2020

Assistive Technology for Mild Traumatic Brain Injury: A Group Protocol for Improving Occupational Performance of College Students

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Assistive Technology for Mild Traumatic Brain Injury: A Group Protocol for Improving

Occupational Performance of College Students

by

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A Scholarly Project

Submitted to the Occupational Therapy Department of the

University of North Dakota

In partial fulfillment of the requirements
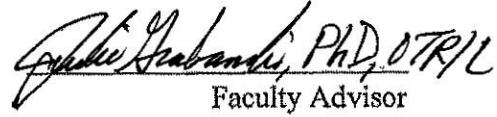
for the degree of

Master of Occupational Therapy

Grand Forks, North Dakota

December 18, 2019

This scholarly project, submitted by Jacob Horn, MOTS and Kyler Peterson, MOTS in partial fulfillment of the requirement for the Degree of Master of Occupational Therapy from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

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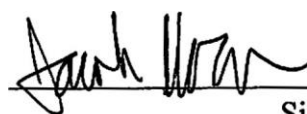Date

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Department: Occupational Therapy

Degree: Master of Occupational Therapy

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ABSTRACT

Assistive Technology for Mild Traumatic Brain Injury: A Group Protocol for Improving Occupational Performance of College Students

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Purpose: The purpose of this project was to develop a group protocol to improve the occupational performance of college students who have had a mild traumatic brain injury (mTBI). This will be done by using iPad apps that address three specific areas of cognitive functioning impacted by mTBI in college student seeking to return to school: psychosocial support needs, task support needs, and memory support needs.

Methods: An extensive literature review was completed on mTBI to determine its impact on occupational performance of college students, the role of occupational therapy (OT) interventions for managing cognition post-mTBI, and the use of iPad apps as assistive technology (AT). Further literature reviewed included Cole's Seven Steps to facilitate group sessions as well as psychosocial support needs, task support needs, and memory support needs as these were the three areas of need specifically included in developing the product.

Results: The product, *Assistive Technology for Mild Traumatic Brain Injury: A Group Protocol for Improving Occupational Performance of College Students*, was created based on the Person-Environment-Occupation (PEO) model. It provides step-by step instruction for guiding OTs in leading group sessions for teaching college students who have had mTBIs how to use specific iPad apps addressing cognition to improve their occupational performance in college.

Conclusions: College students who have had a mTBI often experience occupational deficits in the areas of psychosocial support needs, task support needs, and memory support needs. Using iPad apps as AT is beneficial in addressing these deficits. It is necessary to implement a program to address these needs and teach individuals how to use various iPad apps within a college setting to improve their occupational performance as college students.

CHAPTER I:

INTRODUCTION

Traumatic brain injury (TBI) is a major cause of death and disability in the United States. From 2006 to 2014 the number of emergency department visits, hospitalizations, and deaths related to TBI increased by 53% (Centers for Disease Control and Prevention [CDC], 2019). Approximately 1.7 million individuals per year sustain a mild traumatic brain injury (mTBI) (CDC, 2013). This Scholarly Project (SP) will specifically focus on mild traumatic brain injury (mTBI). For the purposes of this S), mTBI is defined as a 13-15 on the Glasgow Coma Scale or 8-9 on the Ranchos Los Amigos Scale. mTBI is characterized by a loss of consciousness for 30 minutes or less and post-traumatic amnesia for less than 24 hours (American Congress of Rehabilitation Medicine, 1993). According to the CDC (2013), the recovery rate for individuals with mTBI ranges from a few days to months. Disabilities commonly seen include impairments associated with thinking, memory, movement, sensation, and emotional functioning. Symptoms noted can significantly impact an individual's life along with members in their family. College students are a specific population who may experience severe occupational deficits as a result of mTBI. Specifically, they may not be able to meet the high demands that college requires of students, causing them to be at risk of dropping out.

There is current research on various rehabilitation methods for treatment of mTBI; however, there is a gap in the literature for community-based programs that seek to rehabilitate individuals with mTBI. Individuals with mTBI often sustain impairments in daily functioning regarding cognition, so it is imperative that this need is addressed. The authors chose college students as the target population due to pre-existing research providing evidence that they improved in cognition with the use of assistive technology (AT) as a means of rehabilitation.

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Rehabilitation specialists such as occupational therapists (OTs) often develop

recommendations, perform screenings and determine client safety to assist individuals with

managing their cognition following mTBI. The American Occupational Therapy Association

(AOTA) (2014), defines OT as, "the therapeutic use of everyday life activities (occupations)

with individuals or groups for the purpose of enhancing or enabling participation in roles, habits,

and routines in home, school, workplace, community, and other settings." The role of OTs

working with people who have sustained a mTBI focuses on improving client factors and

performance skills that are impaired due to injury. Client factors addressed by an OT are the

specific mental functions of attention and memory, while the performance skills addressed focus

on processing skills. OTs help to enable individuals' engagement in activities by adapting or

modifying their environment. One way that OTs assist individuals with cognitive impairments is

by providing appropriate AT to enable participation in everyday activities. Martinez, Scherer,

and Tozser (2018) define AT as any equipment that promotes or enhances function of an

individual with disabilities. College students with mTBI would benefit from AT as evidence has

shown that AT facilitates improvement in cognition. According to Minton et al. (2017), college

students with TBI indicated improved satisfaction in personal care and household activities,

participation in desired activities, emotional attainment and other areas when using iPad apps as

a means for AT. OTs can play a key role in working with college students with mTBI by

implementing AT, such as providing appropriate iPad apps (i.e., reminders, alarms, notes, etc.),

to improve impaired cognitive functioning following mTBI.

The product for this SP is a group protocol for college students with mTBI. It is guided

by the Person-Environment-Occupation (PEO) model. The primary focus of the model is on the

needs of the individual and how they participate in occupations within their environment. The

model emphasizes that the person is continually developing across the lifespan and making changes in occupational performance. PEO identifies specific transactions to be addressed consisting of the person-occupation (PxO), occupation-environment (OxE), and person-environment (PxE). Intervention strategies look at specific transactions that will be addressed along with changes in occupational performance that individuals with mTBI have experienced within their environment. Primary components of the PEO model are evident throughout the group protocol.

This group protocol assists therapists in providing structured guidance in use of iPads for cognitive rehabilitation in college students with mTBI. The following chapters are organized to supplement the role of an OT working with an individual(s) with mTBI. Chapter II reviews literature on mTBI, focusing on a variety of key concepts. Chapter III identifies the activities and methodology used to conduct the literature review. Chapter IV will discuss in detail the product that was created, which is a group protocol incorporating the use of iPad apps to improve psychosocial, task, and memory support needs. Finally, Chapter V will provide a summary of the scholarly project and identify key findings.

CHAPTER II:

REVIEW OF LITERATURE

According to the CDC (2019), TBI is caused by a bump, blow, or jolt to the head that disrupts the normal function of the brain. The severity of a TBI can range from mild, where there is a brief change in mental status or consciousness, to severe, where there is an extended period of unconsciousness or memory loss after injury (CDC, 2019). People who have sustained a TBI can have impairments associated with thinking or memory, movement, sensation, and emotional functioning that significantly impacts their lives as well as their families' lives.

Traumatic brain injuries are classified into three different levels: mild, moderate, and severe. The levels are based on a person's clinical presentation of neurological signs and symptoms and may vary from person to person. The level that will be focused on for the purpose of this scholarly project is mild TBI (mTBI) because the population includes college students ages 18-30 who are returning to school. This age range was chosen because 18 is typically the youngest age students begin college, however, some people do begin later than this and may take longer to finish which is why age 30 was the cutoff. Additionally, the literature reviewed discussed participants with a wide age range, and the authors found it best to provide a specific age range for the purposes of this scholarly project. Symptoms of mTBI include memory loss, visual disturbances, and poor attention/concentration (Mild TBI Symptoms, 2019). These symptoms will directly impact a person's ability to successfully return to school following mTBI.

Incidence of TBI and Effects on Occupational Performance

According to the Brain Trauma Foundation (n.d.), approximately 2.5 million people experience a TBI each year. A TBI is classified as mild if there is a loss of consciousness and/or confusion and disorientation lasts for less than 30 minutes (Mild TBI Symptoms, 2019). A mTBI typically results in a person experiencing multiple cognitive issues, such as headache, difficulty thinking, memory and attention deficits, mood swings, and frustration (Mild TBI Symptoms, 2019). Although classified as "mild", these cognitive effects can have major impacts on an individual's ability to carry out daily tasks related to being a college student and going to school. Performing in school requires the ability to critically think and attend to tasks. Given that these cognitive abilities are impacted following mTBI, individuals are not able to fully meet the demands of their school duties. Therefore, they are not performing to the standards required of them and may risk having to drop out of college. Given these potential consequences, it is necessary that these individuals be provided with resources to improve their cognitive functioning post-mTBI.

Recommendations for Managing Cognition

Togher et al. (2014) provides guidelines for evidence-informed rehabilitation for individuals with TBI who have cognitive-communication disorders. Rehabilitation teams such as speech-language pathologists (SLPs) and occupational therapists (OTs) often gather together to develop recommendations, perform screenings, and determine client safety to assist individuals with managing their cognition following TBI. According to Togher et al. (2014), international researchers and clinicians gathered to develop recommendations for assessment and intervention for individuals with TBI. The guidelines are as follows:

1. Rehabilitation staff needs to recognize the levels of communication competence and the characteristics that may vary as a function of communication partner, environment, communication demands, communication priorities, fatigue and other personal factors.

