Each student had a total of approximately forty on-task percentages upon the completion of the treatment program. Quiz scores and flashcard accuracy were also assessed multiple times per week. This allowed for aggregation of weekly data and analysis of difference of within-subjects means for each week. The use of RM-ANOVA would allowed me to determine if there was a difference in means for the dependent variables for each week of the treatment.

The participants of the SPP were all entering middle school or high school the next school year. All groups were composed of adolescents in the same grade. The structure of the groups of participants allowed for use of RM-ANOVA to assess for a between-subjects difference in means. It was determined if there is a difference in on-task percentage, quiz score, and flashcard accuracy depending on the grade level of the adolescents. Analysis of a difference in between-subjects means provided information on the treatment effect for each grade level. It was also determined if there was an interaction effect for between-subject and within-subject factors. It was possible that adolescents responded to treatment differently depending on their grade level.

A univariate RM-ANOVA was completed for each dependent variable separately with time as a within-subjects effect. This allowed me to determine if there was a difference among mean values of each dependent variable throughout treatment. A multivariate RM-ANOVA was then
conducted to determine if there was an overall difference in means for all dependent variables with time being the only independent variable. Lastly, a multivariate repeated measures analysis of covariance with mixed models (RM-MANCOVA) was used to determine if there was still an overall difference in the dependent variables controlling for the between subject factor of grade level and if there was a difference in treatment effects among grade levels.

Lastly, it was expected that the dependent variables of quiz scores and flashcard scores would be correlated to each other. Exploratory factor analysis (EFA) was used to reduce the variables to a single factor for each week of treatment. The resulting factor scores for each week were used as a dependent variable titled, Academic Performance. The dependent variable of Academic Performance was then used to conduct confirmatory analysis through the use of RM-ANOVA. Furthermore, multivariate analysis was conducted with the use of RM-MANOVA with the dependent variables of Academic Performance and on-task percentage. The between-subjects effect of grade level was controlled for all analysis.

**Power Analysis**

Although this study was for secondary analysis of existing data, *a priori* analysis was conducted to assure that the sample size was large enough to achieve the minimum required and desired power of .80. The main hypotheses in this study were to assess a difference in the dependent variables (on-task behavior, flashcard accuracy, quiz scores) throughout the weeks of treatment. A power test was conducted through the use of G*Power 3.1.3. (Faul, Erdfelder, Lang & Buchner, 2007) for an F test of differences using RM-ANOVA with within subject factors for a single dependent variable (univariate analysis). A medium effect size of .2 was used and alpha was set to .05, as is commonly used (Bakeman, 2005). Two groups and seven repeated measurements were used in the program. It was also assumed that the repeated
measures would have a correlation of .7. The program reported that the use of 16 subjects would result in a power of approximately .81. The results of this power analysis can be seen in Appendix G.

The secondary purpose of this analysis was to assess simple interaction effects for the within-subjects effect of time and between-subjects effect. The between subjects factor of grade level consisted of two groups. Again, the program estimated the sample size needed when two groups and seven repeated measures are used. A correlation was .7 was assumed for repeated measures. The results indicated that a power of approximately .81 can be reached with the use of 16 participants. The results of this power analysis can be seen in Appendix H.

It appeared that the results of the program provided support for the secondary analysis of the existing data through the use of repeated measures ANOVA. The sample size of the data set in this study was 36 with 28 participants with complete data.

In an attempt to double check the power analysis conducted above, post-hoc analysis was also conducted using the known sample size and expected effect size. Again, an effect size of .2 was used and alpha was set to .05. The sample size was set at 28 with the use of two groups and seven repeated measurements. The correlation among repeated measures was assumed to be .7. The program reported that the expected power would be .98. Because this is quite a high power, the effect size was reduced to .15 to determine the difference in the power analysis. The program reported that the power would be approximately .82 if a small effect size was assumed. The results of this power analysis can be seen in Appendix I.

Post hoc power analysis for the F test of the interaction term for the repeated measures ANOVA was also conducted. The effect size was set to .15 with a sample size of 28 and two groups with seven repeated measurements. The correlation was assumed to be .7 once again.
The program reported that the expected power would be approximately .82. The results of this power analysis can be seen in Appendix J.

It appears that both the *a priori* and post hoc power analysis of the existing data provided support that sufficient power for statistical testing can be achieved. All of the *a priori* power analyses that were conducted resulted in sample sizes that can be met with the existing data set. Furthermore, the post hoc power analysis revealed sufficient sample size for a statistical power of at least .80 to be achieved. However, it should be noted that the power analyses was only conducted for the simplest of the models due to the limitations in the types of models that can be run by the program. A power analysis was unable to be conducted for the multivariate analysis due to the limitations of the program. The results suggest that there is sufficient power to make conclusions about the univariate analyses.
CHAPTER 3

RESULTS

The primary research purpose of this study was to examine the changes over time associated with the STP-A in improving the self-regulation, learning strategy usage, and academic achievement of adolescents with ADHD. I expected that these dependent variables would improve throughout the summer. I also hypothesized that there would not be a difference in the effect of treatment for the between-subjects factors, with the exception of grade level. The results from the analysis on study habits and academic achievement over time are presented prior to the results with the inclusion of between-subjects factors. The descriptive statistics for each dependent variable are provided.

Missing Data

Missing data for each dependent variable are presented in Table 1. Data is missing across the time points for each dependent variable due to absences. I used expectation maximization (EM) on the missing data from each dependent variable in order to use as much information as possible for all participants. EM is a method used to create maximum likelihood estimates of variables using the regression approach. EM increased the sample size by creating unbiased estimators of missing data for each dependent variable across the weeks of treatment in the dataset (Cheema, 2012). A comparison of the means and standard deviations of each dependent variable before and after EM are presented in Table 2.

An assumption necessary to use EM is that the missing data for each dependent variable is missing completely at random. Little’s (1998) missing completely at random (MCAR) test was used to determine if the missing values for each dependent variable were missing at random.
The results from Little’s MCAR test were insignificant for each dependent variable ($p$-value > .01), which suggests that the data is missing at random.

Table 1  
**Missing Data Comparison**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Before EM</th>
<th>After EM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Percentage Missing</td>
</tr>
<tr>
<td>On-task percentage</td>
<td>26</td>
<td>28%</td>
</tr>
<tr>
<td>Flashcard accuracy</td>
<td>28</td>
<td>21%</td>
</tr>
<tr>
<td>Quiz scores</td>
<td>24</td>
<td>33%</td>
</tr>
</tbody>
</table>

Table 2  
**Descriptive Statistics: EM Comparison**

<table>
<thead>
<tr>
<th>Week</th>
<th>Study Hall</th>
<th>Flashcards</th>
<th>Quiz</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\bar{x}$</td>
<td>$s$</td>
<td>$\bar{x}$</td>
</tr>
<tr>
<td>1</td>
<td>.765</td>
<td>.183</td>
<td>.936</td>
</tr>
<tr>
<td>2</td>
<td>.792</td>
<td>.166</td>
<td>.924</td>
</tr>
<tr>
<td>3</td>
<td>.867</td>
<td>.146</td>
<td>1.000</td>
</tr>
<tr>
<td>4</td>
<td>.844</td>
<td>.152</td>
<td>.977</td>
</tr>
<tr>
<td>5</td>
<td>.896</td>
<td>.129</td>
<td>.984</td>
</tr>
<tr>
<td>6</td>
<td>.916</td>
<td>.088</td>
<td>.913</td>
</tr>
<tr>
<td>7</td>
<td>.876</td>
<td>.102</td>
<td>.970</td>
</tr>
<tr>
<td>8</td>
<td>.927</td>
<td>.069</td>
<td></td>
</tr>
</tbody>
</table>

**Descriptive Statistics**

**On-task percentage.** The descriptive statistics and graphs for the mean values of each dependent variable are presented to foster an understanding of the trend in mean values across the summer. The mean value for on-task percentage during study hall increased throughout the summer, as can be seen in Table 2. The average on-task percentage during the first two weeks was below 80% but increased to over 87% by the final two weeks of treatment. Furthermore, the variation of on-task percentage decreased as the summer progressed. The standard deviation of
on-task percentage during the first two weeks was over .16, but decreased to below .10 by the final two weeks of the program.

Table 3

<table>
<thead>
<tr>
<th>Week</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.7606</td>
<td>.17447</td>
<td>36</td>
</tr>
<tr>
<td>2</td>
<td>.7890</td>
<td>.15977</td>
<td>36</td>
</tr>
<tr>
<td>3</td>
<td>.8661</td>
<td>.14013</td>
<td>36</td>
</tr>
<tr>
<td>4</td>
<td>.8430</td>
<td>.14559</td>
<td>36</td>
</tr>
<tr>
<td>5</td>
<td>.8933</td>
<td>.12640</td>
<td>36</td>
</tr>
<tr>
<td>6</td>
<td>.9163</td>
<td>.08408</td>
<td>36</td>
</tr>
<tr>
<td>7</td>
<td>.8813</td>
<td>.09583</td>
<td>36</td>
</tr>
<tr>
<td>8</td>
<td>.9255</td>
<td>.06441</td>
<td>36</td>
</tr>
</tbody>
</table>

*Figure 1.* Graph of on-task percentage during study hall.
**Flashcard accuracy scores.** The average flashcard accuracy scores and standard deviation can be seen in Table 4. Adolescents had an average score of approximately 93% on the quizzes during the first week of the program and 97% during week seven. The mean flashcard accuracy score remained above 90% throughout the summer and all adolescents received perfect flashcard accuracy scores during week three.

