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Executive Function Coaching: Support for Postsecondary Student Success

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EXECUTIVE FUNCTION COACHING: SUPPORT FOR POSTSECONDARY STUDENT SUCCESS

by

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ABSTRACT

The advantages of postsecondary education are numerous and serve as a gateway to increased opportunity. Benefits include improved employment opportunities, lifetime earnings, job satisfaction, access to healthcare and preventative care, and overall better quality of life. In addition, valuable life skills development, including; building new social skills and relationships, developing critical thinking, personal development, how to overcome challenges, time management and organization, and deeper knowledge and understanding of the world. Enrollment rates in postsecondary education are predicted to continue to rise for students with and without disabilities. Students are often underprepared for the transition to college and the levels of self-regulation required to be self-directed learners. Executive function skills are the foundation for intentional planning and self-regulation necessary to adjust as needed to reach goals in all areas of life. Executive function skills are relied on heavily in novel situations such as the transition to college. Students with deficits in executive function lack the skills required for adjustment to college life. Development is based on experiences, highly variable, and often not fully developed until early adulthood. Coaching has shown promise as a means to help support these skills for increased persistence and degree obtainment. This dissertation aims to use three publishable articles to illustrate the potential coaching possesses in supporting all students with executive function deficits to increase their levels of success. The chapters include evidence of coaching as a solution, an in-depth literature review, a practitioner example, and a mixed-methods investigation. Overall, results demonstrate the need for executive function support for students with deficits and the potential value of coaching programs to answer this need.

I dedicate my work to those who live purposefully to inspire and create a society with love and inclusion. Namaste.

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LIST OF ACRONYMS

ADHD	Attention Deficit Hyperactivity Disorder
ASD	Autism Spectrum Disorder
ASICS	Academic Success Inventory for College Students
BAI	Beck Anxiety Inventory
BDEFS-SF	Barkley Deficits in Executive Functioning Scale-Short Form
CBT	Cognitive Behavioral Therapy
EF	Executive Function
FOCUS	Focused Coaching for Undergraduate Success
GPA	Grade Point Average
ICR	Intercoder Reliability
IRM	Intentional Relationship Model
LD	Learning Disability
ODS	Office of Disability Services
RCI	Reliable Change Index
SAS	Student Accessibility Services
SWD	Students With Disabilities
TBI	Traumatic Brain Injury
TTM	Transtheoretical Model of Change
UDL	Universal Design for Learning

CHAPTER ONE: INTRODUCTION

By 2027, current predictions indicate 70% of employment in the United States will require some level of postsecondary education (Blumenstyk, 2020). Between 2020 and 2030, undergraduate enrollment is expected to increase by 8% in the United States (National Center for Education Statistics, 2022). Of current undergraduates, 19.4% are students with disabilities (SWD; U.S. Department of Education, 2021) who face additional challenges with persistence towards degree completion (Cortiella & Horowitz, 2014; Marino et al., 2020). Some of the advantages of earning a college degree include improved employment opportunities, lifetime earnings (Newman et al., 2011), better health, and quality of life (Ma et al., 2016; Trostel, 2015). Executive function (EF) skills develop based on experiences (Diamond, 2013a; Zelazo et al., 2016) and are relied on heavily in novel and challenging situations such as the transition to postsecondary education.

Executive function deficits (e.g., difficulty concentrating, managing time, problem solving, or planning) often impact academic, social, and occupational functions during and after college life. Academic and social adjustment beyond students' homes can be stressful, further exacerbating difficulties with executive function skills. The increased independence and adjustment to life outside students' homes can be difficult for students both with (Goudreau & Knight, 2018) and without disabilities (Kennedy, 2017).

To address the increased need for support, some institutions of higher education are implementing new support mechanisms such as mentoring (Lindsay et al., 2016) and coaching (Marino et al., 2020; Richman et al., 2014). During postsecondary education, coaching can help

students enhance their ability to achieve self-determined goals through increased EF skills, self-awareness, and self-management techniques (Goudreau & Knight, 2018; Parker & Boutelle, 2009). While preliminary evidence suggests coaching can improve postsecondary EF knowledge and skills, additional evidence is needed in this area (Ahmann et al., 2018).

Objective

The objective of this dissertation is to develop three publishable manuscripts for the purpose of knowledge dissemination surrounding the theme of executive function coaching in postsecondary education. Chapter two presents an in-depth literature review examining existing coaching interventions used to support SWD in postsecondary education. Chapter three provides readers with a practical example of how common technologies can be introduced into the coaching process to support student EF skills. A realistic vignette was woven throughout this chapter to present a view of the EF coaching process and how a student works through solving problems associated with EF deficits for increased success. Finally, chapter four offers development and results of a mixed-methods investigation to determine the effectiveness of an EF coaching program, known as FOCUS. Collectively, these chapters demonstrate the positive potential EF coaching programs within the postsecondary environment have to support students with EF dysfunction and increase their levels of success.

Coaching

Coaching is a collaborative, client-centered process designed to elicit client identification of goal areas, increase self-awareness, and problem-solving solutions (Jarosz, 2016).

To address the need for more empirical studies to examine the effectiveness of coaching for students with EF dysfunction, the research team developed a conceptual model for the coaching program presented in this dissertation, Focused Coaching for Undergraduate Success (FOCUS), anchored in previous research. The description of the components used in the conceptual model and reasons for its use are described below.

Conceptual Model

Although coaching shows promise, a deficit in research includes definitive features of coaches that are most effective (Bettinger & Baker, 2014). To address this problem, the Intentional Relationship Model (IRM) was used as a behavioral model for coaches to develop skills for a successful coaching relationship. The IRM was first introduced in 2008 as a way to outline the process of developing therapeutic relationships in occupational therapy practice (Taylor, 2008) and can certainly be used in other professions where relationships are important for success, such as coaching. The 6 modes of the IRM model including advocating, collaborating, empathizing, encouraging, instructing, and understanding are a deliberate response to ever-changing situations. Use of the IRM has the potential to aid coaches in self-reflection, develop awareness of their clients' needs, and improve the coaching relationship.

The Transtheoretical Model of Change (TTM), a comprehensive model often applied to health behaviors such as weight loss, addiction, and smoking cessation was used as the theoretical foundation for this program (Prochaska et al., 1994). The process of coaching relies on facilitating self-awareness to elicit approaches effective for solving problems and reaching self-determined goals. The TTM explains change as a process consisting of a series of five stages

with various processes taking place at each stage. Individuals develop increased self-awareness as they seek to change circumstances surrounding their behaviors. The TTM was chosen as the foundational framework to help coaches understand students' experiences and readiness for change as they progress through the coaching program.

In addition, the research team adopted the Universal Design for Learning (UDL) framework. Universal Design for Learning is a framework for designing flexible curriculum addressing the needs of diverse learners (Capp, 2017). The framework provides a blueprint for the design of proactive planning strategies and is grounded in three principles; multiple means of engagement, multiple means of representation, and multiple means of action and expression (CAST, 2022). The goals specific to UDL including intentional planning, creating goals, flexibility, and timely monitoring (Nelson & Basham, 2014) will allow coaches to create engaging and useful coaching environments tailored to the unique needs of each student.

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CHAPTER TWO: EXECUTIVE FUNCTION COACHING FOR COLLEGE STUDENTS WITH DISABILITIES: A SYSTEMATIC LITERATURE REVIEW

This chapter titled, "Executive function coaching for college students with disabilities: A systematic literature review" has been submitted for publication in the refereed professional journal titled, the *Journal of Postsecondary Education and Disability* and is currently under review.

Abstract

The number of students with disabilities (SWD) enrolling in postsecondary education continues to increase, yet degree completion rates continue to fall behind compared to peers without disabilities. There is an obvious need to investigate interventions to support postsecondary success so all students can reap the benefits of a college education. Empirical evidence demonstrates that coaching is a promising support. This literature review aims to examine coaching interventions currently used to support SWD in postsecondary education. The authors reviewed relevant literature from 2009-to 2021 and identified 17 studies that met the search criteria. Findings indicate positive outcomes, including improved grade point average (GPA), time management, organization, learning and study skills, self-esteem, behavioral regulation, metacognition, and sense of well-being. The authors also include recommendations for additional research.

Introduction

Enrollment rates of students with disabilities (SWD) in postsecondary education continue to rise, currently comprising 19.4% of undergraduates (U.S. Department of Education, 2021).

According to a report from the National Longitudinal Transition Study-2 (NLTS2), 44% of SWD were enrolled in 2-year colleges, 32% were enrolled in vocational schools, and 19% were enrolled in 4-year universities. Often students do not reveal disability status for reasons such as fear of stigma, perceived usefulness of services, and poor self-advocacy skills (Lyman et al., 2016; Smith et al., 2021), therefore enrollment rates are potentially much higher. Despite this rise in enrollment, SWD demonstrate poor academic success and persistence towards degree completion compared to peers without disabilities (Cortiella & Horowitz, 2014; Marino et al., 2020; Madaus et al., 2021). Completion rates for SWD were only 34% compared to 51% for students without disabilities (Newman et al., 2011). Students with disabilities are more likely to be underprepared with skills such as organization, planning, and study strategies needed for success (D'Alessio & Banerjee, 2016; Parker & Boutelle, 2009).

Supports Available for Students

Postsecondary institutions support SWD through the Office of Disability Services (ODS) if a student self-discloses his or her disability along with appropriate documentation (Singh, 2019). Typical supports are symptom-based accommodations derived from an identified diagnosis (Zeng et al., 2018) and include additional time for exams and assignments, distraction-reduced rooms for testing, assistance with note taking, environmental accommodations, and attendance accommodations (Smith et al., 2021). Although these accommodations can be beneficial, they are deficit-based and do not view students through a holistic, individualized lens. Researchers have identified several factors contributing to postsecondary persistence that are not accounted for during the traditional accommodation processes including increased social

demands (Prevatt & Levrini, 2015) and adjusting to the increased independence and complexity in postsecondary environments (Ardell et al., 2016; Lombardi et al., 2016). In addition, executive function (EF) deficits are a prevalent symptom in many disabilities (Leung et al., 2016; Rabinovici et al., 2015; Zelazo, 2020; Zeng, 2018) and affect problem-solving, decision making, and purposeful behavior all of which are necessary for academic and life success.

Executive Function and Self-regulated Learning

Executive function skills form a foundation for knowledge attainment and control over the related purposeful behavior required for creating and reaching self-determined goals (Doebel, 2020; Rabinovici et al., 2015; Zelazo et al., 2016). Development of these skills are based on experience as individuals grow from childhood to adulthood (Diamond, 2013; Zelazo et al., 2016) and can be learned with positive guidance. Executive function skills are necessary for SWD to navigate college life through planning, organizing, staying on-task, maintaining schedules, and positive relationships.

Students experience a decrease in structure and adult support as they transition out of the home setting (O'Rourke et al., 2020). If accommodations are only deficit-based and not geared toward the development of EF skills, SWD will have minimal chance of developing the level of self-regulated learning required for academic success (Parker & Boutelle, 2009). Academic success, health and wellness, and quality of life have been predicted with EF measures (Zelazo et al., 2016), and stronger EF skills are related to better outcomes in life (Diamond, 2013).

Students entering university environments require higher self-regulation and self-directed learning levels than in secondary school (Anastopoulos et al., 2018). Zimmerman (2015) postulated that self-regulated learning is an interaction between intrinsic and extrinsic factors.

Intrinsic factors include motivation, thought processes in planning, initiation, self-understanding, ability to regulate, self-monitor, and evaluate self. Extrinsic factors include the environment and social supports within that environment. Zimmerman (2002) noted that self-regulation is a proactive process involving an individual's feelings, thoughts, and motivations for goal attainment. A high level of self-awareness is required to adjust when strategies work or do not work when learning. Self-regulation also involves self-efficacy and the belief that one can accomplish their goals. Research indicates a correlation between higher levels of EF and efficacious self-regulated learning (Follmer & Sperling, 2016; Rutherford et al., 2018). Therefore, holistic scaffolds are required for students with EF deficits to develop self-regulated learning.

Completing a college education includes higher lifetime earnings, increased employment opportunities, improved access to healthcare benefits and preventative care, and improved quality of life (Ma et al., 2016; Trostel, 2015). From a holistic perspective, contextual supports should be analyzed along with academic supports for SWD as individual goals are heavily influenced by an individual's physical, social, and cultural environment (Law et al., 1996; Zeng et al., 2018). Recognizing the increased need for support, some institutions have begun implementing novel supports such as mentoring (Dunn et al., 2018; Lindsay et al., 2016) and coaching programs (Marino et al., 2020; Richman et al., 2014). Research indicates coaching can assist SWD during postsecondary education to enhance EF skills, increase self-awareness, and

develop techniques to reach self-determined goal areas (Goudreau & Knight, 2018; Parker & Boutelle, 2009).