2. A person with TBI who has a cognitive-communication disorder should be offered an appropriate treatment program.

3. A cognitive-communication rehabilitation program should take into account the person's premorbid native language, literacy, and language proficiency; cognitive abilities; and communication style including communication standards and expectations in the person's culture.

4. A program should provide the opportunity to rehearse communication skills in situations appropriate to the context in which the person will live, work, study, and socialize.

5. A cognitive-communication rehabilitation program should provide education and training to communication partners.

6. Individuals with severe communication disabilities should be assessed for, provided with, and trained in the use of appropriate alternative and augmentative communication aids by suitably accredited clinicians such as OTs for communication and access to devices, writing aids, seating, etc.

7. Interventions addressing patient-identified goals for social communication deficits are recommended after TBI, with outcomes measured at the level of participation in everyday social life. Interventions can be provided either in groups or individually, although there is stronger evidence in support of group interventions.

Due to OT's cultural competence and knowledge in cognitive deficits, the profession can work in an interprofessional environment with individuals of varying backgrounds.

Occupational therapists can make recommendations that can assist individuals with cognitive and communication disorders in their everyday activities to increase their overall function. Additionally, assessments provide OTs with an understanding of a client's cognitive functioning to identify client goals and make appropriate recommendations for managing cognition.

Role of OT

According to the American Occupational Therapy Association (AOTA) (2014), occupational therapy (OT) is defined as, "the therapeutic use of everyday life activities (occupations) with individuals or groups for the purpose of enhancing or enabling participation in roles, habits, and routines at home, school, workplace, community, and other settings." Occupational therapists are skilled in understanding the transactional relationship between the person, his or her engagement in meaningful occupations, and the context in which they are engaging in occupations to design occupation-based intervention plans. This facilitates change or growth in client factors and skills that are necessary for successful participation in occupations (AOTA, 2014). The end result of participation in occupations is the primary concern of OTs. Therefore, it is important to enable engagement by adapting and modifying a person's environment or objects within their environment when necessary (AOTA, 2014).

Occupational therapists provide services for habilitation, rehabilitation, and health and wellness promotion for individuals with disability- and non-disability-related needs (AOTA, 2014). In relation to this scholarly project, the role of OT in working with people with mTBI is to improve client factors and performance skills that were impaired as a result of their injury. The purpose of our product is to improve cognitive functioning for individuals post-mTBI. Therefore,

the client factors that will be addressed are the specific mental functions of attention and memory, while the performance skills addressed will include all of the process skills.

Occupational therapy is a key component in cognitive rehabilitation for improving a client's cognition and occupational performance following mTBI. It is important to integrate cognitive, interpersonal, and functional interventions throughout therapy. Occupational therapists are grounded in understanding the relationship between an individual's cognitive processes and performance in daily occupations. Participation in meaningful occupations enhances clients' functioning in a wide variety of areas, including cognition (AOTA, 2013). This improvement then leads to increased participation in desired daily activities.

Occupational therapists integrate occupation to improve cognitive functioning following mTBI, which may include a variety of tasks that require a client to sequence steps. This could include something like writing out a list of tasks to complete and then having the client complete them. Compensatory strategies are commonly used for people with mTBI to improve their memory and processing skills. Assistive technology (AT) can play a crucial role in this aspect by allowing clients to use things such as iPad apps (i.e., reminders, alarms, notes, etc.) to improve their cognitive functioning following mTBI.

Occupational therapy plays a key role in the implementation of the use of iPad apps in intervention for people with mTBI. Wang, Ding, Teodorski, Mahajan, and Cooper (2016) discussed challenging ADL areas in the use of assistive technology for cognition (ATC) for people with TBI. The most challenging ADL areas reported were remembering names and faces, staying focused on a task, and locating items. To assist with these challenging ADL areas, cognitive strategies can be implemented to assist people with TBI. A cognitive strategy is a

mental plan of action that helps a person to learn, problem solve, and perform (Toglia, Rodger, & Polatajko, 2012). The purpose of cognitive strategy use is to support learning or performance. Toglia, Rodger, and Polatajko (2012) created a primer for therapists to use in implementing cognitive strategies. They divided cognitive strategies into two dimensions: 1) strategy attributes and 2) strategy use. Seven different attributes were identified to describe and organize cognitive strategies. These included: 1) strategy outcome; 2) strategy purpose; 3) range of application; 4) visibility; 5) permanence; 6) performance phase; and 7) strategy target. Cognitive strategy use closely aligns with the person's characteristics, while prerequisites for effective strategy use include a person's general knowledge, repertoire, and beliefs about the value of strategies. The proposed framework is applicable to all stages of the lifespan and to diverse areas of practice (Toglia et al., 2012).

When remediation has run its course while working with clients with mTBI, OTs can use mainstream technology such as iPad apps to implement new cognitive strategies for improving overall cognitive functioning. This will allow clients to trial new ways of learning and provide them with additional resources that they may not have been exposed to previously. The use cognitive strategies will be a key component of our product as we aim to improve occupational performance by using iPad apps for people post-mTBI.

Person-Environment-Occupation (PEO) Model

The specific model that will be applied to this scholarly project is the Person-Environment-Occupation (PEO) model. This model focuses on the needs of the person and how they interact within their environment while participating in various occupations. The model views the person as continually developing across the lifespan with changes in occupational

performance at different points in time. This will be important to implement in our product as participants will have experienced changes in their occupational performance as a result of their mTBI. An OT will implement the PEO model into the program by selecting iPad apps that are meaningful to the participants and allow them to engage in a variety of occupations. The OT can then determine the environmental impacts present in the participants' engagement.

Law et al. (1996) discussed the PEO model of occupational performance which can form the basis of a clinical model of practice for OTs. The PEO model describes interactions between the person, environment, and occupations. Where these three variables overlap is where occupational performance occurs (Law et al., 1996). Occupational performance is maximized when there is optimal "fit" between each component. The PEO model includes a person's personal, social, and physical environments and focuses on how they engage in occupations within these environments (Law et al., 1996).

The specific transactions addressed in the PEO model are the person-occupation (PxO), occupation-environment (OxE), and person-environment (PxE). In college students with mTBI, client factors are related to the person. The person is made of physical, cognitive, sensory, affective, and spiritual components (Baptiste, 2017). The person variables (client factors) impacted with this population are the specific mental functions of memory and attention, as well as cognitive and affective components of the person (P). This directly impacts their ability to successfully perform in the occupation of school (O). Environmental variables (E) include things like lighting, background noise, room temperature, and class size. Components of the environment include a person's physical, social, cultural, institutional, and virtual environments (Baptiste, 2017). By providing a controlled environment with minimal distractions for people with mTBI to learn about iPad apps to improve cognitive performance, they are more likely to be

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successful in returning to school (O). The controlled environment (E) also provides individuals the opportunity to directly address their memory and attention deficits (P). It is important for therapists to understand how the interactions between person, environment, and occupation work together to impact occupational performance. The closer the fit between the components, the more harmoniously they interact with one another.

In relation to our scholarly project, the PEO model is a good fit as it addresses the person variables listed above and how they interact to impact occupational performance. The targeted population of our project is college students returning to school, so the PEO model will address how each variable interacts with one other to improve occupational performance academically.

Assessments

Occupational therapists seek to understand the relationship between the client, the client's roles, daily occupations, and context. To do so, they administer assessments that emphasize cognition and how it relates to participation and occupational performance. As emphasized by OTs, cognitive functioning can only be understood and fully facilitated within the occupational performance context (AOTA, 2013). A specific assessment will be used to guide the product for our scholarly project. Lindstrom, Simmons, and Stube (2014) created a symptom checklist to be used for client's with mTBI to measure the severity of their symptoms. The symptom checklist is intended to be administered at the initial assessment as well as continuously throughout the treatment process to monitor changes in client's symptom severity. The checklist is a subjective measure that monitors physical, cognitive, and emotional changes of the client and how they progress through treatment (Lindstrom, Simmons, & Stube, 2014). It will take approximately 5-10 minutes for group members to complete, so this will save time and help group members remain focused. This will be used in the initial assessment for the members of our program to

gather baseline data of their current functioning, and it will also be used at the conclusion of the program to measure progress they have made and determine the effectiveness of our product in improving cognitive functioning for college students with mTBI.

Interventions

The types of interventions provided by OTs include occupations and activities, preparatory methods and tasks, education and training, advocacy, and group (AOTA, 2014). The therapeutic goal of providing interventions to improve cognitive functioning is to enhance occupational performance (AOTA, 2013). Radomski, Anheluk, Bartzen, and Zola (2016) conducted a systematic review to determine the effectiveness of interventions that addressed cognitive impairments to improve occupational performance for people with TBI. The results of the literature review provide strong evidence in support of using direct attention training, dual-task training, and strategy training to improve executive functioning, encoding, and the use of memory compensations, including AT for people with TBI (Radomski, Anheluk, Bartzen, & Zola, 2016). The use of iPad apps as AT will directly address these areas and improve overall cognition for people with TBI.

The key features of interventions discussed in this systematic review will help guide the product for this scholarly project as a course will be developed to improve cognition through the use of iPad apps for people with mTBI. The product will be a program designed to improve cognitive functioning for 6-8 individuals with mTBI by using iPad apps geared towards improving their working memory capacity. Group members will consist of college students seeking to return to school following mTBI. Therefore, improving their working memory capacity will be essential to them successfully returning to their school environment. To facilitate

the development of class sessions, Cole's Seven Steps will be used to guide the group members through the class and increase their occupational performance.