There was also an overall decrease in variation in flashcard accuracy scores. The standard deviation was approximately .16 during the first week of treatment and .08 during week seven. A graph of the average flashcard accuracy scores throughout treatment can be seen in Figure 3.

<table>
<thead>
<tr>
<th>Week</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.9331</td>
<td>.14637</td>
<td>36</td>
</tr>
<tr>
<td>2</td>
<td>.9239</td>
<td>.12494</td>
<td>36</td>
</tr>
<tr>
<td>3</td>
<td>1.000</td>
<td>.00000</td>
<td>36</td>
</tr>
<tr>
<td>4</td>
<td>.9774</td>
<td>.09190</td>
<td>36</td>
</tr>
<tr>
<td>5</td>
<td>.9872</td>
<td>.08465</td>
<td>36</td>
</tr>
<tr>
<td>6</td>
<td>.9133</td>
<td>.16571</td>
<td>36</td>
</tr>
<tr>
<td>7</td>
<td>.9697</td>
<td>.07923</td>
<td>36</td>
</tr>
</tbody>
</table>

**Quiz scores.** The average quiz scores and standard deviation for each week of treatment can be seen in Table 5. Adolescents had an average score of 60% on the quizzes during the first week of the summer and 74% during week seven. The mean score fluctuated with the highest mean of 94% during week three. It can be seen more clearly in the graph in Figure 2 that quiz scores averaged between 80% and 94% during weeks three through five. The mean decreased to 58% during week six and increased to 74% during week seven. There was also an overall
decrease in variation in quiz scores across adolescents as the treatment continued. The standard deviation fluctuated throughout treatment, but decreased from its rates during the first two weeks of the program. I will address possible causes for this nonlinear trend in the discussion section.

Table 5

<table>
<thead>
<tr>
<th>Week</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.5959</td>
<td>.33397</td>
<td>36</td>
</tr>
<tr>
<td>2</td>
<td>.5645</td>
<td>.29540</td>
<td>36</td>
</tr>
<tr>
<td>3</td>
<td>.9414</td>
<td>.15596</td>
<td>36</td>
</tr>
<tr>
<td>4</td>
<td>.9209</td>
<td>.15091</td>
<td>36</td>
</tr>
<tr>
<td>5</td>
<td>.8040</td>
<td>.22886</td>
<td>36</td>
</tr>
<tr>
<td>6</td>
<td>.5800</td>
<td>.23962</td>
<td>36</td>
</tr>
<tr>
<td>7</td>
<td>.7447</td>
<td>.23055</td>
<td>36</td>
</tr>
</tbody>
</table>

Figure 2. Graph of average quiz scores.
Study Habits and Academic Performance over Time

The Tests of Within-Subjects Effects were used to determine if there was a significant difference in the mean values of the dependent variables across the weeks of treatment. The multivariate analysis was conducted to determine if there was an overall difference in the means of the dependent variables. The three dependent variables are presented as outcomes using multivariate repeated measures analysis of variance (RM-ANOVA) for the within-subjects effect of time. The results can be seen in Table 6.
The multivariate analysis provided four test statistics that are associated with the F ratio. Pillai’s trace statistic was used in the multivariate analysis. In many cases, Pillai’s trace statistic is identical to the F ratio. This statistic was used because it is considered by some statisticians to be the most powerful and robust of the four statistics associated with the F ratio in multivariate analysis (Carey, 1998). The overall Pillai’s trace score demonstrated that there was significant overall difference in the mean values across the weeks of treatment.

Table 6

*Multivariate Tests of Within-Subjects Effects*

<table>
<thead>
<tr>
<th>Within-Subjects Effect</th>
<th>Value</th>
<th>F</th>
<th>Error df</th>
<th>p</th>
<th>Partial Eta Squared</th>
<th>Observed Power*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week</td>
<td>.597</td>
<td>8.444</td>
<td>18.000</td>
<td>&lt;.001</td>
<td>.199</td>
<td>1.000</td>
</tr>
</tbody>
</table>

* Computed using alpha = .05

Table 7

*Univariate Tests: On-Task Percentage, Flashcard Accuracy, & Quiz Scores*

<table>
<thead>
<tr>
<th>Effect</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F*</th>
<th>p</th>
<th>Partial Eta Squared</th>
<th>Observed Power*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-task percentage</td>
<td>.651</td>
<td>.012</td>
<td>.162</td>
<td>7.181</td>
<td>&lt;.001</td>
<td>.174</td>
<td>.995</td>
</tr>
<tr>
<td>Flashcard accuracy</td>
<td>.256</td>
<td>3.718</td>
<td>.069</td>
<td>3.765</td>
<td>.008</td>
<td>.100</td>
<td>.861</td>
</tr>
<tr>
<td>Quiz Scores</td>
<td>5.557</td>
<td>3.743</td>
<td>1.485</td>
<td>22.382</td>
<td>&lt;.001</td>
<td>.397</td>
<td>1.000</td>
</tr>
<tr>
<td>Error(Week)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-task percentage</td>
<td>3.082</td>
<td>136.425</td>
<td>.023</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flashcard accuracy</td>
<td>2.308</td>
<td>126.402</td>
<td>.018</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quiz Scores</td>
<td>8.442</td>
<td>127.270</td>
<td>.066</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Computed using alpha = .05
The results from the Tests of Within-Subjects Effects for each dependent variable are presented. The results from the univariate models provide evidence of a possible change in mean values of each dependent variable across the weeks of participation in the STP-A. Each dependent variable is presented as the outcome separately using a RM-ANOVA for the within-subjects effect of time.

**On-task percentage.** The first univariate RM-ANOVA model included on-task percentage during study hall as the dependent variable and weeks of treatment with eight levels (i.e., weeks) as the within-subjects factor. This analysis included 36 participants.

Sphericity refers to the difference between the variances in each level of the dependent variable being equal. The sphericity assumption is necessary for the use of RM-ANOVA and was tested with Mauchly’s Test of Sphericity (Mauchly, 1940). The result of Mauchly’s Test of Sphericity, measured through Mauchly’s $W$, provided evidence that the assumption of sphericity had been violated. Mauchly’s $W$ was equal to .088 with 27 degrees of freedom which was significant ($p$-value < .001). This means that the differences in variances between all the levels of the dependent variables were unequal and the F statistic would be too large and the associated alpha level would be too small compared with equal variances across the weeks of treatment. A correction was used to test the significance of difference in means. The Greenhouse-Geisser correction was used for all analyses in this study (Abdi, 2010). The Greenhouse-Geisser correction improves the accuracy of the analysis by correcting the number of degrees of freedom.

Levene’s test for equality of variances was used to determine if there was a significant difference in the variances (i.e., normality of distribution) of the dependent variables across the weeks of treatment. This test was used because it has strong power and is able to be used with variables that are not normally distributed (Gastwirth, Gel, & Miao, 2009). The results for
Levene’s test of homogeneity of variance across the weeks of treatment can be seen in Table 8. The results demonstrate that there is a significant difference in the variance of on-task percentage across the weeks of treatment.

The results of the Tests of Within-Subjects Effects for on-task percentage can be seen in Table 9. The sum of squares (SS), degrees of freedom (df), mean square (MS), F statistic (F), p-value (p), effect size (Partial Eta Squared), and observed power are presented. The Greenhouse-Geisser correction was used for all analyses. The F statistic was equal to a significant value of 8.580 with approximately four degrees of freedom and an observed power of .999. The results demonstrate that there is a significant difference in the mean values of on-task percentage across the weeks of treatment.

Table 8

<table>
<thead>
<tr>
<th>Variable</th>
<th>Levene Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-task percentage</td>
<td>4.306</td>
<td>7</td>
<td>279</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Table 9

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F*</th>
<th>p</th>
<th>Partial Eta Squared</th>
<th>Observed Power**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error (Week)</td>
<td>3.280</td>
<td>148.564</td>
<td>.022</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Mauchly’s W (27) = .087, p-value < .001
**Computed using alpha = .05

Flashcard accuracy scores. The second dependent variable that was analyzed was the flashcard accuracy scores of the adolescents. The univariate RM-ANOVA model with flashcard
accuracy scores as the dependent variable and weeks of treatment with seven repeated measurements (i.e., weeks) as the within-subjects factor was used. The final week of treatment was not included because flashcards were not completed during the final week. This analysis included 36 participants. The Tests of Within-Subjects Effects for flashcard accuracy scores can be seen in Table 11. Levene’s test (Table 10) was used once again to determine homogeneity of variances for flashcard accuracy scores across the weeks of treatment. The results suggest that there is a significant difference in the variance of flashcard accuracy scores across the weeks of treatment.

Table 10

<table>
<thead>
<tr>
<th>Levene’s Test: Flashcard Accuracy Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Flashcard accuracy scores</td>
</tr>
</tbody>
</table>

Table 11

Tests of Within-Subjects Effects: Flashcard Accuracy Scores

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F*</th>
<th>p</th>
<th>Partial Eta Squared</th>
<th>Observed Power**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week</td>
<td>.248</td>
<td>3.718</td>
<td>.067</td>
<td>3.757</td>
<td>.008</td>
<td>.097</td>
<td>.861</td>
</tr>
<tr>
<td>Error (Week)</td>
<td>2.315</td>
<td>130.121</td>
<td>.018</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Mauchly’s W (20)=.075, p-value<.001
**Computed using alpha = .05

Quiz scores. The third dependent variable that was analyzed was the adolescents’ quiz scores. The univariate RM-ANOVA model with quiz scores as the dependent variable and weeks of treatment with seven measurements (i.e., weeks) as the within-subjects factor was
analyzed. The final week of treatment was not included because quizzes were not completed during this week. This analysis included 36 participants. The Tests of Within-Subjects Effects can be seen in Table 13. There was a significant F value of 22.295 with approximately four degrees of freedom using the Greenhouse-Geisser correction.