Coaching

Coaching in education as defined by van Nieuwerburgh (2012) is, "A one-to-one conversation that focuses on the enhancement of learning and development through increasing self-awareness and a sense of personal responsibility, where the coach facilitates the self-directed learning of the coachee through questioning, active listening, and appropriate challenge in a supportive and encouraging climate" (p.17). Individuals require an inherent awareness of motivations, beliefs, and self-understanding to regulate their learning process (Boekaerts & Corno, 2005). The individual's context and environment can help or hinder the use and development of self-regulation. Each person will implement these skills differently according to the situations placed in front of them at various times. The collaborative coaching relationship allows students to focus on contextual, academic, and occupational needs for optimal performance in the postsecondary environment.

Purpose of the Present Study

This article describes a systematic review to evaluate the current evidence on coaching interventions for executive dysfunction for undergraduate students with disabilities. The intents of this systematic literature review are: (a) to synthesize components of coaching interventions that address EF skills for undergraduate SWD; (b) to understand the experiences of undergraduates with disabilities in coaching programs; and (c) to highlight areas for future research. The guidelines provided by the Preferred Reporting Items for Systematic Review and

Meta-Analyses (PRISMA) were used to ensure transparency and accuracy in reporting (Page et al., 2021).

Method

A search was conducted using the online databases Google Scholar, PsycINFO, and ERIC using a combination of the following keywords "executive function" and "students with disabilities" or "ADHD" or "learning disability" or "ASD" or "traumatic brain injury" or "emotional and psychiatric conditions" and "undergraduate" or "college" or "post-secondary" and "coaching".

Criteria for inclusion were (a) empirical studies published in peer-reviewed journals between 2009-2021; (b) used qualitative, quantitative, or mixed methods; (c) post-secondary students diagnosed with disabilities; (d) included coaching or mentoring as an intervention; (e) at least one dependent variable included EF skills or outcome associated with EF skills, and (f) study was published in the English language. Studies were excluded if they were program evaluations, conference proceedings, dissertations, or theses. Reference lists from articles meeting inclusionary criteria were also examined to identify additional publications.

The search yielded 863 articles. All abstracts were reviewed for evidence of inclusionary criteria. A total of 23 articles met the criteria. All abstracts were read by two authors. Interrater reliability was calculated by dividing the number of agreements by the number of agreements plus the number of disagreements multiplied by 100% and was 82.14%. Disagreements were discussed and agreements obtained for a total number of 17 articles (see Table 1) to be included in this review.

Results

Study and Participant Characteristics

Of the 17 articles meeting inclusionary criteria for this review, various research designs were employed. Three of the studies utilized qualitative designs (i.e., Harrington et al., 2021; Parker et al., 2013; Parker & Boutelle, 2009), two were exploratory in nature (i.e., Bellman et al., 2015; Rando et al., 2016), three made use of longitudinal designs (i.e., Anastopoulos et al., 2020; DuPaul et al., 2017; Weiss & Rohland , 2015), four used mixed methodology (i.e., Marino et al., 2020; Parker et al., 2011; Richman et al., 2014; Xie, 2020), one used a prospective descriptive design (i.e., Prevatt & Yelland, 2015), one used a case study comparison design (i.e., Kennedy & Krause, 2011), one was quasi-experimental (i.e., Anastopoulos & King , 2015), and two employed randomized controlled trails (i.e., Anastopoulos et al., 2021; Field et al., 2013). Sample sizes ranged from two to 1782, and ages of students ranged from 17-60 years old, although eight of the articles did not report specific ages (i.e., Bellman et al., 2015; Field et al., 2013; Marino et al., 2020; Parker & Boutelle, 2009; Parker et al., 2011; Parker et al., 2013; Richman et al., 2014; Weiss & Rohland, 2015).

Six of the articles did not report socio-demographics of the participants (i.e., Field et al. , 2013; Kennedy & Krause, 2011; Parker & Boutelle, 2009; Parker et al., 2011; Parker et al., 2013; Weiss & Rohland, 2015) and the remaining studies reported the majority of participants were Caucasian (i.e., Anastopoulos & King , 2015; Anastopoulos et al. , 2020; Anastopoulos et al. , 2021; Bellman et al. , 2015; DuPaul et al. , 2017; Harrington et al. , 2021; Marino et al., 2020; Prevatt & Yelland , 2015; Rando et al. , 2016; Richman et al., 2014; Xie, 2020). All studies

except for one only reporting male participants (i.e., Kennedy & Krause, 2011) reported a mix of both male and female participants. Two investigations noted students demonstrated EF deficits but did not specify disability type (i.e., Marino et al., 2020; Xie, 2020), of the remaining investigations two focused on autism spectrum disorder (ASD; i.e., Rando et al., 2016; Weiss & Rohland, 2015), one included a population of traumatic brain injury (TBI; i.e., Kennedy & Krause, 2011), four focused on attention deficit hyperactivity disorder (ADHD) and learning disability (LD; i.e., DuPaul et al. , 2017; Parker & Boutelle, 2009; Prevatt & Yelland , 2015; Richman et al., 2014), six studies investigated primarily ADHD (i.e., Anastopoulos & King , 2015; Anastopoulos et al., 2021, Anastopoulos et al., 2020; Field et al. , 2013; Parker et al., 2011; Parker et al., 2013), and two investigated a variety of diagnoses (i.e., Bellman et al., 2015; Harrington et al. , 2020).

Outcomes

Within the 17 studies examining coaching for postsecondary students with disabilities a variety of models with different combinations of length of program, training for coaches, and frameworks were used. Marino et al. (2020) performed a matched-pairs experimental design with 120 undergraduate STEM majors with EF deficits within the framework of Universal Design for Learning (UDL). Participants received coaching from graduate students who were enrolled in a special education program who received training and supervision about coaching best practices, EF, evidence-based practices in STEM, and UDL from their secondary methods instructor. Coaching plans and goals were developed within a personalized UDL lesson plan and each participant received an average of 8 coaching sessions within one semester. In addition,

participants met with STEM mentors virtually or face-to-face on average three times per semester.

Results indicated significantly higher scores in GPA for the treatment group compared to the control group, increased persistence in STEM major, and participants identified the flexibility based on the principals of UDL was beneficial to the coaching process. In addition, the particular design of using graduate students as coaches significantly reduced overall costs of the program compared to others.

Xie (2020) also investigated undergraduate STEM majors using mixed methodology with 7 students, 43% with disabilities and 57% without disabilities, using mobile EF coaching with WhatsApp. The researcher served as the coach in this study providing six weeks of coaching using the Self-Determination Learning Model of Instruction to set goals and a digital calendar for time-management and organization. Results indicated improvements in EF including time management, organization, goal setting, and learning strategies/study skills. In addition, participants identified the value of an individualized approach used through a mobile application as beneficial and noted decreased stress and increased self-awareness.

In addition, Bellman and colleagues (2015) explored the impact of coaching on the success of 41 postsecondary SWD pursuing STEM degrees through the *AccessSTEM* initiative. Services were provided in-person by a certified coach with over 10-years of experience and participants also received between session communication through email or phone calls. Results from post-intervention surveys suggested improved EF skills (e.g., time-management, organization, planning), motivation, and confidence.

Parker and Boutelle (2009) investigated coaching for students with ADHD and LD through phenomenological methodology. The research was conducted at Landmark College, a postsecondary institute for specifically designed to serve students with ADHD and learning disorders. Coaching is offered to all students as a part of the tuition and fees package. All coaches are employed by the university and formally trained through the International Coaching Federation. The seven students in this study received 10-weekly sessions of EF coaching and then participated in interviews about their experiences. Themes discovered included increased participant self-determination and ability to attain goals, improved well-being and decreased anxiety, and improved self-regulation and EF skills.

Additional research was completed with the population at Landmark college in a longitudinal study over five years (DuPaul et al., 2017). Researchers did not only analyze coaching available to students, but several services available to students in this specialized university setting including tutoring, coaching, and academic advising. Findings showed more hours of services were associated with better outcomes. Regarding coaching, students with ADHD benefitted more than students with LD, however both populations outcomes showed increased hours of coaching had a positive relationship with increase in GPA.

Parker et al. (2011) explored the impact of coaching utilizing a mixed methods study designs with seven students who had a diagnosis of ADHD. Coaches in this study were formally trained through the Edge Foundation which is specifically designed to provide EF coaching (Edge Foundation, 2022). Participants received 10-weekly 30-minute phone sessions as well as between sessions communication with coaches through text, email, or phone calls. Post-intervention data revealed increased GPA, improved self-regulation and decreased stress,

improved ability to attain goals and self-confidence. An additional qualitative study analyzing the outcomes of coaching for participants with ADHD also revealed positive results (Parker et al., 2013). Coaches were trained and supervised in the strengths-based ADHD coaching approach (Sleeper-Triplett, 2010) and provided weekly 30-minute phone call sessions. Outcomes included improved self-regulation, time management, persistence, and confidence.

Field et al. (2013) also analyzed a coaching program with formally trained coaches through the Edge Foundation. The researchers conducted a randomized controlled study with 127 students who had a diagnosis of ADHD. Participants received 30- minute weekly sessions for 24 weeks via phone calls in addition to between session check-ins by email or phone. The intervention group demonstrated improved scores on the Learning and Study Strategies Inventory (LASSI), a self-report assessment of learning and study strategies related to skill, will, and self-regulation. Total scores increased pre-post with statistical significance (p<.01) and large effect size (d=1.02). Improvements were also noted in cluster scores: Skill (t = 7.63, df = 78, p < .01; d=.88), Will (t = 6.11, df = 78, p < .01; d=.65), and Self-Regulation (t = 9.13, df = 78, p < .01; d=1.10). In addition, participants noted improved self-regulation, time management, and self-talk.

Richman et al. (2014) used a mixed methods study design to understand the impact of coaching on EF and self-determination skills that support academic and life success. Coaches were formally trained, and the 24 participants had diagnoses of ADHD and/or LD. Participants received six-12 sessions for 30 minutes each wither in person or on the phone. Quantitative outcomes were not significant, however most participants in the intervention group demonstrated improvements in post-test measures of self-determination, EF, and learning strategies.

Qualitative findings from six participants noted increased self-awareness, ability to manage life, improved self-advocacy skills, and well-being.

Two research studies focused specifically on undergraduates with a diagnosis of ASD provided increased supports compared to coaching programs discussed thus far. Rando et al. (2016) used a peer transition coach model known as Raiders on the Autism Spectrum Excelling (RASE) with 11 participants who received approximately five-hours per week of coaching. Coaches were hired as student employees and completed a training process supervised by the assistant director of disability services. The program included the Universal Design for Learning (UDL) framework and coaches were trained to use various modalities to address learner variability. After completion of one semester of coaching, students participated in less structured meetings and were able to attend a bi-weekly support group for students with ASD. Further support, if warranted, included a meeting to determine additional steps necessary for success with the office of disability services, student and family member(s). Study outcomes indicated increased GPA, retention rates, decreased behavioral incidences, and overall high levels of participant satisfaction.

Weiss & Rohland (2015) analyzed outcomes of the Communication Coaching Program (CCP) for 23 postsecondary students diagnosed with ASD. This holistic program included disability counseling, communication coaching, peer coaching, social groups, and campus resources. Graduate students from the Department of Communication Disorders served as communication coaches and peer coaches were supervised undergraduate students. Both received regular supervision from clinical supervisors to ensure treatment fidelity. The average amount of participation in CCP was for two semesters including 1-2 hours of communication

coaching per week and meetings away from the clinic setting with peer coaches to increase generalization of skills learned. Investigation results specific to communication coaching included improved EF skills (e.g., maintaining calendars time management), goal planning, and social-communication skills.

An additional form of coaching investigated was occupational therapy (OT) led coaching through the Greater Opportunity for Academic Learning and Living Successes ($GOALS^2$) program offered to SWD in a university setting (Harrington et al., 2021). Occupational therapy students completing level II fieldwork supervised by a registered occupational therapist served as coaches and met with participants approximately 10-12 times for the duration of the program. Coaching consisted of a strengths-based approach including individualized academic, health and wellness, and interpersonal relationship goal areas. Phenomenological analysis revealed improved healthy living habits, time management, organization, study skills, and grades. Participants also reported the benefits of safe, open communication with coaches that allowed for engagement and accountability increased self-perceptions of overall academic and social success.

Kennedy & Krause (2011) explored a dynamic coaching model with two college students who were 10 and 14 months post-TBI. Coaching was provided by certified speech-language pathologists with experience in cognitive rehabilitation. Students received two semesters of individualized coaching for approximately one hour per week focused on metacognitive awareness through the use of principles and practices of self-regulated learning. The Functional Assessment of Verbal Reasoning and Executive Strategies (FAVRES) assesses EF accuracy and rationale during challenging, functional activities. Post-intervention student one demonstrated

improvements in speed but no significant changes were noted in accuracy or rationale, student two demonstrated improvements in speed but declined in accuracy. Improvements were noted in the areas of grades, self-awareness, and use of self-regulation strategies.