Role of Assistive Technology

According to Martinez, Scherer, and Tozser (2018), AT is any piece of equipment that enhances the functional capabilities of an individual with disabilities. Additionally, AT is any object that helps to improve or maintain an individual's function with a disability (Hyder, Wunderlich, Puvanachandra, Gururaj, & Kobusingye, 2007). It is pertinent that effective AT is assigned to people with mTBI to assist with possible cognitive disabilities they may encounter. Martinez et al. (2018) stated that AT is essential to integrate into medical care because it offers a wide array of benefits such as the ability to set simple reminders on mobile devices, to using virtual reality (VR) to improve the balance of an individual. A study conducted by Leopold, Lourie, Petras and Elias (2015) examined multiple quasi-experimental studies on the effectiveness of ATC as everyday compensatory tools for those cognitively impaired from TBI. The study found a positive association between AT and individuals' abilities to perform tasks regardless of the severity of TBI and age.

Chu, Brown, Harniss, Kautz, and Johnson (2013) identified the growing need of support for individuals with TBI which included psychosocial support needs, task support needs, and memory support needs. More specifically, psychosocial support needs look at information overload, distractibility, environmental stimuli, and isolation. Whereas task support needs include adhering to schedules, initiating activities, performing complex tasks, learning new tasks, and being able to successfully path find. The specific memory support needs include setting early reminders and using immediate prompts (Chu, Brown, Harniss, Kautz, & Johnson, 2013). Occupational therapy becomes relevant to this population as OTs are trained to identify the

support needs of individuals with disabilities recognized by Chu et al. (2013). As mentioned previously, OTs look at each individual holistically and view them as their own unique self. Therefore, OT plays an essential role in identifying the needs of people with mTBI based off their performance deficits and provide them with appropriate AT to minimize cognitive impairments.

Specific iPad apps were identified for this project by researching existing apps to address psychosocial support, task support, and memory support needs based on the information provided by Chu et al., 2013. Additional criteria for inclusion of the apps in this scholarly project were that they had to be free from the App Store and able to be downloaded onto any mobile device (i.e., smartphone, tablet, etc.). The apps selected are directly applicable to college students. They will assist in improving the occupational performance of associated tasks of being college students.

Benefits and Challenges of Assistive Technology

Evald (2015) investigated the advantages and disadvantages of using low-cost smartphones as a means of AT for those with TBI. Pre- and post-assessments were administered during a 6-week intervention to determine changes in 13 individuals in the study using smartphones as AT. According to Evald (2015), 77% of participants reported that reminder alarms helped them to remember upcoming appointments and 54% reported that smartphones as overall memory devices (calendar, tasks, contacts, mail, phone) were another advantage. Occupational therapists' knowledge in AT can help enhance the performance of people with mTBI by providing recommendations on appropriate AT that fits an individual's specific needs.

Mary Pat Daley (2013) describes challenges associated with implementing ATC assessment and training. They include: 1) reimbursement challenges, 2) limited time to implement ATC, and 3) etiquette and pragmatic communication use with ATC. While ATC can be a very effective intervention approach for people with TBI, there are common challenges faced that need to be addressed. Although Daly is a SLP, the work that she conducted is still relevant to the field of OT. Speech language pathologists and OTs commonly co-treat patients to develop and implement cognitive strategies. Commonly, OT and SLP look at similar cognitive skills such as cognitive skills. Daly (2013) provides valuable information for the assessment process and how to orient clients to ATC. Additionally, the various challenges discussed regarding the implementation of ATC assessment and training will be important to consider in the development of our product. To further build upon this information, current research was reviewed to determine the impact of AT to enable occupational performance for people with TBI.

In a study designed to improve academic and employment success for college students with TBI, the perceived benefits of iPad apps were focused on improved quality of life and how much the app improved academic performance (Jacobs et al., 2017). Participants in this study identified positive perspectives in the use of the technology overall. More specifically, the use of iPad apps was shown to provide improvement in both quality of life and academic performance as perceived by the participants (Jacobs et al., 2017). According to Jacobs et al. (2017), 82% of the individuals in the study reported that the iPad apps provided "moderate" to "a lot" of help with their academic performance. These perceptions suggest that apps focused on improving daily life and academic performance for people with TBI are beneficial in improving their overall well-being.

Along with perceptions of the use of iPad apps for AT, smartphone apps have also been used to assist people with TBI. Evald (2015) discussed participants' experiences with using smartphones in combination with Internet calendars as compensatory memory strategies, and the advantages and disadvantages that were encountered in doing so. The primary advantages identified were that specific features of smartphones assisted the participants in daily activities. The most significant advantages were sounding of reminder alarms and visual pop-up messages to help them remember daily appointments and tasks to complete. Additionally, the capability of the smartphone to be an "all-in-one memory device" where people with TBI can access things such as a calendar, tasks, contacts, mail, and a phone all at once was a beneficial compensatory strategy (Evald, 2015). The primary concern communicated by the participants in the use of smartphones as AT was the battery life. They found that the battery life was too short and became concerned that when the battery was running low they would then lose access to all the information that was stored on the device (Evald, 2015). This led to a feeling of dependency on the device and was the main concern of the participants. Furthermore, Jacobs et al. (2017) stated the importance of "timely and effective interventions needed to assist students with a TBI as they return to school and enter or re-enter the workforce."

It is important to take into consideration the need for structure that individuals with mTBI may require. According to Watt, Murphy, Pascoe, Scanlon and Gan (2011), individuals that participated in a structured learning program had significant reduction in anxiety and an increase in self-efficacy. To provide structure throughout our program, sessions will have the same start time throughout the program. Each participant will be provided an outline of every session to allow them time to process the group objectives beforehand. In order to increase participants' ability to independently schedule tasks and execute a greater number of tasks, sessions will focus

on providing education on the appropriate use of specific technology and iPad apps that assist in psychosocial support needs, task support needs, and memory support needs. Occupational therapists will play a valuable role in the program because of their knowledge in AT to improve cognitive performance.

Understanding the perceived benefits as well as the advantages and disadvantages of various iPad apps to improve cognition will be a key component to developing the product for our scholarly project. This will help to determine which apps are selected to be used in improving cognition while remaining occupation-based. Evidence-based practice for cognitive rehabilitation was reviewed to provide further insight to developing the product.

Evidence-Based Practice for Cognitive Rehabilitation

<u>Project Career</u>

Project Career is a program that provides technological support through merging cognitive support technology (CST) evidence-based practices and rehabilitation counseling to college students who have had a TBI. The overall goal of Project Career was to provide a technology-driven individualized support program to improve the career and employment outcomes for students with TBI (Minton et al., 2017).

Project Career was designed to demonstrate effective practices in addressing academic and employment success. Participants ranged in age from 18 to 52 years old, with 68 participants (58%) being male and 49 participants (42%) female. Additionally, 33 Project Career students (28.4%) were veterans. At the time of enrollment in the program, more than half (54.1%) of students reported that their TBI made it difficult to perform academically as well as in job duties (Minton et al., 2017).

All participants were given the Matching Person with Technology (MPT) assessment that measured attitudes and feelings toward technology, current supports, and self-ratings of the person's abilities in reading skills, comprehension, hearing, seeing, and schedule and time management. Upon completion of initial assessment, each student was able to receive any or all of the various support services available. Services included: 1) cognitive support training in the form of iPad apps targeted to individual needs and capabilities; 2) hands-on training in the use of CST; 3) a mentoring program (electronic or in-person) based on a peer support model; 4) assistance in getting a field-based internship and employment after graduation; and 5) resource directed job placement and accommodation support focused on technology transfer, self-advocacy, and professional networking.

The participants were reevaluated at 6 and 12 months using the baseline and MPT assessments. The results of Project Career indicated that as participants became more familiar with using individualized technological accommodations, they were becoming more independent and participating more in their communities and developed more positive experiences with technology use (Minton et al., 2017). After completing 6 months of the program, participants indicated improved satisfaction in personal care and household activities, overall health, freedom to move in the community, participation in desired activities, emotional attainment, and employment status/potential. Regarding the advantages of using technology, some students reported that using iPads and apps made them appear like everyone else, which resulted in them feeling less stigmatized by having a TBI (Minton et al., 2017).

Project Career incorporated the use of technology in the form of iPads, customized selection of apps to meet specific student challenges, and individualized assistance to produce positive results for students with TBIs. It provided a national model for enabling post-secondary

students with TBI to achieve academic, employment, and career goals. Project Career is relevant to our scholarly project as the target population is college students returning to school post-mTBI. The outcomes of Project Career provide evidence to support the need for the program being developed in our project.

Current Research

Leopold et al. (2015) completed a systematic review to identify the state of current research regarding the use of AT to improve cognition following TBI. More specifically, the researchers focused on the use of ATC to support daily activities for people with cognitive disabilities as a result of TBI. Assistive technology for cognition was defined as any type of technology that is used to compensate for a cognitive deficit in everyday task performance.

Studies included in the systematic review showed positive associations between the use of ATC and individuals' abilities to perform tasks regardless of age, severity of the TBI, and time that has elapsed since the injury. There is baseline evidence that suggests benefits in the use of ATCs to support daily activities for people with cognitive disabilities as a result of TBI. Additionally, Martinez and Davalos (2016) investigated dysexecutive syndrome, which refers to adverse effects of the brain following TBI. This includes challenges in planning, organizing behaviors, disinhibition, preservation, reduced fluency, and initiation of tasks. Martinez and Davalos (2016) targeted college students demonstrating the dysexecutive syndrome and found that students with TBIs experience a greater amount of academic concerns such as the need for increased studying and additional study strategies. Thus, it is important to provide appropriate rehabilitation to people with TBI to increase their independence with everyday life activities.