Table 12

<table>
<thead>
<tr>
<th>Variable</th>
<th>Levene Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiz scores</td>
<td>7.126</td>
<td>6</td>
<td>245</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Levene’s test was used once again to determine homogeneity of variances for quiz scores across the weeks of treatment. The results suggest a significant difference in variance of quiz scores across the weeks of treatment. Furthermore, the results suggest a significant difference in the mean values of quiz scores across the weeks of treatment.

Table 13

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F*</th>
<th>p</th>
<th>Partial Eta Squared</th>
<th>Observed Power**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week</td>
<td>5.560</td>
<td>3.645</td>
<td>1.525</td>
<td>22.295</td>
<td>&lt;.001</td>
<td>.389</td>
<td>1.000</td>
</tr>
<tr>
<td>Error (Week)</td>
<td>8.729</td>
<td>127.584</td>
<td>.068</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Mauchly’s W (20) = .188, p-value < .001
**Computed using alpha = .05

Factor Analysis for Academic Performance

Academic performance. Flashcard accuracy scores and quiz scores were factored into a single variable because of the expected relationship between these variables. Exploratory factor analysis (EFA) was used to create the factor, Academic Performance. EFA was used to factor
quiz scores and flashcard accuracy scores into a single variable, Academic Performance. Factor scores are standardized with an expected mean equal to zero and standard deviation of one. The flashcard accuracy scores for week three with a small amount of random variance were used in order to allow factor analysis. Quiz scores and flashcard accuracy scores showed a moderately positive correlation throughout treatment. There was a significant Pearson Correlation (p < .05) during weeks two through five. Table 14 displays the correlation among flashcard accuracy scores and quiz scores across the weeks of treatment.

Prior to conducting the factor analysis, a small (i.e., no more than .09), random amount of variance was randomly added to each flashcard accuracy scores in week 3 (because flashcard scores for all participants were equal) with the use of a random number generator. This is the same approach used in ridge regression to add variance to the dependent variable. The procedure allowed factor analysis to be conducted with on-task percentage for week three (Hoerl & Kennard, 1970). The mean value of flashcard accuracy scores during week three with variance added was equal to .9575 and .028 standard deviation.

Table 14

<table>
<thead>
<tr>
<th>Correlation Matrix: Flashcard Accuracy Scores and Quiz Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Flashcard Accuracy Scores</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Quiz Score Week 1  -0.072</td>
</tr>
<tr>
<td>Quiz Score Week 2  0.125</td>
</tr>
<tr>
<td>Quiz Score Week 3  0.151</td>
</tr>
<tr>
<td>Quiz Score Week 4  0.492*</td>
</tr>
<tr>
<td>Quiz Score Week 5  0.252</td>
</tr>
<tr>
<td>Quiz Score Week 6  0.407*</td>
</tr>
<tr>
<td>Quiz Score Week 7  0.153</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Quiz Score Week 2  0.466**</td>
</tr>
<tr>
<td>Quiz Score Week 3  0.438</td>
</tr>
<tr>
<td>Quiz Score Week 4  0.263</td>
</tr>
<tr>
<td>Quiz Score Week 5  0.108</td>
</tr>
<tr>
<td>Quiz Score Week 6  0.407*</td>
</tr>
<tr>
<td>Quiz Score Week 7  0.631**</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Quiz Score Week 3  0.330*</td>
</tr>
<tr>
<td>Quiz Score Week 4  0.153</td>
</tr>
<tr>
<td>Quiz Score Week 5  0.163</td>
</tr>
<tr>
<td>Quiz Score Week 6  0.094</td>
</tr>
<tr>
<td>Quiz Score Week 7  0.215</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Quiz Score Week 4  0.548*</td>
</tr>
<tr>
<td>Quiz Score Week 5  0.419*</td>
</tr>
<tr>
<td>Quiz Score Week 6  0.472*</td>
</tr>
<tr>
<td>Quiz Score Week 7  0.154</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Quiz Score Week 5  0.472*</td>
</tr>
<tr>
<td>Quiz Score Week 6  0.170</td>
</tr>
<tr>
<td>Quiz Score Week 7  0.046</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Quiz Score Week 6  0.011</td>
</tr>
<tr>
<td>Quiz Score Week 7  0.121</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

*Correlation is significant at the 0.05 level (2-tailed)

**Correlation is significant at the 0.01 level (2-tailed)
Table 15

*EFA: Variance Explained by Academic Performance*

<table>
<thead>
<tr>
<th>Week</th>
<th>Total Variance Explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>53.59%</td>
</tr>
<tr>
<td>2</td>
<td>73.30%</td>
</tr>
<tr>
<td>3</td>
<td>66.48%</td>
</tr>
<tr>
<td>4</td>
<td>77.39%</td>
</tr>
<tr>
<td>5</td>
<td>73.58%</td>
</tr>
<tr>
<td>6</td>
<td>53.29%</td>
</tr>
<tr>
<td>7</td>
<td>56.04%</td>
</tr>
</tbody>
</table>

As Table 15 shows, at least approximately 53% of the total variance was explained by the first component in all weeks of treatment for the EFA conducted for Academic Performance. The earlier and later weeks of the program have less variance explained than in middle of the program. The descriptive statistics for Academic Performance can be seen in Table 16. The factor scores for Academic Performance increased throughout the summer with the peak being in week 5. The results of the multivariate Tests of Within-Subjects effects with the use of RM-ANOVA and the dependent variables of Academic Performance and on-task percentage can be seen in Table 17.

Table 16

*Descriptive Statistics: Academic Performance*

<table>
<thead>
<tr>
<th>Week</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-0.0147</td>
<td>1.0106</td>
<td>36</td>
</tr>
<tr>
<td>2</td>
<td>-0.0178</td>
<td>1.0088</td>
<td>36</td>
</tr>
<tr>
<td>3</td>
<td>-0.0113</td>
<td>1.0123</td>
<td>36</td>
</tr>
<tr>
<td>4</td>
<td>-0.0125</td>
<td>1.0117</td>
<td>36</td>
</tr>
<tr>
<td>5</td>
<td>0.0211</td>
<td>1.0065</td>
<td>36</td>
</tr>
<tr>
<td>6</td>
<td>-0.0087</td>
<td>1.0132</td>
<td>36</td>
</tr>
<tr>
<td>7</td>
<td>-0.0102</td>
<td>1.0127</td>
<td>36</td>
</tr>
</tbody>
</table>
The results of the multivariate Tests of Within-Subjects effects with the use of RM-ANOVA and the dependent variables of Academic Performance and on-task percentage can be seen in Table 17.

![Graph of academic performance.](image)

**Figure 4.** Graph of academic performance.

Table 17

<table>
<thead>
<tr>
<th>Within-Subjects Effect</th>
<th>Value</th>
<th>F</th>
<th>df</th>
<th>Error df</th>
<th>p</th>
<th>Partial Eta Squared</th>
<th>Observed Power*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week</td>
<td>.177</td>
<td>3.306</td>
<td>12.000</td>
<td>408.000</td>
<td>&lt;.001</td>
<td>.089</td>
<td>.996</td>
</tr>
</tbody>
</table>

*Computed using alpha = .05
Table 18

_Univariate Tests: Academic Performance & On-Task Percentage_

<table>
<thead>
<tr>
<th>Effect</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F*</th>
<th>p</th>
<th>Partial Eta Squared</th>
<th>Observed Power**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic Performance</td>
<td>.036</td>
<td>4.637</td>
<td>.008</td>
<td>.007</td>
<td>1.000</td>
<td>&lt;.001</td>
<td>.052</td>
</tr>
<tr>
<td>On-task percentage</td>
<td>.651</td>
<td>4.012</td>
<td>.162</td>
<td>7.181</td>
<td>&lt;.001</td>
<td>.174</td>
<td>.995</td>
</tr>
<tr>
<td>Error(Week)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic Performance</td>
<td>174.789</td>
<td>157.653</td>
<td>1.109</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-task percentage</td>
<td>3.082</td>
<td>136.425</td>
<td>.023</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Computed using alpha = .05

**Effects of Grade, Ethnicity, and Gender**

The final research question in this study was assessing the effect of grade level, ethnicity, and gender on Academic Performance and on-task behavior. The hypothesis was that there would be a significant interaction effect due to grade level. This is expected because development is faster at younger ages and more rapid development over time may be expected for the younger students. Gender was included because female participants may mature earlier than males while ethnicity was included because it can have an effect on nearly any variable.

The use of covariates for the between-subjects factors of grade, gender, and ethnicity also provide evidence of change in dependent variables when controlling for the between-subjects factor. Analysis was conducted to determine whether there was a change in the dependent variables throughout the program when controlling for the between-subjects factors of grade level, ethnicity, and gender (i.e., covariates). The multivariate repeated measures analysis of covariance (RM-ANCOVA) model with the dependent variables of Academic Performance and on-task behavior in study hall were used for this purpose; along with the within-subjects factor being weeks of treatment and the between-subjects covariate. A separate analysis was run for
each between-subjects factor (i.e., grade level, ethnicity, and gender). Pillai’s trace statistic was used once again for the multivariate analysis to determine the outcome of the repeated measures analysis.

**Grade level.** Analysis with the covariate for grade level was used to determine if grade level impacted the effect on Academic Performance and on-task behavior. The results of RM-ANCOVA for students’ academic achievement and on-task behavior, controlling for grade level can be seen in Table 19. Graphs comparing the dependent variables by grade level were created to display this interaction.