Four studies examined coaching using a cognitive behavioral therapy (CBT) and psychoeducational approach (Anastopoulos & King, 2015; Anastopoulos et al., 2020; Anastopoulos et al., 2021; Prevatt & Yelland, 2015). The specific program ACCESS (Accessing Campus Connections and Empowering Student Success) developed by Anastopoulos & King (2015) used mentoring in addition to CBT. The terms coaching and mentoring are often used synonymously although the terms differ as mentoring refers to sharing specific knowledge and coaching refers to guidance based on the coachee's specific goals (van Nieuwerburgh & Barr, 2017). The research studies authored by Anastopolous et al. met inclusionary criteria based on the description of mentoring within the ACCESS program, "In addition, mentors help students develop realistic goals, monitor their follow-through on achieving those goals, and provide students with ongoing support and personal coaching" (p.145), and because the studies included specific EF outcomes. An open clinical trial revealed significant improvements ($p < .001$) in the EF skills of metacognition ($d = 0.86$), behavioral regulation ($d = 0.74$), and global EF ($d = 0.88$) (Anastopoulos & King, 2015). In a similar study medium effect sizes were found in metacognition ($d = 0.64, 0.53$) and behavioral regulation ($d = 0.66, 0.58$) both active treatment and maintenances phases (Anastopoulos et al., 2020). Additionally, results from a randomized controlled trial demonstrated significant improvements in the immediate treatment ACCESS group EF skills of behavioral regulation and metacognition compared to the delayed treatment control group (Anastopoulos et al., 2021).

In a prospective descriptive study evaluating outcomes of students with a diagnosis of ADHD over a 5-year period, coaches were doctoral-level practicum students supervised by a doctoral-level licensed psychologist and master's level school psychologist (Prevatt & Yelland, 2015). Participants received individual coaching sessions one time per week for eight weeks total and received between session assignments to assist with progress towards goal areas. Results indicated improvements in self-esteem as measured by the Rosenberg Self-Esteem Inventory (RSE) ($p < .01$) with medium effect size ($d = 0.43$) and significant improvements on all 10 subscales (skill, will, and self-regulation) of the LASSI ($p < .01$) with effect sizes ranging from ($d = .40$ to .89).

Discussion

The purpose of this review was to examine how coaching interventions support EF skills and contribute to academic success of postsecondary students with disabilities. The analysis of research completed between 2009-2021 revealed different variations in the frequency, nature, and mode of coaching programs employed at postsecondary institutions. First, coaching services were provided by either certified coaches or informally trained coaches with the benefit of cost reduction noted as justification for informally trained coaches. Second, the models used to guide coaching practices varied and included; Universal Design for Learning (Marino et al., 2020; Rando et al., 2016), Self-Determination Learning Model of Instruction (Xie, 2020), EF coaching tailored specifically for persons diagnosed with ADHD (Field et al., 2013; Parker et al., 2011), strengths-based approach within occupational therapy model of delivery (Harrington, 2021); dynamic coaching model through speech-language pathologist lens (Weiss & Rohland, 2015);

and CBT psychoeducational approach (Anastopoulos & King, 2015; Anastopoulos et al., 2020; Anastopoulos et al., 2021; Prevatt & Yelland, 2015). Third, service delivery including the amount of time and method (in-person or virtual) varied between programs, programs ranged from eight weeks to two full semesters and sessions were between 30-minutes and one hour each with some including between session check-ins/assignments.

Despite the variations in program frequency, nature, and mode the majority of coaching interventions had a positive impact on student success. Positive outcomes include improved GPA, time management, organization, learning and study skills, self-esteem, behavioral regulation, metacognition, and sense of well-being.

Limitations and Future Research

This review has several limitations. First, generalizability of the findings may be limited due to small sample sizes and lack of population heterogeneity within the majority of studies. In addition, search terms, and inclusion and exclusion criteria may have limited discovery of all relevant articles. For example, different search terms may have revealed additional research studies, or criteria requiring outcomes associated with EF skills may have eliminated articles in which EF skills were not clearly defined. Third, due to the variations in research methodologies, variations in types of disabilities studied, and small number of studies discovered the quality of research proves to be difficult to evaluate.

Madaus et al. (2020) noted the difficulty associated with special education research in postsecondary education due to many factors including individual differences in students being studied, variations in types of institutions (e.g., public vs. private, two-year vs. four-year) and

supports available. In addition, there is a lack of quality indicators and standards available for researchers who conduct studies about SWD and postsecondary education. The authors suggest research guidelines including well-defined descriptions of study samples, locations, and methodologies. Of the articles included in this review 35% did not report socio demographics and 11% did not specify disability type creating increased difficulty in generalizing findings and replicating studies. Future research would benefit from following the guidelines outlined for increased consistency, methodological rigor, and overall quality of research regarding SWD in postsecondary education.

Conclusion

Enrollment rates of SWD in postsecondary education continue to rise, yet retention and degree completion rates are lower compared to peers without disabilities (Cortiella & Horowitz, 2014; Marino et al., 2020; Madaus et al., 2021). This systematic literature review provides an update on extant coaching interventions on EF skills imperative for academic and life success. Although the studies differed in nature, frequency, and mode of programs the overall outcomes were positive. Coaching is a collaborative, client-centered process (Parker et al., 2018; Richman et al., 2014) tailored to meet individualized student needs. As such, coaching interventions have the ability to holistically address EF skills in every area of life. The results of current research demonstrate coaching can be an effective and low-cost intervention for helping SWD succeed.

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CHAPTER THREE: TECHNOLOGY TO SUPPORT ECECUTIVE FUNCTION SKILLS

This chapter titled, “Technology to support executive function skills” has been submitted for publication in the refereed journal titled, the *Journal of Special Education Technology* and is currently under review.

Abstract

Enrollment rates of students with disabilities (SWD) in postsecondary education continue to rise, yet SWD continue to face challenges with persistence toward degree completion. Executive function deficits (e.g., difficulty concentrating, managing time, problem solving, or planning) often impact academic, social, and occupational function. Academic and social adjustment to the complexity of life beyond students' homes can be stressful, further exacerbating difficulties with executive function skills necessary for postsecondary success. Coaching can assist young adults during postsecondary education to enhance executive function skills and has the potential to reduce stress and anxiety. Coaching is a collaborative, client-centered process designed to elicit client identification of goal areas, increase self-awareness, and problem-solving solutions. This practitioner article explores executive function skills, coaching, and how technology can be used within the coaching process to support executive function deficits for students in the postsecondary environment.

Introduction

Key legislation including the Individuals with Disabilities Education Improvement Act (2004) and the Higher Education Opportunity Act (2008) support equal education opportunities

for students with disabilities (SWD) to achieve academic and professional goals (Raue & Lewis, 2011). As a result, the number of SWD enrolling in postsecondary education continues to increase, currently comprising 19.4% of undergraduates (U.S. Department of Education, 2021). According to a report from the National Longitudinal Transition Study-2 (NLTS2), 44% of SWD were enrolled in two-year colleges, 32% were enrolled in vocational schools, and 19% were enrolled in four-year universities Yet, completion rates for SWD were only 34% compared to 51% for students without disabilities (Newman et al., 2011).

The advantages associated with a college education are numerous including higher lifetime earnings, increased employment opportunities, improved access to healthcare benefits and preventative care, increased desirable health outcomes (e.g., healthy diet, decreased obesity rates, drinking and smoking), and overall satisfaction with quality of life (Ma et al., 2016). Current predictions estimate 70% of employment in the United States by 2027 will require some postsecondary education (Blumenstyk, 2020). However, SWD continue to face challenges with persistence towards degree completion (Marino et al., 2020; Madaus et al., 2021), placing them at risk for decreased employment opportunities and increased incidence of illness and disease (Carnevale et al., 2016).

The college environment presents increased academic and social demands on students (Lindsay et al., 2019; Prevatt & Levrini, 2015). A primary challenge for SWD in the postsecondary environment that negatively impacts persistence and graduation is deficits in executive function (EF; Goudreau & Knight, 2018; Marino et al., 2020). Executive function deficits impact academic, social, and occupational domains (DuPaul et al., 2009; Grieve et al., 2014). Deficits in EF are a predominant factor in many disabilities including conduct disorder

(Zelazo, 2020), specific learning disability (SLD) (Kennedy, 2017), autism spectrum disorders (ASD) (Leung et al., 2016), and attention deficit/hyperactivity disorder (ADHD) (Goudreau & Knight, 2018), traumatic brain injury (TBI), epilepsy, tic disorders, emotional and psychiatric conditions (e.g., depression, anxiety, obsessive-compulsive disorder), and medication side effects (Rabinovici et al., 2015). Students with disabilities are more likely to be underprepared with skills such as organization, planning, self-regulation, and study strategies needed for success (D'Alessio & Banerjee, 2016; Parker & Boutelle, 2009).

Dysfunction in EF skills are also correlated with increased levels of anxiety (O'Rourke et al., 2020) that may be present when students enter the postsecondary environment and realize they are underprepared. According to the Digest of Education Statistics, in 2015-2016, 19% of undergraduate college students reported having a disability and 17% of those reported difficulty concentrating, remembering, or making decisions (Snyder et al., 2019). A survey of college students in the fall of 2018 revealed 29.5% of students reported feeling overwhelming anxiety in the last two weeks (Statista, 2020). Anxiety associated with deficits in EF skills and anxiety resulting in deficits of EF skills can hamper student academic and social success.

To address the increased need for support, some institutions are implementing new support mechanisms such as mentoring (Dunn et al., 2018; Lindsay et al., 2016) and coaching (Marino et al., 2020; Richman et al., 2014). As indicated by research, coaching can help SWD enhance their EF skills, increase their self-awareness, and develop techniques to achieve self-determined goals during postsecondary education (Goudreau & Knight, 2018; Parker & Boutelle, 2009). This manuscript will discuss how EF coaching has been implemented as a means to support postsecondary SWD during the challenging adjustment to college life.

Vignette

Orson is a 20-year-old full-time undergraduate sophomore majoring in computer engineering who lives on-campus with three other roommates. Orson has diagnoses of Autism Spectrum Disorder (ASD) and Attention Deficit Hyperactivity Disorder (ADHD). He is frustrated because the transition to college has been difficult. He stated he has done poorly on tests, has trouble managing time, and feels disorganized. He was able to pass his first semester freshman year but ended up dropping two out four classes during his second semester. Orson heard about the executive function coaching program at his college from a professor and is hoping it will help him with the skills he needs to succeed.

Executive Function Skills

Executive function (EF) skills form a foundation for knowledge attainment and control over related purposeful behavior required for creating and reaching goals (Doebel, 2020; Rabinovici et al., 2015; Zelazo et al., 2016). Constructs often associated with EF include cognitive flexibility, working memory, and inhibitory control (Diamond, 2013; Kassai et al., 2019; Miyake & Friedman, 2012). Development of EF skills continue into adulthood (Cristofori et al., 2019) and appear to have genetic origins (Friedman et al., 2008), with each skill becoming neurologically linked to the development of the prefrontal cortex based on experience as individuals grow from childhood to adulthood (Diamond, 2013). Numerous researchers have identified EF as a better predictor of academic learning and achievement than an intelligence quotient (Kassai et al., 2019; Zelazo et al., 2016). Executive function is also associated with social competence (Diamond, 2013), physical health (Crescioni et al., 2011), quality of life

(Sharfi & Rosenblum, 2016), academic performance (Zelazo et al., 2016), and effective transition from school to post-school environments (Diamond, 2013).

Using an extended phenotype model, Barkley (2012) improved on definitions of EF, stating "…. the use of self-directed actions so as to choose goals and to select, enact, and sustain actions across time toward those goals usually in the context of others often relying on social and cultural means for the maximization of one's longer-term welfare as the person defines that to be" (p.176). This definition includes crucial elements of self-regulation such as motivation and self-monitoring required for choosing, sustaining, and meeting goals within a particular context. Human development is predictable yet variable depending on experience. Likewise, the development of EF skills depends on experiences supporting those skills (Zelazo et al., 2016). Executive function skills can change and be learned with positive guidance.

Vignette

Orson noted he has difficulty planning and organizing time to complete academic tasks, forgets due dates, misplaces items he needs, has had difficulty making friendships and feeling included, and has overwhelming anxiety about disappointing his parents because he is not doing well in college. Orson understood he would have to learn to manage increased demands associated with independence in college and to do so would require help geared towards supporting his EF skills. Orson began working with an EF coach who noted their work together would be based specifically on Orson's current needs to develop self-awareness and self-regulation required for optimal EF function. See Table 2 for a description of Orson's challenges in reference to EF skill areas.