College students returning to school from a mTBI need AT as it has proven to enhance everyday tasks while promoting a greater opportunity for success. Current research provides support for the need of our program as it discusses the benefits of AT to improve cognition following mTBI. The research also emphasizes that appropriate rehabilitation is needed to increase people's independence in everyday activities. Therefore, OT needs to be directly involved in the implementation of AT to improve cognition following mTBI as the field specializes in promoting independence with everyday life activities through the use of meaningful activities.

Program for Assistive Technology for mTBI

Assistive technology can be used to make positive impacts on people with TBI, and it is important these individuals are trained on how to appropriately use the technology so they can live more independent lives. The program that will be developed as the product for this scholarly project involves participants with mTBI using an iPad with specific apps tailored to improving their cognition. To facilitate the development of class sessions, Cole's Seven Steps (Cole, 2012) will be used to guide the group members through the class and increase their occupational performance. Throughout the program, OTs will teach the participants how to effectively use pre-downloaded iPad apps to help increase occupational performance. The participants in the program will consist of college students seeking to return to school. The iPad apps will assist them in regaining cognitive skills lost due to their mTBI and help them better participate in school. The specific cognitive skills addressed will include psychosocial support needs, task support needs, and memory support needs.

Summary

Symptoms of mTBI include memory loss, visual disturbances, and poor attention/concentration (Mild TBI Symptoms, 2019). These symptoms that can significantly impact one's life, and it is important that individuals with mTBI receive appropriate AT to manage such symptoms. Programs need to be developed to assist individuals with mTBI in learning about the various types of AT they can use to improve their cognitive functioning. Minton et al. (2017) conducted a 6 month program on college students with a TBI and found that students indicated improved satisfaction in personal care and household activities, overall health, freedom to move in the community, participation in desired activities, emotional attainment, and employment status/potential following the use of AT. Additionally, Martinez et al. (2018) found a positive association between AT and individuals' abilities to perform tasks. More specifically, the use of iPad apps was shown to provide better quality of life and greater academic performance for students with TBI (Jacobs et al., 2017). It is important that individuals with disabilities resulting from mTBI become trained on how to appropriately use AT to increase their cognition and independence with daily life.

Occupational therapists' ability to address specific transactions such as PxO, OxE, and PxE allows them to apply appropriate AT to students throughout their life contexts. Additionally, the profession's knowledge on cognitive strategies and training on the use of AT allows OTs to identify an individual's psychosocial support needs, task support needs, and memory support needs. According to Toglia et al. (2012), a cognitive strategy is a mental plan of action that helps a person to learn, problem solve, and perform various tasks. It is important that individuals use cognitive strategies that are unique to their own learning as this will help them most in succeeding. With an appropriate program set in place and guidance from OTs, individuals with

mTBI can increase their cognitive functioning by using iPad apps as AT. The need for such

program indicates why a class designed to improve cognitive functioning of college students

with mTBI will be beneficial in assisting them return to school. The methodology used to

develop our product will be addressed in-depth in the following chapter.

CHAPTER III:

METHODOLOGY

The product, Assistive technology (AT) for Mild Traumatic Brain Injury (mTBI), was created to provide education on the use of iPad apps to improve cognitive performance in college students who have sustained mTBI. The need for this product was found by conducting a detailed literature review on the topics of mTBI, TBI, assistive technology, and occupational therapy and/or rehabilitative strategies for individuals who have had a TBI and are seeking to improve their cognition in order to return to school. The literature was found through the use of research databases that included PubMed, CINAHL, and Google Scholar. The key words that were used while searching for research articles in the databases included: mTBI, TBI, assistive technology, cognition, and program. After completing the article search, summaries key articles were then completed and included the purpose, study design, sample size and characteristics, procedures/interventions used, results, and to identify the need for the role of OT in creating a course to improve cognitive functioning for people who have had a mTBI.

The literature review provided further understanding of the definition of mTBI; symptoms of mTBI; impacts on occupational performance; psychosocial support needs, task support needs, and memory support needs; recommendations for managing cognition following TBI; and the role of OT and specific interventions for managing cognition. Furthermore, the literature identified the growing need for support in psychosocial support needs, task support needs, and memory support needs for our population. These three areas will be individually addressed when developing the product, which is a group protocol designed to be implemented in a class format. The three areas mentioned above will be the primary focus of each class session. Having skills in all three of these areas are necessary for students seeking to return to

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college following mTBI. The role of OT is to enable engagement in each for students to have successful participation in school. This includes addressing client factors and performance skills that have been inhibited due to the individual's mTBI. The group protocol will facilitate successful reengagement in school-related occupations for students after mTBI.

To facilitate the development of class sessions in our program, Cole's Seven Steps will be used to guide the group members through the class and increase their occupational performance. The primary purpose of this group method facilitation is to enable participation of members in a shared task or activity while also reflecting upon its meaning to each individual (Cole, 2012). Cole's Seven Steps are: 1) Introduction; 2) Activity; 3) Sharing; 4) Processing; 5) Generalizing; 6) Application; and 7) Summary. Various performance skills related to school tasks (i.e., time management) will be simulated in this group format and group members will be shown how AT in the form of iPad apps can be used to improve their cognitive functioning.

Prior to developing AT for mTBI, an occupation-based model was chosen to guide the construction of the product. The PEO Model was chosen to organize the group protocol because it incorporates components of the person, environment, and occupation. It focuses on the needs of the person and how they interact within their environment while participating in various occupations (Law et al., 1996). The person, environment, and occupation all contribute to an individual's occupational performance. Occupational performance is maximized when there is optimal "fit" between each component. The PEO model includes a person's personal, social, and physical environments and focuses on how they engage in occupations within these environments (Law et al., 1996). The authors believe that using the PEO model to guide the product will allow them to break down each of the three components and apply appropriate iPad apps to optimize occupational performance for the students seeking to return to college.

The group protocol is intended to be implemented for those who have sustained mTBI and are college-aged adults between the ages of 18-30. Current research indicates that AT, specifically the use of iPad and iPhone apps, is beneficial in improving cognition following TBI (including mTBI); however, there is a gap in the literature related to how people using these apps are trained so that they receive the most benefits out of them as possible. Training in the appropriate use of iPad apps to improve cognition and increase occupational performance following mTBI should be emphasized as those who do not correctly know how to use them will not benefit as much as they possibly can. Using these apps effectively will help students to improve their cognition greater and be able to successfully return to college following mTBI.

The authors developed the group protocol by completing a thorough literature review, selecting an appropriate occupation-based model to apply to the product, and then creating the product. Chapter IV will present the product, Assistive Technology for mTBI.

Chapter IV:

PRODUCT

Assistive Technology for Mild Traumatic Brain Injury: A Group Protocol for Improving Occupational Performance of College Students

TABLE OF CONTENTS

Introduction

Mild traumatic brain injury (mTBI) can have significant impacts on a college student's ability to be successful academically. Symptoms of mTBI include memory loss, visual disturbances, and poor attention/concentration (Mild TBI Symptoms, 2019). These symptoms directly impact a student's ability to successfully return to school following mTBI. Furthermore, there is a growing need of support for individuals with TBI, specifically in relation to psychosocial support needs, task support needs, and memory support needs (Chu, Brown, Harniss, Kautz, & Johnson, 2013). An effective way to address these needs is through the use assistive technology in the form of iPad apps. Assistive technology (AT) is defined as any piece of equipment that enhances the functional capabilities of an individual with disabilities (Martinez, Scherer, & Tozser, 2018).

The use of iPad apps will be a beneficial use of AT to improve the psychosocial support needs, task support needs, and memory support needs of college students with mTBI seeking to return to school as they will directly apply to the tasks associated with being college students. Throughout this group protocol, members will be introduced to a variety of iPad apps to address the specific needs listed above to enhance their occupational performance as college students. The group sessions will be structured to allow members to learn the specifics of how to use each app and the benefits of implementing them into their daily lives. The overall goal is to improve each members' overall cognitive functioning following mTBI for successful reengagement in their college environments and successful occupational performance with associated activities.

Purpose and Rationale

<u>Purpose</u>

The overall purpose of the group protocol is to improve the occupational performance of college students who have experienced cognitive deficits as a result of mTBI. This will be achieved by introducing participants to different iPad apps that have been shown to improve cognitive functioning and teaching them how to appropriately use each app and incorporate it into their everyday lives and routines as college students. The three areas that will be addressed include psychosocial support needs, task support needs, and memory support needs.

Overarching Goals

1. By the end of the group protocol (6 weeks), each participant will be able to identify three iPad apps they can use to help increase occupational performance in college.

2. By the end of the group protocol, each participant will be able to identify one way to improve their occupational performance in college by using iPad apps for psychosocial support needs.

3. By the end of the group protocol, each participant will be able to identify one way to improve their occupational performance in college by using iPad apps for task support needs.

4. By the end of the group protocol, each participant will be able to identify one way to improve their occupational performance in college by using iPad apps for memory support needs.

<u>Frame of Reference and Rationale</u>

The Person-Environment-Occupation (PEO) model will be used to guide the development of this group protocol. The PEO model will be appropriate to use with this population as it will address the transactions between all variables (person, environment, occupation). Where the three variables overlap is where occupational performance takes place (Law et al, 1996). When there is an optimal "fit" between each of these components, occupational performance is maximized. The group members will consist of college students returning to school following mTBI, therefore, finding an optimal fit will be a key component to this group protocol as participants will be "fit" with appropriate iPad apps to improve their occupational performance in tasks associated with college. Occupational therapists are most qualified to be leading this group as they have extensive background in adapting and modifying tasks to facilitate optimal improvement in an individual's occupational performance with daily tasks.