![Graph](image)

*Figure 5. Comparison of on-task percentage between grade levels.*
Table 19

Multivariate Tests with Covariant: Grade

<table>
<thead>
<tr>
<th>Effect</th>
<th>Value</th>
<th>F</th>
<th>Hypothesis df</th>
<th>Error df</th>
<th>p</th>
<th>Partial Eta Squared</th>
<th>Observed Power*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.938</td>
<td>240.697</td>
<td>2.000</td>
<td>33.000</td>
<td>.000</td>
<td>.938</td>
<td>1.000</td>
</tr>
<tr>
<td>Grade</td>
<td>.191</td>
<td>3.901</td>
<td>2.000</td>
<td>33.000</td>
<td>.030</td>
<td>.191</td>
<td>.663</td>
</tr>
<tr>
<td>Within Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week</td>
<td>.722</td>
<td>4.976</td>
<td>12.000</td>
<td>23.000</td>
<td>.000</td>
<td>.722</td>
<td>.997</td>
</tr>
<tr>
<td>Week * Grade</td>
<td>.650</td>
<td>3.562</td>
<td>12.000</td>
<td>23.000</td>
<td>.004</td>
<td>.650</td>
<td>.968</td>
</tr>
</tbody>
</table>

* Computed using alpha = .05

Table 20

Multivariate Tests of Within-Subjects Effects with Covariant: Grade

<table>
<thead>
<tr>
<th>Within-Subjects Effect</th>
<th>Value</th>
<th>F</th>
<th>Hypothesis df</th>
<th>Error df</th>
<th>p</th>
<th>Partial Eta Squared</th>
<th>Observed Power*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week</td>
<td>.203</td>
<td>3.848</td>
<td>12.000</td>
<td>408.000</td>
<td>&lt;.001</td>
<td>.102</td>
<td>.999</td>
</tr>
<tr>
<td>Week * Grade</td>
<td>.131</td>
<td>2.383</td>
<td>12.000</td>
<td>408.000</td>
<td>.006</td>
<td>.066</td>
<td>.965</td>
</tr>
</tbody>
</table>

* Computed using alpha = .05

Table 21

Univariate Tests with Covariant: Academic Performance & On-Task Percentage

<table>
<thead>
<tr>
<th>Effect</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F*</th>
<th>p</th>
<th>Partial Eta Squared</th>
<th>Observed Power**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic Performance</td>
<td>5.666</td>
<td>4.521</td>
<td>1.253</td>
<td>1.135</td>
<td>.344</td>
<td>.032</td>
<td>.375</td>
</tr>
<tr>
<td>On-task percentage</td>
<td>.530</td>
<td>4.215</td>
<td>.126</td>
<td>6.206</td>
<td>.000</td>
<td>.154</td>
<td>.989</td>
</tr>
<tr>
<td>Week*Grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-task percentage</td>
<td>.255</td>
<td>4.215</td>
<td>.061</td>
<td>2.990</td>
<td>.019</td>
<td>.081</td>
<td>.801</td>
</tr>
</tbody>
</table>

* Computed using alpha = .05
The second between-subjects covariate that was used in this study was gender. The results of the Tests of Within-Subjects Effects when controlling for the between-subjects effect of ethnicity can be seen in Table 22. However, there is insignificant power to make any conclusions.

**Gender.** The final between-subjects covariate that was analyzed in this study was the gender of the participant. The results of the Tests of Within-Subjects Effects when controlling for gender can be seen in Table 25. The F statistic for weeks of treatment was equal to 1.985 with approximately 12 hypothesis degrees of freedom. The F statistic was equal to 1.551 for the interaction effect between weeks of treatment and gender.

Figure 6. Comparison of academic performance between grade levels.
Table 22

**Multivariate Tests of Within-Subjects Effects with Covariance: Ethnicity**

<table>
<thead>
<tr>
<th>Effect</th>
<th>Value</th>
<th>F</th>
<th>Hypothesis df</th>
<th>Error df</th>
<th>p</th>
<th>Partial Eta Squared</th>
<th>Observed Power*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week</td>
<td>.041</td>
<td>.683</td>
<td>12.000</td>
<td>396.000</td>
<td>.768</td>
<td>.020</td>
<td>.401</td>
</tr>
<tr>
<td>Week * Ethnicity</td>
<td>.010</td>
<td>.158</td>
<td>12.000</td>
<td>396.000</td>
<td>1.000</td>
<td>.005</td>
<td>.108</td>
</tr>
</tbody>
</table>

* Computed using alpha = .05

Table 23

**Multivariate Tests Effects with Covariant: Ethnicity**

<table>
<thead>
<tr>
<th>Effect</th>
<th>Value</th>
<th>F</th>
<th>Hypothesis df</th>
<th>Error df</th>
<th>p</th>
<th>Partial Eta Squared</th>
<th>Observed Power*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.941</td>
<td>254.134</td>
<td>2.000</td>
<td>32.000</td>
<td>.000</td>
<td>.941</td>
<td>1.000</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>.036</td>
<td>.596</td>
<td>2.000</td>
<td>32.000</td>
<td>.557</td>
<td>.036</td>
<td>.141</td>
</tr>
<tr>
<td>Within Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week</td>
<td>.231</td>
<td>.552</td>
<td>12.000</td>
<td>22.000</td>
<td>.857</td>
<td>.231</td>
<td>.219</td>
</tr>
<tr>
<td>Week * Ethnicity</td>
<td>.087</td>
<td>.176</td>
<td>12.000</td>
<td>22.000</td>
<td>.998</td>
<td>.087</td>
<td>.093</td>
</tr>
</tbody>
</table>

* Computed using alpha = .05

Graphs comparing the dependent variables by gender were created to display the nature of this interaction and can be seen in Figure 7. Discussion about the possible causes of interaction effects will be discussed in the next chapter.

Table 24

**Multivariate Tests of Within-Subjects Effects with Covariant: Gender**

<table>
<thead>
<tr>
<th>Effect</th>
<th>Value</th>
<th>F</th>
<th>Hypothesis df</th>
<th>Error df</th>
<th>p</th>
<th>Partial Eta Squared</th>
<th>Observed Power*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week</td>
<td>.113</td>
<td>1.985</td>
<td>12.000</td>
<td>396.000</td>
<td>.024</td>
<td>.057</td>
<td>.920</td>
</tr>
<tr>
<td>Week * Gender</td>
<td>.090</td>
<td>1.551</td>
<td>12.000</td>
<td>396.000</td>
<td>.104</td>
<td>.045</td>
<td>.822</td>
</tr>
</tbody>
</table>

* Computed using alpha = .05
Table 25

Multivariate Tests with Covariant: Gender

<table>
<thead>
<tr>
<th>Effect</th>
<th>Value</th>
<th>F</th>
<th>Hypothesis df</th>
<th>Error df</th>
<th>p</th>
<th>Partial Eta Squared</th>
<th>Observed Power*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.941</td>
<td>254.134</td>
<td>2.000</td>
<td>32.000</td>
<td>.000</td>
<td>.941</td>
<td>1.000</td>
</tr>
<tr>
<td>Gender</td>
<td>.108</td>
<td>1.939</td>
<td>2.000</td>
<td>32.000</td>
<td>.160</td>
<td>.108</td>
<td>.372</td>
</tr>
<tr>
<td>Within Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week</td>
<td>.431</td>
<td>1.389</td>
<td>12.000</td>
<td>22.000</td>
<td>.243</td>
<td>.431</td>
<td>.558</td>
</tr>
<tr>
<td>Week * Gender</td>
<td>.408</td>
<td>1.264</td>
<td>12.000</td>
<td>22.000</td>
<td>.305</td>
<td>.408</td>
<td>.510</td>
</tr>
</tbody>
</table>

*Computed using alpha = .05

Figure 7. Comparison of on-task percentage between gender.
Figure 8. Comparison of academic performance between gender.
CHAPTER 4

DISCUSSION

This study examined the self-regulation, learning strategy usage, and academic achievement of adolescents with ADHD over an eight week STP-A program. The results of this study suggest that the STP-A helped improve the self-regulatory behaviors, academic achievement, and learning strategy usage among these adolescents. The results of the univariate analysis for each dependent variable provide evidence of a change in the mean values of on-task behavior during study hall, quiz scores, and flashcard accuracy scores throughout the weeks of treatment. A significant difference in means was found across weeks of treatment for academic achievement and on-task percentage even when controlling for the effect of grade level. There also was a significant interaction effect with the between-subjects factor of grade level. The results from these analyses will be compared with the results of the pilot study conducted by Sibley (2011) because there is a limited amount of analysis conducted on the STP-A. The results found in the univariate analysis for this study on each dependent variable will be discussed and then the results of the multivariate analysis will be discussed.

Study Habits and Academic Performance

On-Task Behavior

The first hypothesis in this study was that self-regulatory behaviors would improve throughout the summer. This was assessed by analyzing the average percent of time-spent on-task during study hall. Examining the on-task percentage provided evidence of a change in mean values of on-task behavior throughout the weeks of treatment. The graph of on-task behavior (Figure 1) reveals more information about the direction of this change. The on-task percentage in study hall appeared to mostly increase positively and monotonically, rather than linearly,
every week. The results suggest that the treatment components of the STP-A are effective in improving the adolescents’ on-task behavior during study hall. The treatment components most relevant to on-task behavior during study hall include the use of a planner, self-monitoring, goal setting, and applied behavior analysis, thus the results suggest that these behaviors assisted students to be more on-task over time.