Description of Executive Function Constructs

After careful reflection of challenges impeding EF skills, the coach explores technological options with Orson and organizes these options within the parameters of EF constructs. Executive function constructs (i.e., cognitive flexibility, working memory, and inhibition) are not isolated skills, they all work together in the pursuit of domain specific goals and are influenced by a person's context and environment (Doebel, 2020). Inhibitory control is the ability to suppress responses associated with irrelevant stimuli (Zelazo et al., 2016). For example, attending to a lesson in school while ignoring distractions such as friends or cell phones. In addition, inhibitory control allows for self-control over impulsivity in behaviors and actions. The ability to stay on task despite desires to participate in other activities is a function of inhibitory control.

Working memory is the ability to hold information temporarily and maneuver it as needed to problem solve during cognitive tasks (Diamond, 2013; Rapport et al., 2013). For example, recalling facts and applying them to an exam or taking notes of key points during a class lecture. The ability to remember and use multiple steps while cooking a recipe is also dependent on working memory skills. Students completing college level coursework must be able to effectively manipulate and process information for successful progression in any given course.

Cognitive flexibility is the ability to think about things in various ways, switching attention and tasks as needed (Miyake et al., 2000), and adjusting, allowing for adaptation as necessary (Zelazo et al., 2016; Diamond, 2013). For example, a student's ability to transition from lessons in one subject area to another requires cognitive flexibility, as does the ability to

understand differing viewpoints. Cognitive flexibility requires both working memory and inhibition skills.

If a college student values good grades and knows high scores will please their parents or professor they may exert increased inhibitory control during academic tasks compared to a student who does not place such a value on high grades. Another contextual influence on EF is a student's social life. If a student recently had an argument with a friend or significant other, ruminating thoughts may negatively impact full working memory capacity required for academic success. Some students are prepared for the drastic increase in independence when starting college because their culture has supported college education for generations, other students are less prepared as first-generation college students themselves.

Vignette

Orson was provided with transition services while in secondary school in accordance with the 2004 reauthorization of the Individuals with Disabilities Education Act. Orson noted he felt the IEP team listened to his preferences, needs, goals, and interests. When he made the decision to attend postsecondary school, Orson and his parents were provided with information regarding registering with Student Accessibility Services (SAS) at the university to ensure access to higher education with reasonable accommodations. Based on evaluations and recommendations, the disability specialist provided Orson with testing accommodations including additional time and a distraction-limited environment. However, Orson soon realized he no longer had the support of educators, his parents, and school support staff to ensure he was prepared and completed his assignments in an organized and timely fashion. Orson noted he felt ashamed and embarrassed

and was worried his professors would think less of him because of the accommodations afforded to him.

Supports Available in the Postsecondary Environment

Individuals with disabilities in higher education can gain access to accommodations through offices of disability services at their college or university, yet many students do not take advantage of this opportunity (Newman & Madaus, 2015; Kennedy, 2017). According to a report based on data from NLST2, 87% of students with disabilities received accommodations or supports in secondary school, compared to only 19% in postsecondary institutions. (Newman et al., 2011). The postsecondary education system offers a variety of services, but students do not take advantage of them.

Recent research illuminates some of the reasons SWD are not taking advantage of accommodations and supports offered at postsecondary institutions. Lyman et al., (2016) completed a qualitative study to gain deeper understanding regarding the barriers SWD face in accessing and utilizing accommodations. Findings included student desire for independence and self-sufficiency. Participants noted they did not want to be viewed differently from others or be a burden to their peers and instructors. An additional theme was lack of knowledge regarding accommodations and services available, as well as the perception of services being useful and effective for specific needs. The fear of future ramifications including disability status on transcripts or not receiving strong letters of support because of disability status was reported as reasons for not utilizing accommodations. An additional research study found students with learning disabilities often lack the self-advocacy skills necessary to request accommodations and

services (Hadley, 2006). Adequate provisions and positive guidance are needed to ensure SWD can access and receive supports appropriate for their needs in the postsecondary environment.

Vignette

In addition to feeling embarrassed about receiving accommodations, Orson realized he was grossly underprepared to even take his exams. Orson noted he has difficulty planning and organizing time to complete academic tasks, forgets due dates, misplaces items he needs, has had difficulty making friendships and feeling included, and has overwhelming anxiety about disappointing his parents because he is not doing well in college. Orson understood he would have to learn to manage increased demands associated with independence in college and to do so would require help geared towards supporting his EF skills.

Coaching

Coaching is a collaborative, client- centered process designed to elicit client identification of goal areas and increase self-awareness and problem-solving solutions (Parker et al., 2018; Richman et al., 2014). Parker & Boutelle (2009) noted the use of specific questioning in the coaching process to increase student self-awareness and identification of goal areas. Both problem-based (Kennedy, 2017) and strengths-based learning (Harrington et al., 2021) are often used for identification of goals and action plans during the coaching process.

Kennedy (2017) proposed a dynamic model of coaching designed to teach individuals how to understand their EF skill function within varied contexts. A dynamic model such as this molds well with the cyclical process of self-regulated learning, as students' needs are constantly changing based on academic demands, context, emotions, and environment. Forethought,

performance, and self-regulation facilitated within the coaching process can guide students as they navigate decreased structure and adult support in the postsecondary environment (O'Rourke et al., 2020). Jarosz (2016) discovered the successful coaching relationship includes analysis of what is right with the client, is designed equally by the coach and client, and must be created in a safe and open environment. The coaching relationship is a dynamic, individualized, and holistic approach, ideal for addressing the cyclical nature of self-regulation skills required for growth in EF dysfunction.

Vignette

Using a strengths-based approach, the coach asked questions to encourage Orson to identify skills he would be able to use to help compensate for deficits in EF skills. Orson stated he has excellent technology skills and agreed to explore a variety of applications (apps)and functions available on his phone, watch, and computer to support his EF skills. The coach explained how the use of compensatory techniques for EF deficits will support academic productivity, social success, and perseverance towards goals that will holistically benefit Orson's individual needs.

Technology

In addition to academic skill development across content areas, technology can also contribute to the development of EF skills (Desideri et al., 2020). Accessibility features within mainstream devices and available apps continue to grow offering easy to access supports (e.g., time management, organization, reminders) for SWD (Enable Ireland, 2016). There are over 85% of adults who own a smartphone in the United States, and that number rises to 96% for those aged 18 to 29 (Pew Research Center, 2021). Keeping up with the explosion of technology,

recent research has begun to examine the use of apps within various coaching programs and discovered positive outcomes (Mohammadi et al., 2018; Spelt et al., 2019; Xie, 2020). The following apps described can support strategies used to reach goals created within EF coaching sessions.

Vignette

Orson and his coach discussed the most pertinent challenges that would benefit from technological support and began exploring options available. Within the coaching session Orson trialed various features and apps to determine usability and usefulness. Orson noted he was feeling overwhelmed with classes and did not want a complicated user experience that was not intuitive when choosing apps to support his EF skills. The technology used must be usable and useful or it will simply just waste data space. After dissecting specific problems impacting academic success (e.g., forgetting due dates, poor focus when studying, anxiety) Orson worked with his coach to choose apps related to his main problem areas (i.e., attentional control/inhibition, planning, and emotional regulation). See Table 3 for technology explored by Orson.

Specific Technology

For example, The features Focus, Screen Time within iOS devices and Digital Wellbeing within Android devices allow for customizable settings (e.g., do not disturb, sleep) and self-tracking of screen time to increase overall energy and focus towards domain specific goals. Some of the many apps specific for the area of attentional and inhibitory control assist with time management both in planning and in keeping focus when completing tasks. TimeCamp tracks

time automatically assisting with productivity, Freedom allows the user to set blocking controls, and Todoist acts as a task manager. Both Rescue Time and Pomofocus are customizable time trackers.

Calendar features within devices have several customizable features (e.g., alerts, syncing features, recurring events) beneficial for planning and keeping track of tasks. There are also many available planning apps with additional features. Calengoo offers customizable variations on how to view events, tasks, and details. The user can set events to continue if they are not completed. Any.do and Things 3 also include many customizable features for planning and keeping track of tasks to improve productivity. Habitica sets itself apart from other productivity and planning apps by gamifying features, including built-in rewards and punishment for motivation to remember and complete goal related tasks.

The features Focus, Screen Time within iOS devices and Digital Wellbeing within Android devices can also benefit emotional regulation by decreasing feelings of anxiety associated with being overwhelmed. Various apps available include Happify which offers games and programs to decrease stress and negative thoughts, Samsung Health allows a user to customize and track sleep, nutrition, and exercise for overall well-being. Similar to Samsung Health, Welltory tracks healthy habits in addition to heart rate and blood pressure monitoring allowing the user to understand physical cues that indicate dysregulation. Both Aura and Mindfulness Daily offer mindfulness exercises to increase awareness of emotional states.

There are many apps available to support EF skills. With constant growth in technology apps can quickly become obsolete and prices fluctuate often. The apps described here are available for both iOS and Android devices and prices were not listed due to continual market

changes. When exploring apps, it is imperative for the technology to be usable and useful to the user to encourage most effective outcomes.

Vignette

After exploration, Orson's coach encouraged him to choose just one or two apps or features for each EF area in need of support and to use consistently for at least a week to develop the habit of actually using these supports. For attentional and inhibitory control Orson integrated the use of Todoist to manage timelines for academic work, home maintenance tasks (e.g., laundry, dishes), and exercise routines. He also used Pomofocus as a way to break academic assignments into attainable pieces of time (e.g., 15 minutes on task, 10-minute breaks) for successful completion. Orson stated he felt less overwhelmed when placing all tasks into Todoist as it allowed him to visually see he had the time to complete all tasks and Pomofocus alerts assist him to balance breaks for increased productivity. Orson found his motivation increased greatly using the gamified features of Habitica with the built-in rewards and punishments for tasks completed, or not. Lastly, Orson found Welltory a wonderful way to track health in addition the heart rate tracker cued him to practice deep breathing and mindfulness when feeling overwhelming anxiety. Orson noted having a coach to help facilitate compensatory techniques to support his EF skills helped him realize he was able to manage academic, health, and social independence for success.

Conclusion

The increased academic and social demands in the postsecondary environment can be overwhelming for all students, particularly those with executive dysfunction. Research

demonstrates coaching can be a beneficial support to facilitate self-awareness and self-regulation required for a student to understand steps to take for success. The recent tremendous growth in technology allows for student-centered choice in compensatory supports for EF deficits through both features available within devices and apps. Through careful dissection of challenges and exploration of technology available within the coaching process students with executive dysfunction can access valuable tools for support and subsequent success.

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CHAPTER FOUR: EXECUTIVE FUNCTION COACHING IN POSTSECONDARY EDUCATION: A MIXED-METHODS INVESTIGATION

This chapter titled, "Executive function coaching in postsecondary education: A mixed methods investigation" has been submitted for publication in the peer-reviewed interdisciplinary professional journal titled, the *International Journal of Evidenced Based Coaching and Mentoring* and is currently under review.

Abstract

Empirical evidence suggests coaching programs have a positive impact on post-secondary students with executive dysfunction. This study investigated the impact of a coaching program on post-secondary students' executive function skills, anxiety, and academic success. A convergent parallel mixed-methods design was used ($N = 7$). Findings indicated improvements in executive function (EF) skills, academic success, and reduced levels of anxiety. Qualitative evidence supported participant's satisfaction with the process and identified the benefits of creating attainable goals to enhance EF skills.

Introduction

By 2027, current predictions indicate 70% of employment in the United States will require some level of postsecondary education (Blumenstyk, 2020). Earning a college degree leads to improved employment opportunities, lifetime earnings (Newman et al., 2011), better physical and mental health, and enhanced quality of life (Ma et al., 2016; Trostel, 2015). Executive function skills, such as the ability to organize, plan and initiate a task, are critical during the transition to postsecondary education (Diamond, 2013a; Zelazo et al., 2016).

However, many postsecondary students, including those with and without disabilities, experience executive function deficits, which limit their academic and social potential (Marino et al., 2020).

Executive functions (EF) are cognitive abilities that support goal-formation, reasoning, planning, and behavioral control necessary for success in everyday life activities (Diamond, 2013a; Friedman et al., 2008; Zelazo & Carlson, 2020). Students rely on these functions to solve novel problems, create long- and short-term plans, adjust as needed when plans go awry, and manage relationships. Deficits in EF are associated with many disabilities including autism spectrum disorder (Desideri et al., 2020), attention deficit/hyperactivity disorder, conduct disorder (Zelazo, 2016), specific learning disability (Kennedy, 2017), traumatic brain injury, epilepsy, tic disorders, and emotional and psychiatric conditions (Rabinovici et al., 2015). Furthermore, life circumstances that cause anxiety (O'Rourke et al., 2020), sadness (Diamond, 2013b), and stress (Blair, 2017) negatively impact EF skills.