Information for Occupational Therapists

Group Population and Title

The population for this group protocol is college students who are seeking to return to school after sustaining a mTBI. The group protocol is titled *Assistive Technology for Mild Traumatic Brain Injury: A Group Protocol for Improving Occupational Performance*. Impairments commonly experienced by people with mTBI include those associated with thinking, memory, movement, sensation, and emotional functioning (Centers for Disease Control and Prevention [CDC], 2013). These symptoms can significantly impact a person's everyday life as well as their family members' lives. College students with mTBI are not able to meet the high demands that college requires of students causing them to be at risk of dropping-out.

Group Membership and Size

This will be a closed group where people will not be able to join after the first session has been completed. There will be 6 group members participating in the group session, which may include both men and women between the ages of 18 and 30. Each group member will be at least one month removed from experiencing their mTBI and seeking to return to school. The group members must be experiencing negative effects from their mTBI. These effects may include deficits in process skills, memory and attention, higher level cognitive functioning, and emotional control/regulation. These deficits must directly impact group members' ability to be successful in college. Specific physical and mental capacities are required by all group members, which include:

- Physical Capacities: This activity requires members to be able to hold the iPads while using the apps and use fine motor skills by navigating through apps using their fingertips.
- Mental Capacities: This activity requires group members to be able to follow instructions for using each iPad app, how to open and close the apps, and how to navigate through each app to be exposed to all features.

Role of the Occupational Therapist

The role of the occupational therapist in leading this group protocol is to:

- Lead and facilitate group discussion by following Coles Seven Steps (Cole, 2012).

- Apply concepts of the PEO model within each group session.

- Enhance the PEO transactions in each session of every group member to ensure optimal "fit" of the PEO components and increase occupational performance.

- Educate group members on the use of various iPad apps to enhance their psychosocial support needs, task support needs, and memory support needs.

- Utilize therapeutic reasoning skills to enhance learning of the group members.

- Utilize clinical reasoning skills to better assist group members in learning and applying knowledge gained into a college context.

Timing and Location of Facilitation

The group sessions will be held at Aley Hall on the Casper College campus (125 College Drive; Casper, WY). Session will take place one night a week for 5 weeks and be held twice a semester, once at the beginning and once at midterm. Each session will be 2 hours in length and begin at 6 pm on Wednesdays. These sessions will resemble an outpatient rehabilitation setting as participants are able to travel to the site to attend them and return home after each session.

Concepts of the PEO Model

PEO Model and Transactions

The three constructs within the PEO model include the person, their environment, and the occupation. The *person* within the model is defined as "a unique being who assumes a variety of roles simultaneously" (Law et al., 1996). Their roles are dynamic and may change across time and contexts. The *environment* is broadly defined to include cultural, socio-economic, institutional, physical and social components (Law et al., 1996). Each of these domains are considered through the person's unique perspective. *Occupation* is defined as "groups of self-directed, functional tasks and activities in which a person engages over the lifespan" (Law et al., 1996). A variety of transactions may occur between the person, environment and occupation (PxO, PxE, and OxE).

Examples of transactions that take place within this population of college students returning to school following mTBI may include, but are not limited to:

- Psychosocial Support Needs:
    - A student using an iPad app to help them relax before taking an exam (**PxO**).
    - Students using iPad apps to desensitize from the overflow of auditory stimuli in a loud and crowded classroom (**PxE**).
    - A student using an iPad app to provide calming sounds as background noise while completing a homework assignment (**OxE**).
- Task Support Needs:
    - A student using an iPad app to organize their daily calendar so that they know when a class assignment is due (**PxO**).

- A student using an iPad app instead of sticky notes to de-clutter their environment and improve the likeliness of remembering to complete a specific task (**PxE**).

    - Students sharing their calendars with each other through iPad apps so that they can collaborate to find a time to complete a group project outside of class (**OxE**).

- Memory Support Needs:

    - A student using an iPad app to play memory games to improve their overall ability to remember things that they are taught in class, thus improving their overall performance in school (**PxO**).

    - The use of iPad apps to write down the location of specific times when students have classes and in which buildings on campus they are located (**PxE**).

    - Using note-taking iPad apps as memory aids to write down key points of a lecture in a crowded classroom. This will assist in being able to go back and review the material in a more relaxed environment and increase the likelihood of retaining the information (**OxE**).

Assessment

Symptom Checklist

The Symptom Checklist (Lindstrom, Simmons, & Stube, 2014) will be the primary assessment utilized in this group protocol. It will help to determine the physical, cognitive, and emotional changes each group member has experienced as a result of their mTBI. The assessment (appendix A) will be implemented in the first session to provide a baseline score for all group members as well as in the last session to help determine the improvements made by each member as a result of the group.

Other Possible Assessments

Additional assessments that may be used if access to the Symptom Checklist is not available include the Behavior Rating Inventory of Executive Function (BRIEF) and the PEO Memory Aid. Both assessments address cognitive functioning and therefore would also be applicable to the group population.

Structure of Cole's Seven Steps

Cole's Seven Steps

Each group session in this protocol was designed by utilizing Cole's Seven Steps (Cole, 2012) to guide facilitation. The main purpose for using this type of facilitation is to enable each group member to participate in doing shared tasks and activities and to reflect on the meaning of each of them (Cole, 2012). Within this group protocol specifically, members will participate in learning about and using iPad apps to improve their cognitive functioning for increased participation and occupational performance in being college students. Each session can be adapted and/or modified to meet the goals of each group session based on the group members' needs. Cole's Seven Steps are listed below along with brief descriptions of each step to assist the occupational therapist in leading group sessions:

Step 1: Introduction	• Introduction: The occupational therapist introduces self (name, title, and name of the group) and greets group members. The therapist then asks group members to introduce themselves, even if some people know one another. • Warm-Up: Used to capture the group's attention, relaxes them, and prepares them for the experience to follow. Can be structured or casual and impromptu. • Setting the Mood: Includes the environment, therapist's facial expressions and manner of speaking, and media used. Care should be taken before the group begins to set up the environment appropriately (i.e., proper lighting, decrease clutter, setting out equipment/supplies, correct number of chairs, etc.). • Expectation of the Group: The therapist needs to be aware of their own manner and expression as this should generally reflect their expectation of the group. The therapist should role-model how they would want group members to act in the group. • Explaining the Purpose Clearly: Reiterate the purpose of the group in a way that members are likely to understand. State the goals of each group session and explain objectives clearly. • Brief Outline of the Session: Includes the time frame, materials to be used, and procedures of the session.
Step 2: Activity	• Timing: Should last no longer than one-third of the total session.

	• <u>Therapeutic Goals</u>: Setting goals involves assessing needs of members and applying knowledge of their abilities and disabilities. Group goals should be chosen to meet the needs of most of the group members. • <u>Physical and Mental Capacities of the Members</u>: Considers the deficits of the members involved with the group (those associated with mTBI in this case). • <u>Knowledge and Skill of the Leader</u>: Consider what activities are familiar to the leader that can be adapted to the group experience. • <u>Adaptation of an Activity</u>: Requires some knowledge of activity analysis and synthesis that the therapist can apply to the activity.
Step 3: Sharing	• Each group member is invited to share their personal experience in completing the group activities with the rest of the group.
Step 4: Processing	• Members are encouraged to share how they feel about the experience, the leader, and each other. • Group members' feelings will guide their behavior. • Can reveal important and relevant information if done correctly. • Also includes a discussion of nonverbal aspects of the group dynamics that have a strong influence on outcomes.
Step 5: Generalizing	• The therapist mentally reviews the group's responses to the activity and summarizes them with a few general principles. • The therapist points out similarities and differences in responses provided by the group members.
Step 6: Application	• The therapist helps the group understand how the principles learned in the activity can be applied to the members' everyday lives. • The goal is for each member to understand how they will apply the results of the group experience to help make their own life more functional outside of the group.
Step 7: Summary	• Verbally emphasize the most important aspects of the group so that they will be understood correctly and remembered by the members. • No way to preplan. The points to emphasize should come directly from the responses provided by the group members. (Cole, 2012)

Supplies and Cost

1. **Apple iPad** = $329.00 each from Apple Store

   a. **DISCLAIMER**: may not need to purchase individual iPads

   for group members if they already have their own

   iPhones/iPads.

2. **Breathe 2 Relax App**

   a. FREE on App Store

3. **Stress and Anxiety Companion App**

   a. FREE on App Store

4. **Week Calendar App**

   a. Basic App Version = FREE on App Store

   b. Premium App Version = $24.99 on App Store

5. **Evernote App**

   a. Basic App Version = FREE on App Store

   b. Premium App Version = $69.99 on App Store

6. **Luminosity App**

   a. Basic App Version = FREE on App Store

   b. Premium App Version = $59.99 on App Store

7. **Peak-Brain Training App**

   a. Basic App Version = FREE on App Store

   b. Premium App Version = $34.99 on App Store

Total Cost: $518.96 per group member*

*Assuming the purchase of individual iPads AND premium apps.

Funding Source:

Grant funding will be obtained for the purchase of iPads and

premium iPad apps.