The results also suggest a decrease in variation among on-task percentage scores as treatment continued, i.e., that the adolescents’ behavior became more uniform and consistent during study hall over the summer. This decrease in variation might be due to the use of consistent classroom rules and procedures, suggesting that the use of consistent classroom rules and procedures is an effective strategy to improve overall classroom behavior and student participation.

There was a significant interaction between weeks of treatment and grade level. It appears that the participants entering middle school started with lower rates of on-task behavior than the participants entering high school. However, the adolescents entering middle school increased their on-task behavior at a greater rate than the adolescents entering high school. Possible causes of this interaction will be discussed in further detail later in this chapter.

The results from this analysis are consistent with the findings of the pilot study for the STP-A (Sibley et al., 2011), which had 19 adolescents who participated in the program in the summer of 2009. Sixty seven percent of pilot study participants stayed on-task for at least 80% of study hall on average during the final three weeks of the program. In the present study, participants were on-task an average of 90% of the time during the final three weeks. The results of current study and past studies taken in unison suggest that the treatment components of the STP-A in study hall help improve the on-task behavior of adolescents with ADHD.
Quiz Scores

The second hypothesis in this study was that the academic achievement of adolescents in the STP-A would improve over the treatment program. This was tested through analyzing the mean values of science quiz scores throughout treatment. The graph for average quiz scores throughout the weeks of treatment appears roughly quadratic with the highest scores in the middle of the treatment program, weeks three and four. The average quiz scores for the adolescents improved as the STP-A progressed, but decreased during the final weeks of treatment.

The cause for this curvilinear trend in quiz scores is not clear, but could be due to multiple factors. First the difficulty of the science terms, and thus the quizzes, increased during the treatment program. The difficulty of the science terms during the final weeks of the program may have negatively impacted the quiz scores. An alternative cause of the quadratic trend in quiz scores is the motivation of the students. By the final weeks of treatment, the students may have been less motivated or experiencing academic burnout and simply wanted to enjoy their summer.

There also appears to be a change in the variation of quiz scores as the treatment progresses. As with on-task percentage, the standard deviation of quiz scores decreased as treatment progressed, i.e., behavior became more uniform during the summer. Sizable variation in quiz scores early in the program is not surprising because variance is common when using formative assessments with students with ADHD and students were from all over the area, with varying levels of preparation. However, an alternative explanation for the decrease in variance seen in quiz scores may be task difficulty. The difficulty of science terms increased throughout
treatment and was not accounted for in the analysis. Further analysis of this dependent variable may be improved through the use of an indicator for difficulty.

The average quiz scores improved during weeks three through five when compared to the first two weeks of treatment. However, they decreased during weeks six and seven of the program. Perhaps the treatment components of the STP-A most relevant to the ALC are somewhat effective in improving the quiz scores of the adolescents. The treatment components most relevant to this increase in quiz scores include the use of flashcards to study. Both quiz scores and flashcard accuracy scores had a similar quadratic trend of improvement, which suggests a relationship between these variables. An alternative cause to the improvement in quiz scores is that the adolescents improved with practice in taking the recall assessments employed in the treatment.

The results from the pilot study conducted by Sibley et al. (2011) suggested that quizzes were an area of difficulty for the adolescents participating in the program. Only 37% of the participants received an average of a C or higher on quizzes during the final three weeks of the program in the pilot study. The results from the current study provide evidence of an overall improvement in quiz scores throughout treatment. However, the average quiz scores during the final two weeks of treatment appeared very similar to the average quiz scores during the first two weeks of treatment. In the current study, the average quiz score was 66% during the peak, weeks six and seven of the current study, which was a slight improvement over the first two weeks of the treatment (58%), but still below a C average. Although quiz scores momentarily improved during weeks three through five, the overall average quiz scores regressed to slightly above the mean towards the end of the program. The results of the current study provide further evidence that quiz grades are an area of difficulty for adolescents with ADHD (Sibley et al., 2011).
Flashcard Accuracy

The third hypothesis in this study was that learning strategy usage would increase during the treatment program. A significant improvement in mean flashcard accuracy scores was seen across weeks of treatment. The graph for flashcard accuracy scores was also roughly quadratic and similar to the graph of quiz scores. Average flashcard accuracy scores improved during weeks three through five. The mean flashcard accuracy score of adolescents remained above 92% throughout the summer.

The flashcard results suggest that the use of direct instruction in the classroom to teach the students how to create flashcards as a study tool was effective. Adolescents had flashcard accuracy scores above 90% throughout the program, suggesting that the strategy was successfully taught to the adolescents during the first week of treatment. The positive and consistent trends in flashcard accuracy scores and on-task percentage suggest that adolescents consistently completed homework assignments, such as the flashcards, throughout treatment. This may be due to the use of applied behavior analysis and goal setting. An alternative cause for the consistently positive flashcard accuracy scores is that all the adolescents had mastered this strategy prior to entering the program. However, this is unlikely because participants had to be experiencing significant academic difficulties to be eligible to participate in the study.

The results from the pilot study of the STP-A (Sibley et al., 2011) showed that adolescents successfully completed homework assignments, such as flashcard completion, during the final three weeks of treatment: 90% of participants turned in 80% of homework assignments during the final three weeks of treatment. However, the average flashcard accuracy scores were not presented in the publication of the pilot study. The average weekly flashcard accuracy scores for all participants never fell below 90% for the duration of the current study. It
appears that the participants in the study could accurately complete their flashcards with regularity throughout the program. It is appears that the use of applied behavior analysis, goal setting, a planner, and study hall schedule can be effective strategies for homework completion with adolescents with ADHD.

**Academic Performance**

Academic Performance was composed of the factor scores combining quiz scores and flashcard accuracy scores. Adolescents appeared to improve their scores during the beginning of the treatment with the peak being seen in the fifth week. Adolescents scored higher during the final weeks of the summer when compared to their scores at the commencement of the program. The results from the multivariate analysis with the use of the dependent variables of Academic Performance and on-task behavior in study hall provide evidence about a significant positive change in dependent variables throughout the weeks of treatment.

The findings from the multivariate analysis suggest that the treatment components of the STP-A may improve the study habits of adolescents with ADHD. However, it should be noted that not any single treatment component of the STP-A can be singled out and is fully responsible for this improvement, rather the program is responsible as a whole. This is because there are many treatment components of the STP-A which were not discussed or analyzed in the current study that may relate to the dependent variables in question, including parent training and social skills training. Although the use of applied behavior analysis, self-monitoring, goal setting, and a planner may be most related to the improvement in study habits, other treatment components of the STP-A were likely positive factors as well. Furthermore, limitations of the treatment exist because not all adolescents with ADHD are able attend the STP-A. However, the use of self-
monitoring, flashcards, and goal setting are cost effective interventions that can be used in the classroom.

Overall, the results from the multivariate analysis corroborate the conclusions made from the univariate analysis. The results of the univariate and multivariate analysis taken in unison provide evidence of an overall positive effect on study habits and academic achievement due to participation in the STP-A. The results of this study support the effectiveness of the STP-A as a treatment program for adolescents with ADHD, although they are not definitive.

**Interaction Effect**

The final hypothesis in this study was that there would be a significant difference in the effect of treatment due to grade level. Further analysis was also conducted to determine if there was a significant interaction effect for the between-subjects effects of ethnicity and gender.

**Grade level.** Analysis of the dependent variables of on-task percentage in study hall and Academic Performance were used to determine a difference in treatment effects. The results suggest that there may be a significant interaction between weeks and grade level. The presence of a significant interaction term between weeks and grade level has important implications about the effectiveness of the treatment for differing samples.

Although a significant positive effect was seen for both groups, it appears that adolescents entering middle school improved at a greater rate than adolescents entering high school. A possible explanation for the higher rate of improvement seen by adolescents entering middle school may be neural plasticity (Stiles, 2000). The neural plasticity of an individual decreases as they develop. This means that it is more difficult for older individuals to make changes to their neural pathways and synapses by changing their behaviors. The neural systems of younger individuals may be more able to adapt to approaching a situation or problem
differently than would older individuals. As with most treatments, it appears that better treatment results are seen the earlier the individual begins to implement the intervention.

An alternative cause of the interaction term between weeks of treatment and grade level may be due to the maturity of the participants. The use of self-monitoring procedures may have been more difficult for adolescents in middle school than it was for adolescents in high school. This may account for the initially lower scores in on-task percentage. However, the younger adolescents improved their on-task percentage at a greater rate as the summer progressed when compared to the adolescents entering high school. This may be because it took the younger adolescents more time to learn and apply the self-monitoring strategies in study hall, but they were able to implement the strategies effectively later on. Possible differences in treatment effectiveness were not explored in the pilot study for the STP-A (Sibley et al., 2011). Future analysis conducted on the ongoing SPP study may provide further information about a possible difference in treatment effectiveness for grade level.

The graph in Figure 8 compared the factor scores for Academic Performance for each grade level. Middle school and high school students began with similar rates of academic achievement during the first week of treatment, but only the students entering high school improved their academic behavior as treatment continued. Factor scores for Academic Performance actually decreased for the adolescents entering middle school as the treatment continued. A possible cause is the difficulty of the science terms. Inclusion of a factor for task difficulty could be used in the future to gain further information.

**Ethnicity and gender.** Approximately 70% of the sample in this study was Hispanic. This is considered to be fairly representative of the population of Miami-Dade County (United States Census Bureau, 2015). Furthermore, approximately 80% of the adolescents in this study
were male. This is also fairly representative of the population of ADHD individuals since males are twice as likely to be diagnosed with ADHD than females (APA, 2013). Analysis conducted to explore a possible difference in treatment effectiveness due to ethnicity was inconclusive because there was an insufficient amount of observed power to make any conclusions about the interaction between weeks of treatment and ethnicity.