In the college environment students are expected to be self-directed learners, a drastic change from secondary school where most students have the support of family members and teachers to remind them of due dates and assist with projects. In addition, the social context includes more demands with many students faced with the challenge of creating new social circles and living with less oversight. Diamond (2013b) noted EF skills are "the first to suffer" in situations causing stress, loneliness, and sadness. College students are precariously close to suffering any or all these life stressors depending on how they adjust to the complexities of the postsecondary environment. Therefore, supports must be readily available to assist the unmet needs of students during this transition.

A number of cognitive mechanisms are associated with EF, including working memory, cognitive flexibility, and inhibition (Diamond, 2013a, Miyake & Friedman, 2012, Rapport et al., 2013). Working memory allows an individual to temporary hold and manipulate information to solve cognitive tasks (Zelazo et al., 2016). Cognitive flexibility is the ability to adapt and change ways of thinking as needed. Inhibition allows for the suppression of irrelevant stimuli. However, over-simplifying these cognitive skills without considering an individual's context and environment is cause for concern (Doebel, 2020).

Coaching Can Improve Executive Function Performance

The International Coaching Federation (2021), "defines coaching as partnering with clients in a thought-provoking and creative process that inspires them to maximize their personal and professional potential. The process of coaching often unlocks previously untapped sources of imagination, productivity, and leadership" (para. 1). Coaching is a collaborative, client- centered process designed to elicit client identification of goal areas, increase self-awareness, and problem-solving solutions (Parker et al., 2018; Richman et al., 2014). Several prior studies provided preliminary evidence of the efficacy of coaching.

For example, Marino et al. (2020) performed a matched-pairs experimental design with 120 undergraduate STEM majors with EF deficits. Results from the coaching intervention group indicated significantly higher scores in GPA and persistence in STEM majors when compared to the control group. Xie (2020) found statistically significant improvements in EF skills after students participated in a mobile coaching program. A phenomenological analysis by Harrington et al. (2021) revealed coaching improved healthy living habits, time management, and

organization. Richman et al. (2014) discovered participants noted increased self-awareness, ability to manage life, and overall well-being. In addition to improvements in EF skills, other studies found participants decreased stress levels (Parker et al., 2011) and improved self-confidence (Sleeper-Triplett, 2010). Although positive outcomes have been associated with coaching interventions, there is a need for additional research related to its specific impacts on executive function (Goudreau & Knight, 2018).

Purpose

The overall aim of this investigation was to determine the effectiveness of a novel ten-week coaching program named FOCUS, which was created for undergraduates with EF dysfunction. The research questions guiding the investigation included:

Research Question 1:

To what extent do EF skills change after participation in the FOCUS coaching program?

Research Question 2:

To what extent does the FOCUS coaching program impact participant anxiety?

Research Question 3:

To what extent does the FOCUS coaching program impact participant academic performance?

Research Question 4:

What are the characteristics of student-developed weekly coaching goals?

Research Question 5:

How did participants perceive the coaching program?

Methods

This study used a convergent parallel mixed-methods design to collect and analyze quantitative and qualitative data. The method allowed researcher(s) to achieve an in-depth understanding of the research problem (Mills & Gay, 2019). In this form of study design, qualitative and quantitative data are concurrently collected. The results of each are merged for a rich analysis and interpretation (Mills & Gay, 2019; Zhang &Watanabe-Galloway, 2014). Data were analyzed to understand individual coaching goal areas created, how the goals related to EF skills, explore changes throughout the duration of the 10-week program, and measure outcomes of student EF, anxiety, and academic skills. The authors triangulated data by comparing quantitative statistics with qualitative findings to substantiate and validate conclusions (Creswell & Plano-Clark, 2007). Data were obtained and analyzed separately, then compared and interpreted together as part of this research procedure. (See Figure 1).

Participants

The research team recruited participants from a diverse Minority Serving Institution in the southeastern United States with more than 70,000 students following approval from the Institutional Review Board. Study groups were selected using criterion sampling. The criteria

included students over the age of 18 with reported problem areas in EF (e.g., time management, organization, creating and meeting self-determined goals, etc.), stress, and/or anxiety that negatively impact college and life success. Students were recruited through three pathways: (a) distribution of flyers across multiple locations, (b) targeted emails to department chairs and directors at the university, which asked them to distribute the flyers to students in their program areas, and (c) distribution of the flyers using social media linked to various groups and clubs associated with the university. Responses included 21 students with and without disabilities. A total of seven students completed the coaching program, see Table 4 for demographic details.

Program Design

The FOCUS coaching program combined coaching interventions with varied technologies (e.g., tablets, smartphones, apps) to help students learn individual compensatory strategies for stress, anxiety, and EF management that are critical to academic success. The novel conceptual framework was based on a coaching model developed for undergraduate STEM majors including a focus on individual strategies for success (Marino et al., 2020). Please see Figure 2.

Program Procedure

Doctoral students were assigned to the FOCUS coaching project based on interest in the program. They were trained as coaches by faculty advisors with prior experience implementing the FOCUS model. A manual of all training modules was created and accessible to coaches at all times to decrease potential drift from protocol, thereby increasing fidelity. Each coach completed the following virtual training modules prior to the start of coaching activities: (a) CITI training

(i.e., human subjects research and responsible conduct of research), (b) Beck Anxiety Inventory (BAI; Beck & Steer, 1990), (c) Barkley Deficits in Executive Functioning Scale-Short Form (BDEFS-SF; Barkley, 2011), (d) Academic Success Inventory for College Students (ASICS; Prevatt et al., 2011), (e) The Transtheoretical Model (TTM; Prochaska et al., 1994), (f) The Intentional Relationship Model (IRM; Taylor, 2008), (g) Universal Design for Learning (UDL; Meyer et al., 2014), (h) What is Coaching? (Jarosz, 2016; Kennedy, 2017), and (i) a review of applications (apps) for organization, time management, anxiety, and stress reduction techniques.

The research team organized and ensured all copies of assessments, permissions and informed consent were available. In addition, password secured data storage was established to ensure confidentiality and anonymity of participants (Creswell & Poth, 2018). Researchers ensured participants were informed about the purpose of the study in a transparent manner. Informed consent was obtained (Creswell & Poth, 2018).

Coaches provided ten weeks of coaching, including pre- and post-assessments. Three doctoral students pursuing a Ph.D. in exceptional (i.e., special) education provided coaching services. Each coach also had specialty certifications, one in occupational therapy, life coaching and health coaching, one in speech-language pathology, and one in behavior analysis. Prior to the first coaching session, participants completed a Qualtrics survey that included demographic information, disability type, symptoms of EF dysfunction, and goals for improvement during the coaching process.

Session Descriptions

Participants were seen individually for ten total sessions lasting between 20 and 45 minutes per session depending on student needs. The cost was US$100 for the ten-week program and participants with financial need were able to participate for free. During the initial session, participants completed pre-assessments including the BDEFS-SF, BAI, and ASICS. In addition, coaches provided education about EF skills, forming goals, and the coaching process. The pre-assessment reports were reviewed with each participant during session two. Any additional pertinent information was added to the narrative portion of the report. After identification of needs and expectations based on the pre-assessment and discussion, coaches facilitated the process of creating short-term goals based on the participants' desired long-term outcomes (e.g., graduate with desired degree, increase life balance). For the remainder of the coaching program, new goals were created weekly. Barriers to success and accomplishments were discussed. Coaches encouraged exploration of novel technologies (e.g., apps, calendar features) to support EF skills and facilitated modifications as necessary for improved goal attainment. Participants also received between session text messages for accountability purposes (Ahmann et al., 2018; Harrington et al., 2021). The final session included completion of post-assessments, a satisfaction questionnaire, and wrap-up discussions designed to promote the generalization of learned skills.

Implementation Fidelity

The implementation of a detailed plan for all stages of the research process decreased threats to both internal and external validity. The research team developed a specific plan to address implementation fidelity during the preliminary planning phase of the coaching program

based on the recommendations of the Treatment Fidelity Workgroup of the National Institutes of Health Behavior Change Consortium (NIHBCC; Bellg et al., 2004). The plan included five areas: (a) design, (b) treatment, (c) delivery, (d) receipt, and (e) enactment of participant learned skills. Table 5 presents descriptions of each area. The authors conducted random observations of recorded coaching sessions 20% of the time to ensure adherence to the intervention protocol. Receipt and enactment of the intervention protocol was assessed through a review of 20% of the coaching sessions. The mean implementation fidelity score was 89%. See Appendix B for fidelity implementation checklists.

Measurement Instruments

The Barkley Deficits in Executive Functioning Scale-Short Form

The Barkley Deficits in Executive Functioning Scale (BDEFS) is an empirically based norm-referenced tool designed to assess dimensions of EF in daily life functioning of adults ages 18-81 years-old (Barkley, 2011). The BDEFS includes both self and other reports in short form (20 questions) and long form (89 questions). The short form was used in this study. Scale measurements range between *never or rarely* (1) and *very often* (4) in response to each item. The time required to complete the short form assessment is approximately 10-15 minutes. The items within the BDEFS are categorized with five EF construct domains including Self-Management to Time, Self-Organization/Problem Solving, Self-Restraint or Inhibition, Self-Motivation, and Self Activation/Concentration. Executive function deficits are considered significant for answers scored as three or four.

As indicated by Barkley (2011), the BDEFS-SF is an indicator of general EF deficits, which can be used to determine whether follow-up testing is necessary. Satisfactory validity and test-retest reliability in a two-three-week time period (r = .84 for total scale, r = .80 for total summary score of BDEFS-SF) has been demonstrated by the BDEFS-SF. Clauss et al. (2021) recently completed a study to examine the factor structure and incremental validity of the BDEFS-SF. Findings supported the use of the BDEFS-SF in research practices.

The Beck Anxiety Inventory

The Beck Anxiety Inventory (BAI) is a 21- item criteria-referenced assessment for measuring the severity level of anxiety. The assessment is appropriate for ages 17-80 years-old (Beck et al., 1988). Each item scores between 0-3 and the total score is calculated by adding all 21-items. Cumulative scores range from 0-63 with higher total scores equating to higher levels of anxiety. Psychometric properties for the instrument are well-established and include evidence of internal consistency, test-retest reliability, convergent validity, and discriminant validity.

Wetherell & Gatz (2005) found adequate internal consistency in an older adult population diagnosed with generalized anxiety disorder (GAD) (a = .90) and a control group without a diagnosis (a = .81). Test-retest reliability reported in a sample of 85 adolescents over one-week is considered acceptable at .71 (Osman et al., 2002). Beck et al. (1988) reported similar acceptable findings in an adult population r (81) =.75. Kabacoff et al. (1997) measured discriminant validity in older adult patients with an anxiety disorder compared to those without through comparison of differences in mean scores. Results indicated a significant difference in patients with anxiety (M = 21.75, SD = 13.11) and those without anxiety (M = 14.44, SD =

10.93). Convergent validity was demonstrated with the BAI and the Hamilton Anxiety Rating Scale (HAMA) in a population of older adults diagnosed with GAD (Wetherell & Gatz, 2005).

The Academic Success Inventory for College Students

The Academic Success Inventory for College Students (ASICS) is a 50-item self-report tool used to evaluate academic success in college students (Prevatt et al., 2011). The constructs measured within this assessment include ten factors: general academic skills, career decidedness, internal and external motivation, anxiety, concentration, socializing, personal adjustment, and perceived efficacy of instructor. The ASICS can be completed in approximately ten minutes and domain areas of concern are found when students score lower than 75% of the normative sample (Prevatt & Levrini, 2015). The assessment includes acceptable evidence of internal consistency, convergent validity, and discriminant validity.

Measures of internal consistency include general academic skills = .93, internal motivation = .86, concentration =. 87, external motivation/future = .88, socializing =. 84, career decidedness = .87, lack of anxiety = .77, personal adjustment = .86, external motivation/current = .62, perception of instructor efficacy =. 92 (Prevatt et al., 2011). Large correlations were found between socialization and personal adjustment r = .82, general academic skills and personal adjustment r = .65, internal motivation/confidence and concentration r = .50. Discriminant validity was compared between those in Honors program (n = 265) and a group on academic probation (n = 346). All domains except external motivation significantly differed across groups with Honors students exhibiting higher positive scores.

Weekly Documentation

Weekly sessions were documented by coaches using the Subjective, Objective, Assessment and Plan (SOAP) format. Using this format enabled coaches to track students' needs, challenges, goals, and progress throughout the coaching program in an organized manner (Cameron & Turtle-Song, 2011). Coaches were able to identify salient EF needs (e.g., time-management, organization, self-regulation) and guide students in the creation of weekly goals accordingly. See Appendix C for sample weekly documentation.