Recruitment of Participants

Group members for the program will be recruited by creating promotional flyers (appendix A) and handing them out at various locations on the Casper College campus as well as at local health clinics and hospitals who treat individuals with mTBI. All participants will need to provide medical documentation of having a mTBI that is verified by a medical doctor in order to participate in the program.

Group Protocol Outline

Session 1: Introduction

A facilitative leadership style will be used by the therapist leading this session. First, group members will introduce themselves to each other and then an overview will be provided of the program along with guidelines set in place. This session is about introducing the iPads to participants and allowing them to become familiar with settings. Additionally, each group member will take the Symptom Checklist (Lindstrom, Simmons, & Stube, 2014). The PEO Model is applied in this session because it focuses on the transactions between the person and occupation (PxO), person and environment (PxE), and the occupation and environment (OxE). The primary focus of the model is on the needs of the individual and how they participate in occupations within their environment. Due to the age gap and severity of mTBI, the therapist will lead the session to adapt to their learning styles and current levels of cognitive functioning. Due to the participants being between an 8 and 9 on the Ranchos Los Amigos scale, the therapist can assume that members can adequately follow the directions provided and maintain themselves throughout the session. Outcome criteria will be based upon each group members' ability to successfully navigate iPad settings as instructed.

<u>Session 2: Psychosocial Support Needs</u>

Group members will first discuss key takeaways from session 1. They will then be introduced to iPad apps focused on improving their psychosocial functioning and well-being. Group members will be taught how to appropriately use the iPad apps introduced to them and then practice using the apps on their own. The session will last two hours. The leadership style used for this group activity will be facilitative because the therapist leading the session will provide initial instruction for how to correctly use the iPad apps, then allow the group members to practice using the apps on their own. The therapist will be available to assist group members as needed and to answer questions they may have. Specific outcomes will be measured by group members' abilities to successfully navigate through the apps independently and complete a specific task using the apps.

<u>Session 3: Task Support Needs</u>

Group members will first discuss key takeaways from session 2. They will then be introduced to iPad apps that can be used to improve their abilities to complete tasks associated with college. Group members will be instructed on how to appropriately use the iPad apps introduced to them and then practice using the apps on their own. The duration of the session will be 2 hours. The leadership style used for this group activity will be facilitative because the therapist leading the session will provide initial instruction for how to correctly use the iPad apps, then allow the group members to practice using the apps on their own. The therapist will be available to assist group members as needed and to answer questions they may have. Outcomes will be measured by group members' abilities to successfully navigate through the apps independently and complete a specific task using the apps.

<u>Session 4: Memory Support Needs</u>

Group members will discuss what they have learned thus far from session 2 and 3 and key takeaways. This session will focus on addressing the group members' prospective memory, which includes remembering and planning for upcoming events. Members will be instructed on how to appropriately use the iPad apps introduced to them and then practice using the apps on their own. The session will last a total of 2 hours. The leadership style used for this group activity will be facilitative because the therapist leading the session will provide initial instruction for how to correctly use the iPad apps, then allow the group members to practice using the apps on their own. The therapist will be available to assist group members as needed and to answer questions they may have. Outcomes will be measured by the group members' abilities to successfully navigate through the apps independently and complete a specific task using the apps.

Session 5: Conclusion

Participants will take the Symptom Checklist to determine the improvement in cognitive functioning made throughout the duration of the program. This session will summarize everything that group members have learned previously. Group members will also review and discuss which apps they liked most and how they found them to beneficial in their college lives. A review of how participants benefited from learning use and reflection on all weeks of the training session will also be addressed. Participants will complete a review of anything needed to be addressed as requested by participants. The leadership style used for this group activity will be facilitative because the therapist will be leading the session and asking questions to provide thoughtful answers from the group members. The leader will summarize and discuss what each participant learned to keep them engaged within the group session. Outcomes will be measured by group members' subjective improvement in scores in relation to physical, cognitive, and emotional changes on the Symptom Checklist and overall feedback they provide regarding the course in a questionnaire.

Individual Session Outlines

Session 1 Structure: Introduction

Supplies and Cost:

1. **Apple iPad** = $329.00 each from Apple Store

    a. **DISCLAIMER**: may not need to purchase individual iPads

    for group members if they already have their own

    iPhones/iPads.

    Total Cost: $329.00 per group member

1. **Introduction**

- Welcome everyone to your first session of Assistive technology for Mild Traumatic Brain Injury.

- Assistive technology for Mild Traumatic Brain Injury was designed to improve three areas of your everyday lives: psychosocial support needs, memory support needs and task support needs.

  - Psychosocial support needs look at the amount of information our brain can take in, our distractibility, environmental stimuli, and isolation.

  - Task support needs address our ability to adhere to schedules, initiating activities, performing complex tasks, learning new tasks, and being able to successfully path find.

  - Memory support needs address setting early reminders and using immediate prompts.

- In today's session we will complete a warm-up activity to get to know each other better. Following the warm-up, we will hand out iPads and get familiar with them and towards the end we will have each of you complete an individual assessment.

Objectives

- By the end of the session, each member will identify 1-2 occupational needs related to psychosocial, tasks, and/or memory that they would like to address to be successful in college occupations.

- By the end of the session, each member will demonstrate how to navigate the iPad and adjust settings to be able to successfully use them in a college setting.

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- By the end of the session, each member will apply 1-2 tasks in which they will use their iPad within the college environment in the next week.

Expectations

- It is expected that all members complete the Symptom Checklist (Lindstrom, Simmons, & Stube, 2014).
- It is expected that all members will participate during the activities and contribute during the discussion.
- Today's session will last approximately 2 hours.

Warm-Up (10 minutes)

- Each member will state their name, where they are from, and when they sustained their TBI.

2. **Activity (80 minutes)**

Timing of Session

- The timing of the session will be approximately 2 hours total.

Activity 1

- Assessment: Each member will complete the Symptom Checklist assessment (appendix B). Members will be provided with the purpose of the assessment and directions for completing it.

    3. **Sharing**: Have members share their occupational needs and identify 1-2 goals they would like to work on.

<u>Activity 2</u>

- Each member will demonstrate how to adjust and navigate the settings such as lighting, font size, and notifications (appendix C).

3. **Sharing**: The members share what they believe might be useful in the college environment. Members will share what their priority needs are prior to entering the program. and complete the Symptom Checklist at the end of the session.

<u>Activity Description</u>

- Please refer to appendix C for a complete description of the activity and directions for completion.

3. **Sharing**

- Each member will share which iPad setting they found most useful to use when setting up their iPad.
- Each member will share at least one specific feature of each app they found to be useful.
- Each member will share priority needs before entering the program.

4. **Processing**

- How do you currently use technology in your daily lives as college students?
- What experience have you had in using iPads before today's session? **(PxO)**
- What features of the iPad do you feel most comfortable using? Do you feel comfortable using the iPad? **(PxO)**
- What settings were hard to navigate? Which settings did you find easy?

- What areas in your college life are you currently struggling with the most? **(PxO)**

- Of the three support needs we plan to address (psychosocial support needs, memory support needs and task support needs), which one do you believe will benefit you most? Which one do you think you are currently good at? **(PxO)**

5. **Generalizing**

- Make connections between the answers that were stated within the processing section. For example, "Most of you stated that you were struggling/good at this ...in life."

- Discuss similarities found.

6. **Application**

- Now that we all understand how to use the iPads, we can learn how to use specific apps to help us improve our occupational performance. Adjusting the iPad settings such as lighting and text size may enhance your reading and comprehension skills. Additionally, adjusting the notifications to different sounds and alarms will help provide reminders for different tasks.

- Which iPad features under general settings might you use in the college setting within the next week?

7. **Summary**

- The objectives of this session were to 1) identify 1-2 occupational needs related to psychosocial, tasks, and/or memory that they would like to address to be successful in college occupations; 2) demonstrate how to navigate the iPad and adjust settings to be able to successfully use them in a college setting; and 3)

apply 1-2 tasks in which they will use their iPad within the college environment in the next week.

- As college students, it is important that you able to complete assignments and tasks in a timely manner. Improving the three support needs will allow for greater independence in the college setting which translates into future jobs. Learning how to use the iPad to improve your occupational performance will assist in the areas that you may have struggled in due to sustaining a mTBI. Hopefully this session was beneficial for you all in identifying and giving you a general sense on the use of iPads to increase your performance in school.
- In the next session, we will be covering iPad apps to address various psychosocial support needs related to being college students.
- Thank you for your participation in today's session and sharing your thoughts with everybody!

PEO Application

This session focuses on the transactions between the person and occupation (PxO), person and environment (PxE), and the occupation and environment (OxE). The primary focus of the model is on the needs of the individual and how they participate in occupations within their environment (PxE). The goal of the facilitator is to take everyone's variables (person) into consideration to assist them with struggling occupations within the environment (PxO). By having group members adjust their iPad settings to fit their needs, they are able to complete occupations within their environment (OxE). It is important to consider their environment of the room in which the session is being held, as this will also influence person variables. The lighting, background noise, room temperature, and the size of the room will all be important factors to consider.

Session 2 Structure: Psychosocial Support Needs

Supplies and Cost:

1. **Apple iPad** = $329.00 each from Apple Store

    a. **DISCLAIMER**: may not need to purchase individual iPads

    for group members if they already have their own

    iPhones/iPads.