There is also still a significant difference in the mean values of the dependent variables across the weeks of summer even when controlling for gender. The results of this analysis suggests that there may be a significant interaction effect due to gender. This may be due the maturity of the participants. Females often mature earlier than males and this may account for the higher scores in on-task percentage and Academic Performance. However, it should be noted that there were a total of only six female participants in this study and this may have impacted the variance and distribution of scores. Future analysis on the STP-A should attempt to explore differences in treatment effects due to the gender and ethnicity of the participants.

**Limitations**

Several considerations must be taken into account in this study. This includes the difficulty of assignments throughout the treatment. According to the design of the treatment program, the difficulty of the assignments increased throughout the summer. The limitations of the study might be taken into consideration during further data analyses. Another limitation of the study is the inability to account for student maturation. It is possible that an alternative cause of the changes seen in dependent variables will be due to natural maturation of the individual and not due to participation in the STP-A. Another possible alternative cause of improvement is the adolescents’ medication usage. Medication usage or non-usage was constant throughout the
program and monitored. Medication usage and its possible effect was not explored in this study, but it is being monitored in the ongoing study on the SPP being conducted by Dr. Sibley.

Furthermore, frequent or extended absences of participants from treatment due to sickness or personal reasons may have affected treatment and interpretation of results. Although a total of 36 participants completed the treatment program, missing data limited the amount of participants with complete data in each specific analysis.

**Conclusions**

The results of this study suggest that the STP-A helped improve the study habits and academic achievement of adolescents with ADHD. Participants in the current study significantly improved their self-regulatory behaviors, learning strategy usage, and academic achievement during the summer. Although a significant improvement in quiz scores was seen, this still remains an area of difficulty for adolescents with ADHD. The results also suggest a possible interaction effect between weeks of treatment and grade level, possibly due to maturity. Future analysis conducted on the STP-A should attempt to assess a possible difference in treatment effects due to grade level.
## APPENDIX A

### DAILY STP-A SCHEDULE

<table>
<thead>
<tr>
<th>Time</th>
<th>Middle School</th>
<th>Time</th>
<th>High School</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00-8:15</td>
<td>Arrivals</td>
<td>8:00-8:15</td>
<td>Arrivals</td>
</tr>
<tr>
<td>8:15-8:20</td>
<td>Transition</td>
<td>8:15-8:20</td>
<td>Transition</td>
</tr>
<tr>
<td>8:20-9:10</td>
<td>Classroom (Writing/History)</td>
<td>8:20-9:10</td>
<td>Classroom (Writing/History)</td>
</tr>
<tr>
<td>9:15-10:05</td>
<td>Classroom (Science/Health)</td>
<td>9:15-10:05</td>
<td>Classroom (Science/Health)</td>
</tr>
<tr>
<td>10:05-10:10</td>
<td>Transition</td>
<td>10:05-10:10</td>
<td>Transition</td>
</tr>
<tr>
<td>10:10-10:40</td>
<td>Organization Skills Training</td>
<td>10:10-10:40</td>
<td>Organization Skills Training</td>
</tr>
<tr>
<td>10:40-10:50</td>
<td>Transition</td>
<td>10:40-10:50</td>
<td>Transition</td>
</tr>
<tr>
<td>10:50-11:50</td>
<td>Sports Game</td>
<td>10:50-11:50</td>
<td>Sports Game</td>
</tr>
<tr>
<td>12:15-12:25</td>
<td>Transition</td>
<td>12:15-12:25</td>
<td>Transition</td>
</tr>
<tr>
<td>12:55-1:05</td>
<td>Transition</td>
<td>12:55-1:05</td>
<td>Transition</td>
</tr>
<tr>
<td>1:05-2:35</td>
<td>Jobs</td>
<td>1:05-2:05</td>
<td>Skill Drills</td>
</tr>
<tr>
<td>2:35-2:45</td>
<td>Transition</td>
<td>2:05-2:15</td>
<td>Transition</td>
</tr>
<tr>
<td>2:45-3:45</td>
<td>Skill Drills</td>
<td>2:15-2:45</td>
<td>Study Hall</td>
</tr>
<tr>
<td>3:45-3:55</td>
<td>Transition</td>
<td>2:45-2:55</td>
<td>Transition</td>
</tr>
<tr>
<td>4:25-4:30</td>
<td>Transition</td>
<td>4:25-4:30</td>
<td>Transition</td>
</tr>
<tr>
<td>4:55-5:00</td>
<td>Transition to Departure</td>
<td>4:55-5:00</td>
<td>Transition to Departure</td>
</tr>
<tr>
<td>5:00</td>
<td>Departures</td>
<td>5:00</td>
<td>Departures</td>
</tr>
</tbody>
</table>
APPENDIX B

SCORING RUBRIC

Grading-Science

Quiz grades. Each day the adolescents take a quiz. The quiz consists of vocabulary words and a list that must be recalled. Each quiz grade is calculated based on the total % of items answered correctly (for quizzes with 10 words, this is \(x/10\), for quizzes with 15 items, this is \(x/15\)). For quizzes that include the mnemonic list, this is \(x/16\), with only 1 point included for the entire list recalled. The adolescent may receive a half of a point for recalling over 50% of the items on the list.

Homework Grade. Each day the adolescents also receive a homework grade. The homework grade is the percentage of study tools (i.e., 15 flashcards and 1 Mnemonic) that the adolescent turns in completed and legibly written. A correct flashcard has the vocabulary word written on one side of the card, and a brief definition on the other side of the card (no more than five words). Adolescents should be instructed that they will not receive credit for a card if the definition exceeds five words.

Grading. Flashcards and quizzes should be graded, grades recorded in the grade book, and all flashcards and quizzes returned to the adolescents before the end of Organization Skills Training.
APPENDIX C

STUDY HALL SCHEDULE

<table>
<thead>
<tr>
<th>Time</th>
<th>Task</th>
<th>Adol. Initials</th>
<th>Staff Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 minutes</td>
<td>Write Health Class Daily Summary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 minutes</td>
<td>Read History pages 56-58 and write notes from text</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 minutes</td>
<td>Create Acronym on Planets</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX D

FSU HUMAN SUBJECTS COMMITTEE APPROVAL

Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Date:  12/02/2014

To:    Michael Mena

Address: [Redacted]

Dept.:  EDUCATIONAL PSYCHOLOGY AND LEARNING SYSTEMS

From:  Thomas L. Jacobson, Chair

Re:  Use of Human Subjects in Research
     Study Habits of Adolescents with ADHD

The application that you submitted to this office in regard to the use of human subjects in the research propos referenced above has been reviewed by the Human Subjects Committee at its meeting on 11/12/2014. Your project was approved by the Committee.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals which may be required.

If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by 11/11/2015, you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report, in writing, any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to ensure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc:  Susan Losh, Advisor
     HSC No.  2014.11236
APPENDIX E

PARENTAL CONSENT FORM

A Summer Preparatory Program for Middle and High School Students with ADHD

PURPOSE OF THE STUDY
The purposes of this study are to determine the effectiveness of an intervention that prepares students with Attention Deficit/Hyperactivity Disorder (ADHD) for the transition to middle and high school. This intervention is different than most treatments for ADHD in adolescence in that it 1) relies on high parental involvement and 2) provides intensive opportunities for skill development in a summer program setting.

NUMBER OF STUDY PARTICIPANTS
A total of 252 participants will enroll in the study. For each of three years, 72 students with ADHD and 12 students without ADHD will be recruited. Half of these students will be entering the 6th grade and half of these students will be entering the 9th grade. If you are a family without a child who has ADHD, information on ADHD can be found on the provided ADHD informational sheet.

DURATION OF THE STUDY
The duration of the study is 15 months. You will complete an intake appointment to gather information about your family in the spring. If your child is in the ADHD group, you will participate in either a summer preparatory program or a parenting group during the summer (both 8 weeks). During the following school year, your adolescent will receive follow-up services at school from a school mental health professional. If your child is being recruited because he/she does not have ADHD, you and your child will participate in the summer preparatory program during the summer and will come for a final assessment at the end of the following school year.

PROCEDURES
Before your child starts the study, you and your adolescent will attend a two-part intake assessment to make sure that your child is eligible to participate in this study. Each part may last up to two hours. During these visits, your child will receive an intelligence test and you will complete an interview about your adolescent’s problems at school. You, your adolescent’s other parent if applicable, and your adolescent’s teachers will be asked to complete questionnaires about your child’s functioning. This information will be used to determine if your child is eligible to participate in this study. You will be paid $100 for completing the intake process (which consists of two assessment sessions).

If your child qualifies for the study as part of the ADHD group, your child will be randomly assigned (like flipping a coin) to one of two groups. The first group (Group 1) receives the
Summer Preparatory Program (SPP) over the summer and follow-up services for the adolescent during the school year. The second group (Group 2) receives a parenting course over the summer and follow-up services for the adolescent during the school year. If your child does not have ADHD (Group 3) you will be assigned to attend the SPP and will also complete assessments, but will not receive treatment during the school year.

**Summer Preparatory Program (Group 1 and Group 3)**

The SPP will run from Monday through Friday, from 8:00 AM until 5:00 PM for eight consecutive weeks during the summer.