Satisfaction Questionnaire

The researchers created a ten-item Likert satisfaction questionnaire including 2 open-ended questions (Appendix D). Respondent ratings obtained from the questionnaire were judged to be adequately reliable a = .858 (Glen, 2020).

Data Analysis

For research question one, “To what extent do EF skills change after participation in the FOCUS coaching program?” quantitative data analysis included a paired samples t-test to determine the extent of EF change after participation in the 10-week coaching program. In addition, the Reliable Change Index (RCI) threshold for the BDEFS-SF Total Summary Score (Barkley, 2011) was used to determine whether the degree of change was reliable and not a result of measurement error (Jacobson & Truax, 1991). Research question two, “To what extent does the FOCUS coaching program impact participant anxiety?” was analyzed using descriptive statistics. Research question three, “To what extent does the FOCUS coaching program impact participant academic performance?” was analyzed using a paired samples t-test to determine the extent of academic performance change post-intervention. This information was triangulated

with the qualitative data.

Qualitative data analysis was used in research questions four, “What are the characteristics of student-developed weekly coaching goals?” and five, “How did participants perceive the coaching program?” to analyze the characteristics of goals created within the coaching program and of the open-ended responses to the satisfaction questionnaire. Analysis began with repetitive readings of the 129 participant developed goals to generate initial themes from a holistic point of view (Lester, 1999). The same process was used for 14 responses to the satisfaction questionnaire. NVivo 12 Pro (2018) software was utilized for two cycles of coding directly following the initial analysis. Initially, descriptive coding was utilized to categorize topics related to EF skills (Saldaña, 2009). Axial coding was used in the second cycle of coding to reorganize the topics into a more refined set of EF skills. Intercoder reliability (ICR) was assessed to determine whether the coding was thorough and if it was the most appropriate fit for the research topic (O’Connor & Joffe, 2020). Percent agreement between two members of the research team was 0.99, nearly perfect.

Results

Research Question One

A paired samples t-test was used to compare pre-post-test scores of the BDEFS-SF to determine the extent of change in EF skills for participants. The analysis revealed a statistically significant difference in scores from pretest to posttest (M=13.29, SD=6.65), p=.002, g=7.6. In addition, the RCI was used to ensure change in scores were reliable with 95% confidence (Jacobson & Truax, 1991). The RCI value for the total BDEFS-SF summary score for all participants in this study was 11.90 (Barkley, 2011). Four participants exceeded the RCI value,

meaning the change in scores are considered reliable (see Table 6). Although three participants did not meet or exceed the RCI threshold, it should be noted posttreatment scores of 41, 27, and 39 are well below the mean of the normative sample, 1.5 *SDs* (44.9), demonstrating coaching resulted in normalization in the areas of EF skills as measured by the BDEFS-SF.

Research Question Two

Summative scores of the BAI were also captured pre- and post-coaching. The 21 symptoms of the BAI each have four possible answers: 1) not at all, 2) mildly, it did not bother me much, 3) moderately, it was very unpleasant, but I could stand it, and 4) severely, I could barely stand it (Beck et al., 1988). The score ranges between 0-3, and a summative score is retrieved. A total score of 0-7 is interpreted as minimal level of anxiety, 8-15 is mild, 16-25 is moderate, and 26-63 is severe. Five participants indicated a decreased level of anxiety, while one showed increased anxiety. However, the scores, 6 and 7, both remain in the same category of minimal anxiety, and one participant remained the same at 0 indicating no anxiety. Mary specifically noted she had problematic anxiety due to medication side effects. These symptoms cause her difficulty in managing full-time employment and a full-time course load. Susan self-identified as having an anxiety disorder and is currently trying to control symptoms with prescribed medications. See Table 7.

Research Question Three

The research team compared pre- and post-test mean scores of the total ASICS inventory (see Table 8). The analysis revealed a statistically significant difference in scores from pretest to posttest (M=-.40, SD=4.27), p=.044, g=4.9. In addition, individual score analysis revealed 68.6%

improvement in individual summaries of all ten subscales demonstrating coaching as a beneficial part of student success. See Appendix E for individual ASICS score summaries.

Research Question Four

After the initial repetitive readings of goal areas, two cycles of coding were used including descriptive and axial coding. Descriptive coding was utilized to categorize topics related to EF skills and axial coding was then used to reorganize topics into a more salient set of EF skills (Saldaña, 2009). Descriptive codes included 26 specific areas from a total of 129 goals. Through axial coding methods these 26 areas were refined into five themes including working memory, time management, inhibition, life balance, and planning. Table 9 demonstrates examples of goals developed by participants within each category and overall percentage of goals used in each area. Participants successfully achieved 78.75% of goal areas created within sessions.

Research Question Five

Overall, participants answered either "satisfied" or "very satisfied" on the 5-point Likert scale of 10 questions (see Appendix C). Analysis of 2 open-ended questions revealed 5 themes including accountability, desire to work with others, creating goals, motivation, and self-awareness. When asked, "What was most helpful during the coaching process?" all participants noted creating goals and learning to disaggregate goals down into achievable steps. For example, one participant stated, "The most critical takeaway from this program was acknowledging

different ways to tackle a goal, specifically by breaking down that goal into smaller parts" and another participant noted, "creating goals and check-ins". In addition, 43% of participants noted they would have liked to receive more between session accountability checks, and 57% of participants stated they wanted this program to be easier to find within such a large campus. Additionally, 29% of participants noted they would have liked to meet and work with others in the program during the coaching process.

Discussion and Implications

Postsecondary institutions have increasingly implemented new solutions to address student success such as mentoring (Lindsay, 2019) and coaching (Marino et al., 2020). This study sought to describe a novel coaching program specifically designed to address EF skills in all facets of daily life and provide evidence of efficacy to enhance student success. Results from the paired samples t-test for EF skills according to the 5-construct domain within the BDEFS-SF indicated a statistically significant outcome form pre- to post-test. Additionally, four students were considered to have a reliable change according to the RCI and three students demonstrated scores well below 1.5 *SDs* of the normative sample. The paired samples t-test analysis of total ASICS scores revealed statistically significant outcomes from pre- to post test. Scores of the BAI, although not statistically significant, indicated improvement post-intervention.

Qualitative analysis of goal areas showed great variability in goal choice between participants. Goals were developed across five categories of EF skills including working memory, time management, inhibition, planning, and life balance. Humans are individuals, all with different knowledge, values, and beliefs (Doebel, 2020). Variations in contextual

circumstances (e.g., adjustment to dorm life, increased need for self-directed learning, etc.) can have impacts such as stress, sadness, and anxiety all of which can negatively impact EF function (Diamond, 2013b). Therefore, variations in the goal areas demonstrate this coaching program's focus on individual's holistic needs. Although participants did not meet every goal created during coaching sessions (78.75%), the analysis of documentation showed increased self-awareness as evidenced by comments such as, "I realized I need to break the goal down into smaller parts" or "I need to come up with rewards that will motivate me." Outcomes from the satisfaction survey demonstrated the importance of the coaching relationship, flexibility to address diverse needs, and timely feedback.

Coaching can enhance self-advocacy, social skills, and executive function skills required to increase independence during the time of transition into the postsecondary environment. Coaching is an unregulated industry that has seen rapid growth in the last decade and due to the elusive nature of specialties coaches address, it is nearly impossible to determine the amount or rates of existing coaching programs. A simple Google search reveals hourly rates for private coaching services from $75-$250/hour or monthly packages from $2k or more. Private colleges offering coaching services cost approximately $62k/year. The FOCUS coaching model used in the current study was cost effective and easily scalable to address the need for colleges and universities that seek to promote student success, increased equity, and inclusion.

The FOCUS research team utilized doctoral students with certifications based in EF knowledge (i.e., occupational therapy, speech/language pathology, applied behavioral analysis) to provide services within the university setting at reduced costs to $100 per 10-week coaching package. The coaches noted benefits of understanding postsecondary student EF needs in all

areas of life (e.g., academic, social, independent living skills) helped them realize all students have individualized goals. Cultivating self-compassion along with means to reach these goals leads to student success. Although this was a small study, it provides valuable insight into the growing body of coaching literature.

Limitations and Future Research

Several limitations are worth noting in this study. First, the study sample size was small (N = 7) creating limited statistical power to predict impact of the coaching program on students with EF dysfunction. Additionally, coaches although trained by the principal investigator were not certified by any coaching accreditation organizations. The assessments included self-reported data, which is subject to biases including potential dishonesty, selective memory, lack of introspective ability, and poor interpretation of questions. However positive outcomes including participant survey data demonstrate benefits of the program.

Future research should include large randomized controlled trials. The participants used in this study were from one university which limits the overall generalizability. In addition, gathering longitudinal data would increase knowledge about far transfer effects of the coaching intervention. Furthermore, it would be beneficial to explore reasons behind attrition rates.

Conclusion

Institutes of higher education are continuing to implement coaching programs as a means to support students with and without disabilities with positive outcomes (Marino et al., 2020). This study utilized a convergent parallel mixed-methods design to analyze the impact of a 10-week coaching program on EF skills, anxiety, academic success, and the characteristics of

student created goals. Outcomes indicated improvements in all areas and high participant satisfaction with the coaching program. In particular, participants noted gaining the knowledge to understand types of realistic and attainable goals to be the most helpful aspect of coaching. The development of this program demonstrated ease in portability and a low-cost option for students who require supports in EF skills. Indeed, a growing body of research suggests EF skills can be enhanced through coaching, the need for continued research is evident. See appendix G for an integrated discussion.

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APPENDIX A
UCF IRB LETTER

Institutional Review Board
FWA00000351
IRB00001138, IRB00012110
Office of Research
12201 Research Parkway
Orlando, FL 32826-3246

UNIVERSITY OF CENTRAL FLORIDA

NOT HUMAN RESEARCH DETERMINATION

November 18, 2021

Dear Kiera Anderson:

On 11/18/2021, the IRB reviewed the following protocol:

Type of Review:	Initial Study
Title of Study:	An Analysis of Coaching Outcomes, Executive Function Skills, and Anxiety Associated with Postsecondary Undergraduate Students with Disabilities
Investigator:	Kiera Anderson
IRB ID:	STUDY00003624
Funding:	None
Grant ID:	None
Documents Reviewed:	• ProjectFOCUSFacultyAdvisorForm.pdf, Category: Faculty Research Approval; • ASICS.pdf, Category: Test Instruments; • BAI.pdf, Category: Test Instruments; • BDEFS-LF.docx, Category: Test Instruments; • FOCUS Coaching Satisfaction Survey.docx, Category: Interview / Focus Questions; • STUDY 3624 HRP-250-FORM-V2.docx, Category: IRB Protocol;

The IRB determined that the proposed activity is not research involving human subjects as defined by DHHS and FDA regulations.

IRB review and approval by this organization is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities are research involving human in which the organization is engaged, please submit a new request to the IRB for a determination. You can create a modification by clicking **Create Modification / CR** within the study.

If you have any questions, please contact the UCF IRB at 407-823-2901 or irb@ucf.edu. Please include your project title and IRB number in all correspondence with this office.

Sincerely,

Gillian Bernal
Designated Reviewer

APPENDIX B
FIDELITY IMPLEMENTATION CHECKLIST

Delivery of Information

	Creates weekly goals in SMART format and ensures client records goals.
	Reviews progress towards short-term goals set for previous week, provides positive feedback for progress made.
	Encourages breaking down goals not met into new goals that are attainable based on collaboration with client.
	Reviews/collaborates strategies to use for problem areas (e.g., Pomodoro, calendar apps, phone/computer functions).
	Asks the participant to name specific ways coaching is beneficial or not.
	Reviews calendar for following week and sets up the next appointment.

Receipt of Intervention and Enactment

	Progress towards goal areas is evident in weekly note.
	Client response to intervention is easily identifiable through subjective and assessment portions of weekly note.
	Client ability to utilize compensatory strategies for behavior change to enhance EF is evident in assessment portion of weekly note.
	Client growth is evident in plan and assessment portions of weekly note.
	Client receives coaching on a weekly basis as evidence by dates on weekly note log.

APPENDIX C
SAMPLE WEEKLY DOCUMENTATION

Client: J.F.
Session 2

Subjective
Client expressed feeling overwhelmed and anxious regarding tasks to complete to ensure graduation by the end of the fall semester.

Objective (Goals)
Previous:

1. Client will make an appointment with program advisor to clarify dates for certification exams and required assignments for incomplete course by 5pm today**. (Met)**
2. To decrease procrastination and increase organization, Client will complete to-do list in journal for upcoming week inclusive of course assignments and employment related tasks by 5pm today. **(Met)**
3. To increase organization and decrease anxiety, client will complete three loads of laundry by 10pm on Saturday. **(Partially Met)**

Current:

1. Client will finish and submit three lesson plan assignments for incomplete coursework by 5pm tomorrow.
2. Client will complete outline for unit plan assignment by Friday 10pm.
3. Client will complete final draft of unit plan assignment and submit by Sunday 11:59pm.