2. **Breathe 2 Relax App**

    a. FREE on App Store

3. **Stress and Anxiety Companion App**

    a. FREE on App Store

    Total Cost: $329.00 per group member

1. **Introduction**
   - Today we will be learning about specific iPad apps to address psychosocial support needs in your everyday lives. The two specific apps we will be using are the Breathe 2 Relax app and Stress and Anxiety Companion app. Breathe 2 Relax provides stress management through breathing exercises that help to decrease the body's stress response. It also helps with mood stabilization, anger control, and anxiety management. The Stress and Anxiety Companion app provides tools to manage anxious feelings and to identify triggers to avoid these feelings in the future. The app uses cognitive behavioral therapy (CBT) strategies, such as relaxation training, negative thought reframing exercises, and education on stress and anxiety to help alleviate symptoms.

Objectives

- By the end of the session, each group member will be able to navigate through each app independently.
- By the end of the session, each group member will identify at least one way in which they feel the apps can be used to improve their psychosocial well-being.
- By the end of the session, each group member will identify how they can incorporate using the apps into their daily lives as college students.

Expectations

- The expectations for today's session are that everybody will participate to the best of their abilities, be respectful of one another, and ask questions as needed.

- Do you have any questions regarding the expectations of the session today before we begin?

Warm Up (10 minutes)

- Each group member will state one current strategy they use to help them relax. Each member will also state difficulties they feel they currently have regarding attention and concentration related to school.

- Each group member will share at least one feature of iPads that they found useful in navigating through from the previous session.

2. **Activity (80 minutes)**

Timing of Session

- The timing of this session will be approximately 2 hours total. Group members will be introduced to iPad apps to address their psychosocial needs (appendix D), which will take approximately 20 minutes. They will then practice navigating through and using each app and then complete a specific activity within each app, which will take approximately 60 minutes. The group members will participate in a short discussion at the end of the activity.

Activity Description

- Please refer to appendix D for a complete description of the activity and directions for completion, as well as for information about where and how to download the apps.

3. **Sharing**

   ● Each member will share at least one specific feature of each app they found to be

   useful.

4. **Processing**

   ● What did you like about using each iPad app to improve your psychosocial well-

   being? Were the apps enjoyable to use? **(PxO)**

   ● What made the apps easy or difficult to navigate through? **(OxE)**

   ● What would you identify as benefits of the Breathe 2 Relax app? Drawbacks?

   (PxO, PxE and OxE)

   ● What would you identify as benefits to the Stress and Anxiety Companion app?

   Drawbacks? **(PxO, PxE and OxE)**

   ● How do you see the Breathe 2 Relax app helping to improve your psychosocial

   well-being? **(PxO)**

   ● How do you see the Stress and Anxiety Companion app helping to improve your

   psychosocial well-being? **(PxO)**

   ● How do you see yourself incorporating the apps into your daily lives as college

   students? **(PxO, PxE, and OxE)**

5. **Generalizing**

   ● Therapists will make connections between the answers that were given by group

   members within the processing session. For example, "Most of you stated that

   you (enjoyed or didn't enjoy) the activity," or "Common benefits you all

   identified were…"

6. **Application**
   - iPad apps to address psychosocial well-being can be used in your everyday lives as college students to help you relax and improve your attention and concentration. These are all important aspects of being college students as they will help to improve your overall academic performance.
     - Can you think of the best times for you to use each app? Under what circumstances will you use them to support your psychosocial support needs?
     - Make sure each person commits or responds to when they will use the iPad apps in their everyday lives.

7. **Summary**
   - The objectives for this session were to learn how to navigate through each iPad app independently, identify at least one way in which you feel the apps can be used to improve your psychosocial well-being, and to identify how you can incorporate using the apps into your daily lives as college students.
   - As college students, it is very important to make sure your psychosocial needs are being met as this will greatly impact your performance in school. Learning how to use different iPad apps to improve your psychosocial well-being will be a useful tool to address these needs. Hopefully this session was beneficial for you all in identifying and learning how to use specific apps in helping you to relax and improve your attention and concentration in school.
   - In the next session, we will be covering iPad apps to address various task support needs related to being college students.

- Thank you for your participation in today's session and sharing your thoughts with everybody!

PEO Application

The PEO Model is directly applicable to the group members in this session as evidenced by the transactions between the person, environment, and the occupation of being college students. The person factors (P) that are addressed in this session include stress management, mood stabilization, anger control, and anxiety management. These factors influence, and are influenced by, the environment and occupations of the group members. The class is being held at a classroom on the Casper College campus (E), which simulates the group members' college environment. The overall goal is to increase the group members' occupational performance related to being college students (O). Occupational performance is influenced by all of the transactions between the person, environment, and occupations (PxE, PxO, OxE) and is enhanced by establishing an optimal fit between each.

Session 3 Structure: Task Support needs

Supplies and Cost:

1. **Apple iPad** = $329.00 each from Apple Store

   a. **DISCLAIMER**: may not need to purchase individual iPads

   for group members if they already have their own

   iPhones/iPads.

2. **Week Calendar App**

   a. Basic App Version = FREE on App Store

   b. Premium App Version = $24.99 on App Store

3. **Evernote App**

   a. Basic App Version = FREE on App Store

   b. Premium App Version = $69.99 on App Store

   Total Cost: $423.98 per group member*

   *Assuming the purchase of individual iPads AND premium apps.

1. **Introduction**

- Today we will be learning about specific iPad apps to address task support needs in your everyday lives. The two specific apps we will be using are the Week Calendar app and Evernote app. Week Calendar assists in providing visual aids for schedules using colors and emojis. It provides a detailed overview of schedules for the day, week, month, and/or year and allows users to move appointments by dragging, copying and pasting. The Evernote app can be used to help you remember everything across all the devices you use. It will help you to stay organized, take notes, create to-do lists, record voice reminders, and make your notes searchable.

Objectives

- By the end of the session, each group member will be able to navigate through each app independently.

- By the end of the session, each group member will identify at least one way in which they feel the apps can be used to improve their task support needs.

- By the end of the session, each group member will identify how they can incorporate using the apps into their daily lives as college students.

Expectations

- The expectations for today's session are that everybody will participate to the best of their abilities, be respectful of one another, and ask questions as needed.

- Do you have any questions regarding the expectations of the session today before we begin?

Warm Up (10 minutes)

- Each group member will share how they used the Breathe 2 Relax and Stress and Anxiety Companion apps learned in the previous session with their everyday college lives.

- Each group member will share the pros and cons of using each app on their own since the previous session.

2. **Activity (80 minutes)**

Timing of Session

- The timing of this session will be approximately 2 hours total. Group members will be introduced to iPad apps to address their task support needs (appendix E), which will take approximately 20 minutes. They will then practice navigating through and using each app, which will take approximately 60 minutes. The group members will participate in a short discussion at the end of the activity.

Activity Description

- Please refer to appendix E for a complete description of the activity and directions for completion, as well as for information about where and how to download the apps.

3. **Sharing**

- Each member will share at least one specific feature of each app they found to be useful.

4. **Processing**

- What did you like about using each iPad app to improve your task support needs? Were the apps enjoyable to use? **(PxO)**

- What made the apps easy or difficult to navigate through? **(OxE)**

- What would you identify as benefits of the Week Calendar app? Drawbacks? **(PxO, PxE and OxE)**

- What would you identify as benefits to the Evernote app? Drawbacks? **(PxO, PxE and OxE)**

- How do you see the Week Calendar app helping to improve your task support needs? **(PxO)**

- How do you see the Evernote app helping to improve your task support needs? **(PxO)**

- How do you see yourself incorporating the apps into your daily lives as college students? **(PxO)**

5. **Generalizing**

- Therapists will make connections between the answers that were given by group members within the processing session. For example, "Most of you stated that you (enjoyed or didn't enjoy) the activity," or "Common benefits you all identified were…"

6. **Application**

- iPad apps to address task support needs can be used in your everyday lives as college students to help you stay on track and make sure you complete assignments in a timely manner, as well as attend class when you are supposed to.

These are all important aspects of being college students as they will help to improve your overall academic performance.

- ○ Can you think of the best times for you to use each app? Under what circumstances will you use them to support your task support needs?
- ○ Make sure each person commits or responds to when they will use the iPad apps in their everyday lives.

7. **Summary**

- The objectives for this session were to learn how to navigate through each iPad app independently, identify at least one way in which you feel the apps can be used to improve your task support needs, and to identify how you can incorporate using the apps into your daily lives as college students.
- As college students, it is very important to make sure you stay on top of all of your tasks as this will greatly impact your performance in school. Learning how to use different iPad apps to improve your task support needs will be a useful tool to address these needs. Hopefully this session was beneficial for you all in identifying and learning how to use specific apps in helping you to stay organized with school.
- In the next session, we will be covering iPad apps to address various memory support needs related to being college students.
- Thank you for your participation in today's session and sharing your thoughts with everybody!

<u>PEO Application</u>

The PEO Model is directly applicable to the group members in this session as evidenced by the transactions between the person, environment, and the occupation of being college students. The person factors (P) that are addressed in this session include the group members' organization of daily tasks/activities in order to help improve their cognition and ability to remember things. These factors influence, and are influenced by, the environment and occupations of the group members. The class is being held at a classroom on the Casper College campus (E), which simulates the group members' college environment. The overall goal is to increase the group members' occupational performance related to being college students (O). Occupational performance is influenced by all of the transactions between the person, environment, and occupations (PxE, PxO, OxE) and is enhanced by establishing an optimal fit between each.

Session 4 Structure: Memory Support Needs

Supplies and Cost:

1. **Apple iPad** = $329.00 each from Apple Store

    a. **DISCLAIMER**: may not need to purchase individual iPads

    for group members if they already have their own

    iPhones/iPads.