Counselors and other camp staff will monitor the adolescents for appropriate and inappropriate behaviors and provide immediate behavioral feedback about these behaviors. These behaviors will be tracked by counselors and used to determine whether adolescents earn certain privileges, such as holding a paid position within the camp or serving as team captain during Recreation time. Examples of appropriate behaviors that will be monitored and rewarded include: (1) following directions; (2) ignoring distractions; (3) prosocial behaviors toward peers; (4) staying on-task during study time (5) and contributing positively to group discussions. Examples of inappropriate behaviors that may be monitored include: (1) breaking rules; (2) whining and complaining; (3) physical aggression; (4) destruction of property; (5) noncompliance with adult requests or commands; (6) stealing; (7) teasing other adolescents; (8) talking back to staff members; (9) swearing; (10) leaving his or her group without permission and (11) interrupting others. This type of program is generally called behavior modification or behavior therapy.

Adolescents may be punished for certain behaviors. Punishment will take the form of detention (missing free time activities) or loss of privileges (e.g., ability to perform daily job, ability to hold leadership positions). The adolescent will receive immediate demotions to the most restricted privilege level as a consequence for physical aggression, destruction of property, repeated noncompliance, excessive teasing, and repeated group disruption.

If an adolescent continually refuses to comply with the staff, is physically aggressive to the point of causing a bruise or broken skin in another adolescent or staff member, destroys property of value or causes damage to the facilities, or pulls a fire alarm, the adolescent will be escorted to a quiet suspension room. He/she will be required to display calm behavior and complete a problem-solving worksheet with a counselor prior to rejoining the group. In the rare case that the adolescent does not display calm behavior after a reasonable period of time, he/she will be suspended from the SPP for the remainder of the day. If the adolescent is suspended, parents will be notified immediately and will be asked to come to the program to pick up the adolescent as soon as possible and will be expected to keep the adolescent in his or her room without access to any enjoyable activities until the camp day ends (5:00 p.m.).

The SPP includes social skills coaching. Throughout the day, the adolescents will receive feedback from both staff members and other adolescents on his/her social interactions with others. The adolescent will work to improve self-monitoring of these skills in everyday situations. The adolescents will also be taught group problem solving skills. This will involve
Summer Preparatory Program (SPP) over the summer and follow-up services for the adolescent during the school year. The second group (Group 2) receives a parenting course over the summer and follow-up services for the adolescent during the school year. If your child does not have ADHD (Group 3) you will be assigned to attend the SPP and will also complete assessments, but will not receive treatment during the school year.

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teaching adolescents a multi-step procedure that they will practice with their group as group problems arise. Group discussions will occur in which adolescents are encouraged to share examples of real problems they are currently facing that will then be solved by the entire group. During this time adolescents may discuss problems commonly encountered in the middle and high school years. Examples of these topics include dating, bullying, drugs and alcohol, smoking, delinquency, dealing with difficult teachers, school-drop out, and violence.

For the first part of the day, the adolescents will be in a school-like environment. Each day they will participate in two 50 minute subject courses (i.e. creative writing, health, history, science) that alternate daily on a block schedule. They will also participate in a 30 minute structured study hall during which study skills and note-taking will be developed and reinforced. During these academic mornings, they will receive support from the staff as he/she works to improve time management, organization, self-monitoring, and academic skills. Adolescents will be given adequate time during the SPP day to complete all homework assignments. If the adolescent does not complete these assignments during the STP day, he/she will NOT be permitted to complete these assignments at home. Behavioral treatment will be continuously implemented during all academic classes.

Throughout the day the adolescent will participate in age-appropriate activities, such as team sports, swimming, and recreational group activities. During these activities, the counselor to adolescent ratio will be at least 1:4. The behavioral treatments described above will be implemented continuously during these activities. The counselors are undergraduate students and Miami-Dade County Public Schools staff who have successfully completed an intensive training program and who receive supervision from the CCF senior staff.

For example, adolescents will be eligible to apply for and hold a junior counselor position within the SPP. As a group, the adolescents will also manage their own “business” to raise money for an end of the summer trip. Extent of the trip will also depend on the amount of money the adolescents raise (past examples have included water park trips, overnight campouts, amusement parks). The trip will be chaperoned by the SPP staff and as a result, adolescents must raise enough money to fund counselors as well.

The SPP staff may develop individualized programs for an adolescent when the staff has determined that additional treatment components are necessary. Individualized programs that differ substantially from the treatment described herein will be discussed with parents in advance of their implementation.

Adolescents must have a physical examination conducted by his or her regular physician or pediatrician prior to the SPP, from which the physician must certify that there are no physical conditions that contraindicate an adolescent’s participation in the Summer Preparatory Program.

Throughout the day adolescents may be observed by trained observers, who will code different aspects of an adolescent’s behavior, and will be rated by program staff on a number of rating scales. These observations may occur across a variety of settings, including small group,
individual, dyadic, structured or unstructured settings, free play, the classroom, or individual testing sessions.

Transportation will be provided to the SPP; however, if parents elect to provide their own transportation, adolescents must arrive at the program site by 8:00 AM and must be picked up by 5:30 PM daily. Parents will receive brief individual feedback from the SPP staff regarding the adolescent’s behavior at the end of each day. Parents will be coached by program staff to provide daily home privileges and restrictions for performance during the SPP day.

Each adolescent needs to bring his/her lunch, snacks, a water bottle, sunscreen, combination lock, and softball glove in a knapsack each day, and should be dressed appropriately for active, outdoor activities. All other equipment and expenses will be provided by the CCF.

**Summer Parent Training Groups (Group 1 and Group 2)**

Regardless of the group their child is assigned to, all parents will participate in a weekly parent training group during the summer. These groups are held with 18 families and address how to manage academic and behavior problems in the home setting. Parenting groups are held once a week from 6:30–8:00 pm on a weekday that will be determined. Activities will be available for students and siblings during these parent meetings. Sample topics include:

*Session 1: Basics of Behavior Management*  
*Session 2: Positive Attending and Special Time*  
*Session 3: Planned Ignoring*  
*Session 4: Making Appropriate Requests*  
*Session 5: Monitoring your Adolescent*  
*Session 6: Academic Interventions*  
*Session 7: Establishing a Home Privilege Program*  
*Session 8: Developing a Relationship with Teachers and School Staff*

**Follow-up academic support during the school year (Group 1 and Group 2)**

All students in Group 1 and Group 2 will receive follow-up academic support in the school year from an M-DCPS support specialist. This clinician will coordinate school-based intervention delivery with your child’s teachers. Each month, your child’s progress will be evaluated by obtaining brief ratings from your child’s core academic teachers. If your child’s progress is deemed to be inadequate, the support specialist will provide further support to your child and his/her teachers. These services may include help with organization, coordinating a daily progress report, help with daily planner use, and use of classroom strategies to improve on-task behavior. Monthly parenting groups will also be held during the school year in order to provide ongoing support at home.

**Assessments (Group 1, Group 2, and Group 3)**

You and your child will also participate in brief assessments at the Center for Children and Families in August and the following May in order to track your adolescent’s progress. You will be reimbursed $50 for each of these assessments. We will also conduct a follow-up assessment.
via mail or in person at the end of the following school year (7th or 10th grade) to monitor your child’s progress.

In addition, we will monitor your child’s academic progress through the M-DCPS grade portal during the upcoming school year. Teacher ratings will also be collected from your child’s core academic teachers in order to monitor progress in school.

Participants will be allowed use of stimulant medication during the study; however, use of this medication will be monitored by study staff. Additionally, participants in both groups will be permitted to seek additional psychosocial treatment.

RISKS AND/OR DISCOMFORTS
The primary risk associated with this study is discomfort providing personal information about your child’s functioning. In order for the treatment to be implemented effectively, there is also a time commitment (as noted in PROCEDURES). In addition, it is possible some information transmitted via email, fax, or mail may be lost in the mail or accidentally sent to the wrong recipient. However, all transmitted information will be de-identified. The password provided for the grade portal log-in may also be a personal password that you use for other electronic or computer log-ins. Research staff will see this password. However, you are free to change the password at any time.

BENEFITS
You will receive an assessment of your child’s ADHD symptomatology and your child will receive free psychoeducational testing and treatment. Your child will receive free psychosocial treatment which will include 8 weekly group sessions with a clinician to set up a home privilege program and daily school target goals. Participation in this study will also contribute to the field’s knowledge of how to treat ADHD in adolescents.

ALTERNATIVES
Instead of participating in this study, your child may continue on his or her usual behavioral treatments for ADHD, seek out medication treatment, or receive no treatment. Common medication treatments include Ritalin, methylphenidate or MPH, Concerta, Metadate CD, Adderall XR, Straterra, and dextroamphetamine.

CONFIDENTIALITY
The records of this study will be kept private and will be protected to the fullest extent provided by law. In any sort of report we might publish, we will not include any information that will make it possible to identify your child as a subject. Research records will be stored securely and only the research team will have access to the records. Your child’s records may be reviewed for audit purposes by authorized University or other agents who will be bound by the same provisions of confidentiality. Log-in information for the grade portal will be kept in a password protected database on a secure server that will only be accessible to the Investigator. Log-in information will be destroyed at the conclusion of the study.
To help us protect your privacy, we have obtained a Certificate of Confidentiality from the National Institutes of Health. With this Certificate, the researchers cannot be forced to disclose information that may identify you, even by a court subpoena, in any federal, state, or local civil, criminal, administrative, legislative, or other proceedings. The researchers will use the Certificate to resist any demands for information that would identify you, except as explained below.

The Certificate cannot be used to resist a demand for information from personnel of the United States Government that is used for auditing or evaluation of Federally funded projects or for information that must be disclosed in order to meet the requirements of the federal Food and Drug Administration (FDA).

You should understand that a Certificate of Confidentiality does not prevent you or a member of your family from voluntarily releasing information about yourself or your involvement in this research. If an insurer, employer, or other person obtains your written consent to receive research information, then the researchers may not use the Certificate to withhold that information.