Assessment

Session began with review of previous goals and discussion of barriers including difficulties with procrastination and task-initiation. Client able to identify motivators (i.e., allowing for Netflix binge time when goals have been met) and compensatory techniques. For example, client found the app "Todoist" assisted with recall and completion of tasks. Client noted she will break laundry task into twice a week to increase organization and efficiency.

Plan

Client to continue to identify barriers, use compensatory techniques including motivators such as rewards for self and technology (i.e., apps, calendar feature in phone) to enhance executive function skills for increased success in academics and life.

APPENDIX D
SATSFACTION QUESTIONNAIRE

Using the scale below, please indicate your satisfaction with each statement regarding the coaching process.

1 = Very Dissatisfied
2 = Dissatisfied
3 = Neutral
4 = Satisfied
5 = Very Satisfied

1. My coach was an effective listener.
2. My coach used clear communication skills.
3. My coach built a strong relationship with me.
4. I trusted my coach.
5. My coach provided timely feedback.
6. The coaching process increased my self-awareness regarding strengths and challenges.
7. I was able to identify areas of need and create relevant goal areas during my coaching sessions.
8. My coach provided easy to use suggestions to help me meet my goal areas.
9. My coach allowed for flexibility in both scheduling and format of coaching sessions.
10. I was satisfied with my coaching experience.

1. What was most helpful during your coaching experience?
2. What could be improved upon in your coaching experience?

APPENDIX E
INDIVIDUAL ASICS SCORE SUMMARIES

Area of functioning	Participant	Pre-score	25th percentile cutoff	Post-score
Academic skills	Edward	46.41		44.03
	Frank	78.54		70.21
	Mary	64.26		**72.59**
	Marvin	32.13	45	**51.7**
	Zane	66.64		**80.92**
	Nick	44.03		**54.74**
	Susan	52.36		**55.93**
Internal motivation	Edward	86.68		85.68
	Frank	71.4		**80.325**
	Mary	71.4		69.615
	Marvin	62.475	45	44.625
	Zane	30.345		**57.12**
	Nick	57.12		**71.4**
	Susan	66.045		**73.185**
Instructor efficacy	Edward	57.12		**91.39**
	Frank	34.272		**45.696**
	Mary	71.4		**74.256**
	Marvin	37.128	46	34.272
	Zane	37.128		34.272
	Nick	65.688		**71.4**
	Susan	88.536		**97.104**
Concentration	Edward	21.42		**53.55**
	Frank	24.99		**24.99**
	Mary	60.69		53.55
	Marvin	49.98	29	**74.97**
	Zane	14.28		**17.85**
	Nick	24.99		**46.41**
	Susan	28.56		**28.56**
External motivation future	Edward	78.54		71.4
	Frank	49.98		**60.69**
	Mary	92.82		78.54
	Marvin	60.69	36	42.84
	Zane	78.54		71.4
	Nick	53.55		**53.55**
	Susan	78.54		**96.39**
Socializing	Edward	78.54		**99.96**
	Frank	67.83		**92.82**
	Mary	96.39		**96.39**
	Marvin	60.69	57	**74.97**
	Zane	99.96		96.39
	Nick	89.25		53.55
	Susan	89.25		67.83

Area of functioning	Participant	Pre-score	25th percentile cutoff	Post-score
Career decidedness	Edward	96.39		93.39
	Frank	42.84		**60.69**
	Mary	82.11		**85.68**
	Marvin	74.97	57	**78.54**
	Zane	92.82		78.54
	Nick	57.12		**64.26**
	Susan	78.54		**78.54**
Lack of anxiety	Edward	52.36		**80.92**
	Frank	23.8		**33.32**
	Mary	14.28		**19.04**
	Marvin	76.16	29	47.6
	Zane	14.28		**52.36**
	Nick	52.36		**52.36**
	Susan	14.28		**28.56**
Personal adjustment	Edward	57.12		**99.6**
	Frank	95.2		66.64
	Mary	33.32		23.8
	Marvin	71.4	43	**80.92**
	Zane	85.68		**85.68**
	Nick	28.56		**42.84**
	Susan	33.32		**42.84**
External motivation current	Edward	85.68		57.12
	Frank	71.4		**85.68**
	Mary	57.12		**57.12**
	Marvin	66.64	52	**66.64**
	Zane	95.2		**95.2**
	Nick	52.36		38.08
	Susan	80.92		**80.92**

Note. $N = 7$. ASICS = Academic Success Inventory for College Students. Bold numbers identify ≥ post-test scores compared to pre-test scores.

APPENDIX F
FIGURES AND TABLES

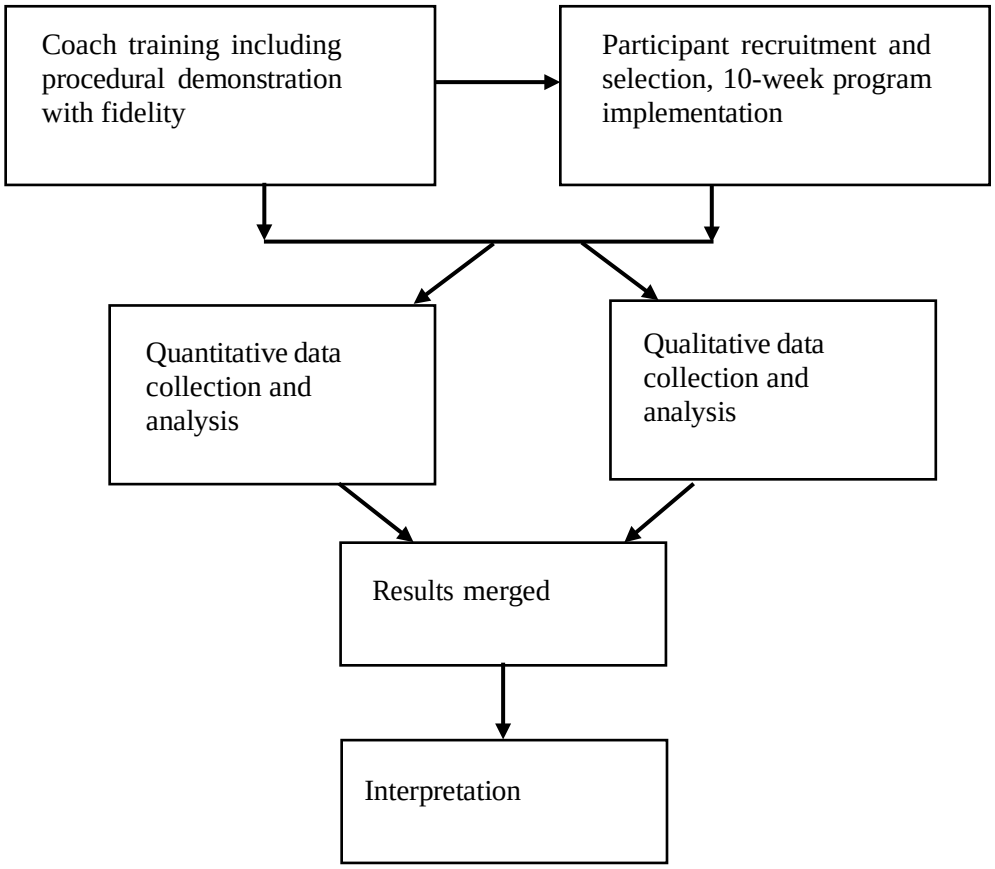

Figure 1: The Research Process

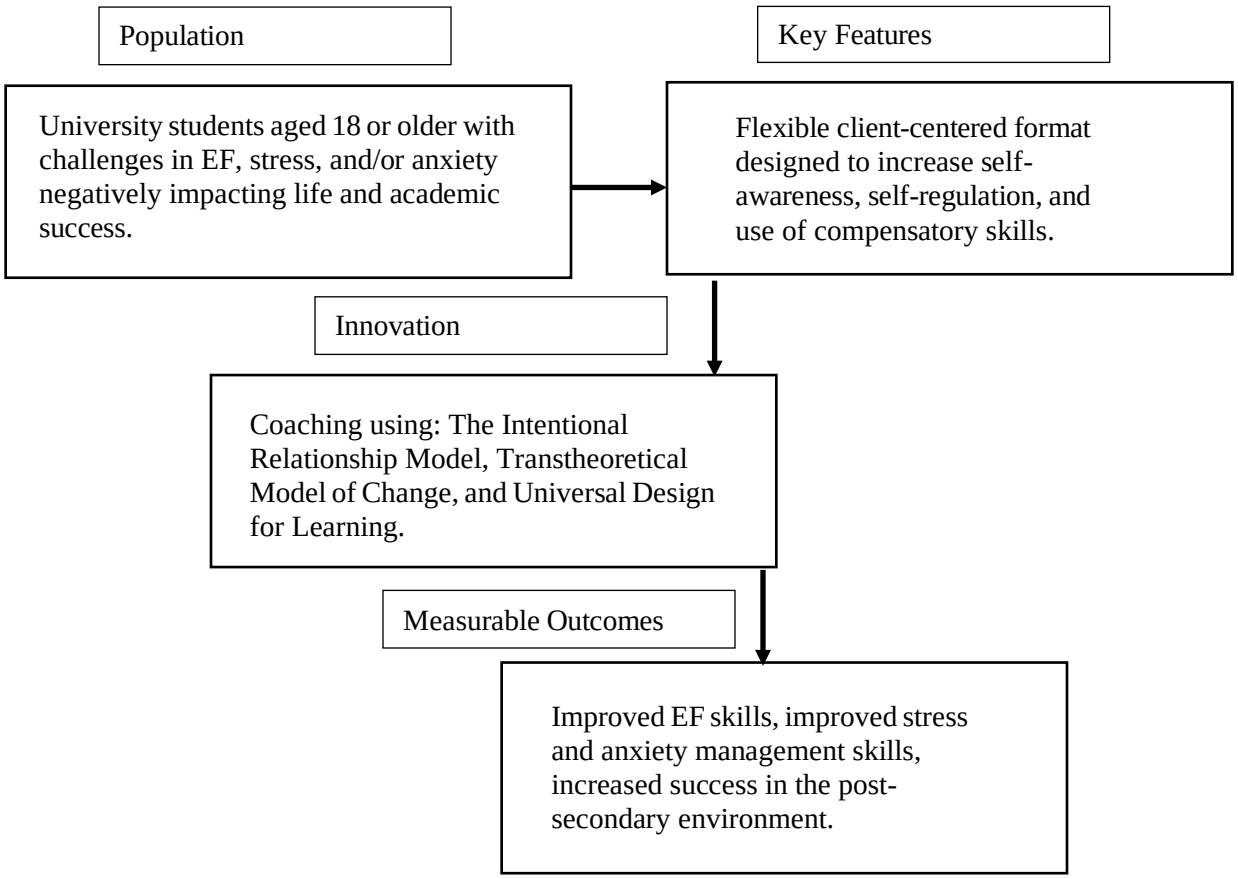

Figure 2: Conceptual Framework

Table 1: Summary of Literature

Study	Methodology	Participants	Intervention Characteristics	Results
Parker & Boutelle (2009)	Qualitative phenomenological	7 students (ADHD, LD)	Formally trained coaches, EF coaching available for free to all students up to 1hr/week	Improved self-awareness, EF skills and ability to attain goals, well-being and decreased anxiety
Parker et al. (2011)	Mixed methods	7 students (ADHD)	Formally trained coaches, 10-weekly 30 min. phone sessions	Improvements in goal attainment, positive sense of well-being and decreased stress, increased self-regulation and self-control, and improved confidence
Kennedy & Krause (2011)	Case study comparison	2 (TBI)	2 semesters, about 1 hour per week	Improvements on graded assignments, student reports of increased use of strategies (e.g., time management, organization) and positive academic decisions
Field et al. (2013)	Randomized controlled trial	127 (ADHD) (88 intervention/39 comparison)	Formally trained coaches, 6 months/30 min. telephone sessions	Improved EF skills, self-regulation, self-talk, time management

Study	Methodology	Participants	Intervention Characteristics	Results
Parker et al. (2013)	Qualitative	19 (ADHD)	Formally trained coaches, weekly 30-min. between session check-in.	Improved self-regulation, time management, well-being.
Richman et al. (2014)	Mixed methods (with non-equivalent comparison group)	24 (ADHD/LD) (16 intervention/8 comparison)	Formally trained coaches, 12-24 sessions over two semesters.	Improved self-awareness, self-management, and well-being.
Anastopoulos & King (2015)	Quasi-experimental	40 (ADHD)	Group CBT and mentoring with mentors who have background in psychology, 8 weeks followed by maintenance phase in subsequent semester.	Improved ADHD knowledge and symptoms, behavioral strategies, adaptive thinking, and EF skills, increased use of campus resources.
Bellman et al. (2015)	Exploratory survey	41 (variety of diagnoses), includes survey results from 16	Formally trained coach, services offered for academic year.	Increased self-confidence, motivation, improved study skills, improved time management, stress management, organization.

Study	Methodology	Participants	Intervention Characteristics	Results
Prevatt & Yelland (2015)	Prospective descriptive	148 (ADHD/LD)	Combined cognitive-behavioral therapy and psychoeducational techniques, 8 sessions/1x per week. Coaches trained and participated as part of practicum and supervised by doctoral level psychologist and master's level school psychologist.	Improved learning strategies, self-esteem, decrease emotional distress and increased satisfaction with school and work.
Weiss & Rohland (2015)	Longitudinal	23 (ASD)	Specific communication coaching program including disability counseling, communication coaching, peer coaching, social groups, and campus resources. Length of participation was for two semesters.	Results specific to communication coaching: improvement in EF planning/function, improvement in social communication, ability to budget time, keep schedules, and complete assignments.

Study	Methodology	Participants	Intervention Characteristics	Results
Rando et al. (2016)	Exploratory	11 (ASD)	Transition coach (peer) model student employees served as coaches, allowed up to 10 hour/week, ended up being approximately one hour/day 5 days/week, bi-weekly support group available post-skill development.	Improved GPA, retention, decrease in behavioral incidences, high levels of program satisfaction.
DuPaul et al. (2017)	Longitudinal	1782 (ADHD/LD)	Formally trained coaches.	Total hours of coaching had positive relationship with GPA.
Anastopoulos et al. (2020)	Longitudinal	88 (ADHD)	Mentoring in combination with CBT group sessions, maintenance phase-1-2 booster CBT sessions, 4-6 mentoring sessions. Mentoring provided by trained graduate students in doctoral-level psychology, post-doc in clinical psychology, doctoral-level psychologists.	Improved EF, ADHD symptoms, behavioral regulation, metacognition, use of disability support services, decreased symptoms of anxiety and depression, and increase in number of credit hours taken by participants.

Study	Methodology	Participants	Intervention Characteristics	Results
Marino et al. (2020)	A Mixed-methods, matched-pairs experimental design	120 undergraduate STEM majors with executive function deficits (60 intervention/60 control).	Semester long coaching, average 8-weeks, graduate students majoring in special education served as coaches.	Higher GPA, increased STEM persistence. Use of graduate student in special education to serve as coaches reduced costs of program.
Xie (2020)	Mixed methods	7 (with and without disabilities all presented with challenges in EF skills)	6 weeks of coaching through mobile application (WhatsApp) and between session check-ins.	Improved EF and learning strategies/skills.
Anastopoulos et al. (2021)	Randomized controlled trial	250 (ADHD)	Group CBT and mentoring, provided by graduate student research assistants.	Improved ADHD symptoms, EF skills, use of disability accommodations.
Harrington et al. (2021)	Qualitative phenomenological	18 (variety of diagnoses, ADHD most common)	Occupational therapy-led coaching sessions (10-12) provided by occupational therapy students as part of level II fieldwork under supervision of registered occupational therapist.	Improved study habits, time management, communication, processing, grades, improved healthy living habits.

Note. EF=executive function; STEM=science, technology, engineering, mathematics; ADHD=attention deficit hyperactivity disorder; LD=learning disabilities; ASD=autism spectrum disorder; CBT=cognitive behavioral therapy; GPA=grade point average.

Table 2: Executive Function Constructs and Orson's Challenges

Executive Function Construct	Challenges
Attentional Control	*Difficulty reading long documents and staying focused during lectures. *Easily distracted while studying or during conversation and group work. *Unfinished assignments, repeating questions, staring off into space.
Planning	*Frequently late or missed classes. *Assignments may be late or poor in quality. *Difficulty making decisions and prioritizing.
Working Memory	*Difficulty multitasking (e.g., taking notes during lecture). *Forgetfulness (e.g., missing assignments, difficulty following directions with multiple steps). *Difficulty following conversations.
Inhibitory Control	*Difficulty following through to task completion. * Preoccupation with technology. *Rush through assignments without checking work. *Respond and make decisions too rapidly.
Cognitive Flexibility	*Difficulty understanding different ways of thinking from one's own. *Difficulty adjusting to new routines. *Struggle with abstract concepts.
Emotional Regulation	*Inappropriate emotional reactions (e.g., yelling at roommates when dishes piled in sink). * Easily annoyed or upset. *Underestimate time and effort required for tasks. *Constant feelings of anxiety about social and academic situations.

Table 3: Technology Explored by Orson

Executive Function Construct	Apps/Features Within Devices	Description	Support Provided
Attentional and Inhibitory Control	Android: Digital Wellbeing Apple: Focus, Screen Time	Customizable features (e.g., do not disturb, sleep, daily timers for app use), self-tracking of screen time, customize home screen.	Minimizes distractions from devices for increased attention to task. Improves quality of sleep for optimal daytime function. Supports time management skills.
	App: Todoist	Acts as a task manager, customizable, easily linked to calendars and automatically places items into due dates for tasks, includes templates to help users learn how to organize.	Supports follow-through and task completion. Decreases incidences of missed assignments. Assists with organization to break goals up into manageable subcomponents.
	App: Freedom	Blocks apps and internet search for customizable periods of time to increase focus and productivity.	Eliminates distractions for increased focus. Increases quality of work because of. increased attention Helps build cognitive ability to focus for longer periods of time.

Executive Function Construct	Apps/Features Within Devices	Description	Support Provided
	App: Pomofocus	Customizable time tracker with visual cues to signify work time vs. break time.	Supports time management skills. Visual cues assist with sustained attention to task.
Planning and Working Memory	Calendar feature available within all devices	Customizable, easy to use, add events with options such as repeat, alerts, and options to add invitees to tasks.	Supports planning to meet goals and due dates. Decreases forgetfulness for meetings, due dates, classes, chores.
	App: CalenGoo	Provides scheduling management, synchronizes with Google Tasks, includes reminders, repeat, ability to add others, links, and maps to events, and modular layout for easy drag/drop.	Assists with planning and prioritization. Supports organization and time management.
	App: Habitica	Assists with productivity and planning, gamified features motivate users through a reward system to complete daily habits and routines.	Supports planning to reach goal areas. Assist with building good habits in planning, organization, and task completion.

Emotional Regulation	Android: Digital Wellbeing Apple: Focus, Screen Time	Customizable features (e.g., do not disturb, sleep, daily timers for app use), self-tracking of screen time, customize home screen.	Supports decreased anxiety by decreasing overwhelming thoughts by setting up notifications (e.g., do not disturb, wind down, daily limits with timers). Assist with time management for increased success with task completion.
	App: Welltory	Tracks healthy habits in addition to heart rate and blood pressure monitoring, syncs with other productivity, sleep, and nutrition apps, send guidance to users for stress management.	Assists with maintenance of emotional stability. Teaches the users how to understand physical cues associated with stress (e.g., rapid heart rate) and how to manage stress (e.g., breathing exercises, coping skills).
	App: Mindfulness Daily	Teaches mindfulness through short breathing pauses, short or longer guided meditations, and user check-ins about mood and stress levels.	Assists users in the development of emotional regulation. Provides specific tools and alerts to help decrease anxiety and maintain emotional stability.

Table 4: Participant Demographics

Demographic categories	*n*	*%*
Gender		
Male	5	71.4
Female	2	28.6
Age		
18-20	2	28.6
21-23	5	71.4
Class level		
Freshman	2	28.6
Sophomore	1	14.3
Junior	2	28.6
Senior	2	28.6
Ethnicity		
White	4	57.1
White and Hispanic	2	28.6
African-American	1	14.3
Disability category		
ADHD	3	42.9
ASD	1	14.3
Narcolepsy and depression	1	14.3
Anxiety disorder	1	14.3
No disability	1	14.3

Note. N = 7. ADHD = Attention-Deficit/Hyperactivity Disorder; ASD = Autism Spectrum Disorder.

Table 5: Implementation Fidelity Descriptions

Component of Treatment Fidelity	Description
Design	Standard number of sessions, interventions incorporating IRM, UDL, and consistent with the Transtheoretical Model.
Training	Training program including observations of recorded sessions, direct observation of interventions, booster training as necessary to ensure skills do not decline over time. Strategies to include weekly meetings with advisor and 20% random observation of sessions.
Delivery	Ensure adherence to intervention protocol, correct any observed problems. Strategies to include weekly meetings with advisor and completion of fidelity checklist during 20% random observations.
Receipt	Review weekly coaching notes to ensure coaches' understanding of content.
Enactment	Review progress towards goal areas from weekly notes to ensure participants implementing skills and strategies to enhance EF.

Table 6: Comparison of BDEFS-SF Pre-Post Test Scores

Participant	Pre-total EF score	Clinical significance	Post-total EF score	Clinical significance	RCI
Edward	38(78%)	Marginal	26(26-50%)	Normal range	12
Frank	41(85%)	Borderline	26(26-50%)	Normal range	15
Mary	52(98%)	Moderately deficient	41(85%)	Borderline	11
Marvin	34(51-75%)	Normal range	27(26-50%)	Normal range	7
Zane	64(99%)	Markedly deficient	45(93%)	Mildly deficient	20
Nick	57(98%)	Moderately deficient	33(51-75%)	Normal range	24
Susan	44(92%)	Borderline	39(81%)	Marginal	5

Note. N = 7. Names are pseudonyms. BDEFS-SF = Barkley Deficits in Executive Function Scale Short Form. Raw scores included with percentiles or percentile ranges placed in parenthesis. RCI = Reliable Change Index.

Table 7: BAI Summary Scores

Participant	Pre-score	Level of Anxiety	Post-score	Level of Anxiety
Edward	3	Minimal	1	Minimal
Frank	9	Mild	5	Minimal
Mary	31	Severe	29	Severe
Marvin	0	Minimal	0	Minimal
Zane	6	Minimal	7	Minimal
Nick	18	Moderate	3	Minimal
Susan	23	Moderate	22	Moderate

Table 8: Comparison of Mean Percentile Results Pre-Post ASICS

Student	Pre-total ASICS score	Post-total ASICS score
Edward	66.03	77.70
Frank	56.03	62.11
Mary	64.38	63.05
Marvin	59.23	59.65
Zane	61.48	67.0
Nick	52.50	54.90
Susan	61.04	65.0

Note. N = 7. Names are pseudonyms. ASICS = Academic Success Inventory for College Students.

Table 9: Goals

Goal category	Examples	%
Working memory	Taking notes during lecture; Adding tasks to calendar	9
Time management	Creating a weekly calendar inclusive of academic, social, and employment tasks; Utilizing timers (e.g., Pomodoro technique, cell phone)	32
Inhibition	Using features on devices (e.g., do not disturb, sleep mode); Setting time limits for leisure tasks (e.g., video games, movies)	10
Life balance	Schedule exercise activities; Improve sleep hygiene; Include social activities in weekly calendar	27
Planning	Set up appointments (e.g., medical, academic advisor, tutoring); Set up alerts within calendar	22

APPENDIX G
INTEGRATED DISCUSSION

The objective of this dissertation was to bring increased awareness to the education community about the impact of EF dysfunction and to provide empirical data supporting the use of EF coaching as an intervention. These chapters sought to define and provide empirical evidence regarding EF coaching for postsecondary students. Chapter two presented an in-depth literature review examining existing coaching interventions used to support students with EF dysfunction. Findings included variations in the frequency, nature, and mode of delivery of coaching programs employed at postsecondary institutions. Despite the variations in research methods and program specifics positive student outcomes included improved GPA, time management and organization skills, study skills, behavioral regulation, metacognition, and overall life satisfaction. Based on previous research, chapter three included the development of a narrative to help practitioners understand the complexity of coaching and how to implement ubiquitous technologies to support EF within a coaching program. Chapter four provided an underpowered mixed-methods empirical research study. Outcomes included improved EF skills and academic success, reduced levels of anxiety, and overall program satisfaction.

Specifically, these chapters highlight the importance of EF skills for academic, social, and life success. Programs such as the one developed for project FOCUS are a way to provide low-cost, individualized, holistic interventions for students requiring supports other than typical accommodations, tutoring, and mentoring. Students may struggle with EF skills for a myriad of reasons including symptoms associated with disability, life crises, adaptation to new surroundings, anxiety, sadness, and stress. Dysfunction in EF places students at risk for persistence and degree obtainment. These chapters demonstrated the positive potential coaching programs have for students with EF dysfunction.