The Certificate of Confidentiality does not prevent the researchers from disclosing voluntarily, without your consent, information that would identify you as a participant in the research project under the following circumstances:

If we learn about risk of serious harm to you or someone else, we will take steps to protect the person endangered even if it requires telling the authorities without your permission. If we have reason to believe that your child is being abused, we will report this to the Florida Abuse hotline. In these instances, we would only disclose information to the extent necessary to prevent harm.

**COMPENSATION & COSTS**
Behavioral treatments, monitoring, and psychological/psychoeducational evaluations will be provided free-of-charge. You will be reimbursed $50 for each assessment visit you attend (up to $200).

**RIGHT TO DECLINE OR WITHDRAW**
Your child’s participation in this study is voluntary. Your child is free to participate in the study or withdraw his/her consent at any time during the study. Your child’s withdrawal or lack of participation will not affect any benefits to which he/she is otherwise entitled. The investigator reserves the right to remove your child from the study without your consent at such time that they feel it is in the best interest.

**RESEARCHER CONTACT INFORMATION**
If you have any questions about the purpose, procedures, or any other issues relating to this research study you may contact William E. Pelham, Jr. (wpelham@fiu.edu) or Margaret H. Sibley (msibley@fiu.edu) at the FIU Center for Children and Families, 305-348-0477.

**IRB CONTACT INFORMATION**
If you would like to talk with someone about your child’s rights of being a subject in this research study or about ethical issues with this research study, you may contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu.

PARTICIPANT AGREEMENT

I have read the information in this consent form and agree to allow my child to participate in this study. I have had a chance to ask any questions I have about this study, and they were answered for me. I understand that I am entitled to a copy of this form after it has been read and signed.

I agree to release my log-in information for the Miami-Dade County Public Schools Grade Portal to the Center for Children and Families in order to monitor my child’s academic progress during the school year. I understand that this authorization is effective for a period of 18 months from the date of the signature. No time frame may exceed 18 months from the date of the signature. I understand that I have the right to revoke this authorization at any time by changing my password or by sending a written request to the investigator.

☐ Yes, I agree to release my log-in information.
☐ No, I do not agree to release my log-in information.

______________________________
Signature of Parent/Guardian

______________________________
Date

______________________________
Printed Name of Parent/Guardian

______________________________
Printed Name of Child Participant

______________________________
Signature of Person Obtaining Consent

______________________________
Date
APPENDIX F

ADOLESCENT ASSENT FORM

A Summmer Preparatory Program for Middle and High School Students with ADHD

WHY ARE YOU DOING THIS STUDY?
We would like for you to be in a research study we are doing. A research study is a way to learn information about something. We would like to find out what kind of programs help students with ADHD to be successful in middle and high school.

HOW MANY OTHERS WILL BE IN THIS STUDY?
If you agree to participate in this study, you will be one of about 252 students in this research study.

HOW LONG WILL THE STUDY LAST?
You will be in this study for about 15 months. During this time, we will pay attention to how you are doing in school by checking how your grades are and asking you, your parents, and your teachers to answer questions about how you are doing. You will also participate in one of two programs designed to help you do better in school next year.

WHAT WILL HAPPEN IN THIS STUDY?
You will visit our clinic and participate in testing so that we can see if you qualify for the study. You will be asked to answer questions about how you are doing in school.

If you are chosen for the study and you have ADHD, you will be randomly assigned (like flipping a coin) to one of two groups.

Group 1 attends an 8-week summer program from 8:00am to 5:00pm (Monday-Friday) during the summer. This program consists of academic, sports, and leadership programming designed to get you ready for 6th or 9th grade.

A lot of kids find that as they get older, school gets more difficult, parents get harder to deal with, and life gets a lot busier. At the summer program, you will participate in activities that are designed to be fun, but also to provide the skills that will help you out with school, dealing with others, and managing a busy life. Some of these activities include learning how to be organized, student government, a junior counselor program, life skills class, and learning academic skills to help you do better next year.

During the school year, we will assign a counselor to work with you and your teachers to help you do better in school. For example, the counselor might meet with you to help you stay organized or stay on top of your homework. They might meet with your teachers to teach them.
ways to help you pay attention in class. Your parents will also go to a parenting group once a week during the summer and once a month during the school year to learn ways to get along with you better and help you out in school.

If you are assigned to Group 2, your parents will attend a weekly parenting group during the summer (like we describe above). During the next school year, you will be assigned a counselor who will work with you and your teachers to help you do better in school next year (like we describe above).

If you do not have ADHD and you are a part of this study then you will be in Group 3. Group 3 will also attend the summer program (described above).

Participants in all groups will come back to our center at the end of the summer (August) and the end of next school year (May) to fill out questions about how you are doing in school. Also, we will contact you after the end of the following school year (7th or 8th grade) to see how you did during that year.

**CAN ANYTHING BAD HAPPEN TO ME?**
Sometimes people feel uncomfortable answering questions about how they get along with their parents or whether they have tried drugs or alcohol. You do not have to answer any questions that make you feel uncomfortable. Also, it is possible that information about how you are doing that your teachers send us can get lost in the mail or can accidentally go to the wrong email address.

**CAN ANYTHING GOOD HAPPEN TO ME?**
If you have ADHD, you will receive free help for school problems that may include a summer program. These programs may help you do better in school this year. If you do not have ADHD, then you will get to go to a fun summer program for free. Also, participants in all groups will help us learn more about how to help students with ADHD who have trouble in school.

**DO I HAVE OTHER CHOICES?**
You do not have to be in this study.

**WILL ANYONE KNOW I AM IN THE STUDY?**
The records of this study will be kept private and will be protected by the researchers. Your parents will know that you are in this study and some of your teachers will know if you are in this study because they will fill out questions on how you are doing in school. No one will be able to see your answers to questions we ask you except for the study staff.

To help us keep your information private, we obtained a Certificate of Confidentiality from the National Institutes of Health, which is part of the United States government. With this Certificate, no one can force us to share any of the information you tell us— even if a judge or a court asks for it. We will use the Certificate to prevent anyone from getting your private information.
Sometimes, people who work for the government check in with researchers to make sure they are doing their studies correctly. The Certificate does not allow us to stop these government officials from seeing your information.

Even though we have the Certificate, you and your parents can still request that we share information with someone that you choose. If you or your parent signs a document saying we can share your information, we will share it, even though we have the Certificate.

There are some exceptions to the Certificate’s protection. For example:

If we learn that you are at risk for serious harm or that you are going to harm someone else, we will take steps to protect the person who is in danger. This might mean telling the police without your permission. If we have reason to believe that you are being abused, we will report this to the Florida Abuse hotline. In these instances, we would only tell them the information that is needed to prevent harm.

**WILL I HAVE TO PAY ANYTHING FOR PARTICIPATING?**
You will not need to pay for anything to participate in this study.

**WHAT IF I DO NOT WANT TO DO THIS?**
You do not have to be in this study if you don’t want to and you can quit the study at any time. If you don’t like a question, you don’t have to answer it and, if you ask us, your answers will not be used in the study. No one will get mad at you if you decide you don’t want to participate.

**WHO CAN I TALK TO ABOUT THE STUDY?**
If you have any questions about the research study you may contact Dr. William Pelham or Margaret Sibley at the FIU Center for Children and Families, 305-348-0477, msibley@fiu.edu or wpelham@fiu.edu. If you would like to talk with someone about your rights of being a participant in this research study, you may contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu.

**PARTICIPANT AGREEMENT**
This research study has been explained to me and I agree to be in this study.

_________________________  _______________________
Signature of Youth Participant  Date

_________________________
Printed Name of Youth Participant

_________________________  _______________________
Signature of Person Obtaining Consent  Date
APPENDIX G

A PRIORI POWER ANALYSIS I
APPENDIX H

A PRIORI POWER ANALYSIS II

[Diagram showing statistical analysis with parameters and outputs]
APPENDIX I

POST-HOC POWER ANALYSIS I

![Power Analysis Diagram]

**Input parameters**
- Effect size $f = 0.15$
- $\alpha$ err prob = 0.05
- Total sample size = 28
- Number of groups = 2
- Number of measurements = 7
- Corr among rep measures = 0.7
- Nonsphericity correction $\varepsilon = 1$

**Output parameters**
- Noncentrality parameter $\lambda = 14.700000$
- Critical $F = 2.1571434$
- Numerator df = 6.000000
- Denominator df = 156
- Power (1-$\beta$ err prob) = 0.8165087
APPENDIX J

POST-HOC POWER ANALYSIS II

Critical $F = 2.1571$

Test family: $F$ tests
Statistical test: ANOVA: Repeated measures, within-between interaction

Type of power analysis: Post hoc: Compute achieved power - given $\alpha$, sample size, and effect size

Input parameters:
- Effect size $f = 0.15$
- $\alpha$ err prob = 0.05
- Total sample size = 28
- Number of groups = 2
- Number of measurements = 7
- Corr among rep measures = 0.7
- Non sphericity correction = 1

Output parameters:
- Noncentrality parameter $\lambda = 14.700000$
- Critical $F = 2.1571434$
- Numerator df = 6.000000
- Denominator df = 156
- Power (1-\beta err prob) = 0.8165087
REFERENCES


Michael P. Mesa graduated from Florida International University in 2012 with a BA in Psychology and minor in Statistics. He participated in the STP and STP-A several times throughout his undergraduate and graduate studies. He graduated from Florida State University in 2015 with a Master’s degree in Learning & Cognition and a graduate certificate in Measurement & Statistics. He worked at the Florida Center for Reading Research during his graduate studies. His advising professor was Susan Losh, associate professor of Educational Psychology.