2. **Luminosity App**

    a. Basic App Version = FREE on App Store

    b. Premium App Version = $59.99 on App Store

3. **Peak-Brain Training App**

    a. Basic App Version = FREE on App Store

    b. Premium App Version = $34.99 on App Store

    Total Cost: $423.98 per group member*

    *Assuming the purchase of individual iPads AND premium apps.

1. **Introduction**
   - Today we will be learning about specific iPad apps to address memory support needs in your everyday lives. The two specific apps we will be using are the Lumosity app and Peak- Brain Training app. The Lumosity app uses science-based games to exercise memory, attention, speed, flexibility, and problem-solving skills. Peak- Brain Training will be used to improve your memory, attention span, problem-solving skills, and mental agility.

Objectives

- By the end of the session, each group member will be able to navigate through each app independently.
- By the end of the session, each group member will identify at least one way in which they feel the apps can be used to improve their memory support needs.
- By the end of the session, each group member will identify how they can incorporate using the apps into their daily lives as college students.

Expectations

- The expectations for today's session are that everybody will participate to the best of their abilities, be respectful of one another, and ask questions as needed.
- Do you have any questions regarding the expectations of the session today before we begin?

<u>Warm Up (10 minutes)</u>

- Each group member will share how they used the Week Calendar and Evernote apps learned in the previous session with their everyday college lives.

- Each group member will share the pros and cons of using each app on their own since the previous session.

2. **Activity (80 minutes)**

<u>Timing of Session</u>

- The timing of this session will be approximately 2 hours total. Group members will be introduced to iPad apps to address their memory needs (appendix F), which will take approximately 20 minutes. They will then practice navigating through and using each app, which will take approximately 60 minutes. The group members will participate in a short discussion at the end of the activity.

<u>Activity Description</u>

- Please refer to appendix F for a complete description of the activity and directions for completion, as well as for information about where and how to download the apps.

3. **Sharing**

- Each member will share at least one specific feature of each app they found to be useful.

4. **Processing**

- What did you like about using each iPad app to improve your memory support needs? Were the apps enjoyable to use? **(PxO)**

- What made the apps easy or difficult to navigate through? **(OxE)**

- What would you identify as benefits of the Lumosity app? Drawbacks? **(PxO, PxE and OxE)**

- What would you identify as benefits to the Peak- Brain Training app? Drawbacks? **(PxO, PxE and OxE)**

- How do you see that the Lumosity app helping to improve your task support needs? **(PxO)**

- How do you see the Peak- Brain Training app helping to improve your memory support needs? **(PxO)**

- How do you see yourself incorporating the apps into your daily lives as college students? **(PxO)**

5. **Generalizing**

- Therapists will make connections between the answers that were given by group members within the processing session. For example, "Most of you stated that you (enjoyed or didn't enjoy) the activity," or "Common benefits you all identified were…"

6. **Application**

- iPad apps to address memory support needs can be used in your everyday lives as college students to help you improve your short-term and long-term memory as well as attention span and problem-solving skills. These are all important aspects of being college students as they will help to improve your overall academic performance.

○ Can you think of the best times for you to use each app? Under what circumstances will you use them to help support your memory?

○ Make sure each person commits or responds to when they will use the iPad apps in their everyday lives.

7. **Summary**

- The objectives for this session were to learn how to navigate through each iPad app independently, identify at least one way in which you feel the apps can be used to improve your memory support needs, and to identify how you can incorporate using the apps into your daily lives as college students.

- As college students, it is very important to improve your memory capacity as this will greatly impact your performance in school. Learning how to use different iPad apps to improve your memory support needs will be a useful tool to address these needs. Hopefully this session was beneficial for you all in identifying and learning how to use specific apps in helping to improve your memory with school-related activities.

- In the next session, we will be covering iPad apps to address various memory support needs related to being college students.

- Thank you for your participation in today's session and sharing your thoughts with everybody!

PEO Application

The PEO Model is directly applicable to the group members in this session as evidenced by the transactions between the person, environment, and the occupation of being college students. The person factors (P) that are addressed in this session include memory, attention, speed and flexibility in relation to cognition, and problem-solving. These factors influence, and are influenced by, the environment and occupations of the group members. The class is being held at a classroom on the Casper College campus (E), which simulates the group members' college environment. The overall goal is to increase the group members' occupational performance related to being college students (O). Occupational performance is influenced by all of the transactions between the person, environment, and occupations (PxE, PxO, OxE) and is enhanced by establishing an optimal fit between each.

Session 5 Structure: Conclusion

Supplies and Cost:

1. **Apple iPad** = $329 each from Apple Store

   a. **DISCLAIMER**: may not need to purchase individual iPads

   for group members if they already have their own

   iPhones/iPads.

   Total Cost: $329.00 per group member

1. **Introduction**

- The purpose of today's session is to apply what we have learned from previous sessions into college scenarios.

- Take the Symptom Checklist.

- Discuss what apps were most enjoyable and easiest to navigate.

- Review of perceived benefits from training sessions.

<u>Objectives</u>

- By the end of the session, each member will identify 3-4 occupational needs that they can benefit from when using their iPads.

- By the end of the session, each member will apply 3-4 tasks in which they will use their iPad within the next week.

- By the end of the program, each member will be able to navigate through the 6 apps described in previous sessions.

- By the end of the session, group members will demonstrate improvement in scores on the Symptom Checklist compared to session 1.

<u>Expectations</u>

- It is expected that all members complete the Symptom Checklist assessment.

- It is expected that all members participate during the activities and contribute during the discussion.

- Do you have any questions regarding the expectations of the session today before we begin?

Warm Up (10 minutes)

- Each group member will share how they used to iPad apps for memory support needs learned in the previous session within the last week.

2. **Activity (80 minutes)**

Timing of Session

- The timing of the session will be approximately 2 hours total.

Activity 1

- Assessment: Each member will complete the Symptom Checklist.

  3. **Sharing**: Have members share what aspects of the iPad have increased occupational performance the most.

Activity 2

- Apply what they have learned in previous sessions through the college scenarios handout (appendix G).

3. **Sharing**: The members share which app they decided to use in each given scenario provided.

Activity Description

- Please refer to appendix G for a complete description of the activity and directions for completion.

3. **Sharing**

   - Each member will share which iPad app they found most useful to them.

   - Each member will share how one of the iPad apps increased their occupational
     performance.

   - Each member will share two apps that will help them in the college setting.

4. **Processing**

   - Which of the apps that we covered in the program were your favorite? Why?
     (PxO, PxE and OxE)

   - Which apps were easiest to navigate? Which were hardest? Why? **(PxO, PxE and
     OxE)**

   - Which session did you find to be most beneficial? Why? **(PxO, PxE and OxE)**

   - Which of the three support needs (psychosocial support needs, memory support
     needs and task support needs) covered do you believe you struggled with the most
     before coming to this program? How do you feel your skills in these areas have
     improved as a result of this this course? **(PxO, PxE, and OxE)**

   - Where in your college lives do you see yourself using these apps the most? **(PxE)**

   - Can you think of any other environments in which you will use the iPad apps?
     (PxE)

   - What are your thoughts about the program? What did you like? What didn't you
     like? **(PxO, PxE and OxE)**

5. **Generalizing**

   - Make connections between the answers that were stated within the processing

     section. For example, "Most of you stated that you were struggling/good at this..."

   - Discuss similarities and differences found.

6. **Application**

   - How do you see yourselves using the iPad apps we covered in your college

     careers?

7. **Summary**

   - The objectives for today were to navigate the apps, apply knowledge we have

     gained from the previous sessions and identify occupational needs that have

     improved.

   - As college students, it is important that we can complete assignments and tasks in

     a timely manner. Now that you understand how to use assistive technology to

     improve the support needs, it will allow for greater independence in the college

     setting which translates into future jobs. Using the iPad apps given will assist in

     increasing your independence.

   - We hope that you found this course beneficial and plan on using some of the iPad

     apps to increase your occupational performance.

   - We would like you to take a brief satisfaction survey regarding your thoughts

     about this program (appendix H).

   - Thank you for your participation and sharing your thoughts with everybody!

PEO Application

The PEO model is applied in this session through focusing on the various transactions between person, environment and occupation. The questions within the college scenarios worksheet (appendix F) address common scenarios that group members will see within their college setting. PxE is addressed as the session focuses on the experiences that the group members may encounter within their natural environments. The transaction of PxO is addressed through allowing the individual to choose the appropriate app they would use to perform the occupation. This session is structured to address each individual's variables to allow them to gain an understanding of how they would perform occupations within their environment which addresses OxE. The environmental considerations such as lighting, background noise and room temperature are taken into consideration as they impact an individual's occupational engagement.

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APPENDICES (A-H)

APPENDIX A

PROMOTIONAL FLYER

**If you have sustained a mild traumatic brain injury (mTBI) and could use assistance with your college career, we are here to help!

**Beginning the first week of the semester, a FREE program will be held at Casper College to help you increase your cognition using iPad apps!

Image retrieved from: https://www.google.com/search?biw=1242

Assistive Technology for Mild Traumatic Brain Injury (mTBI)

Image retrieved from: https://www.google.com/search?biw=1242

**A 2-hour class will be held once a week for 5 weeks.

**Email jacob.horn@ndus.edu OR kyler.peterson@ndus.edu to enroll!

** People with mTBI can have a broad spectrum of symptoms and impairments. With new technology available on iPads, it is possible to improve your cognition and performance with daily activities!

APPENDIX B

SYMPTOM CHECKLIST

Activity Description and Directions for Completion

The Symptom Checklist (Lindstrom, Simmons, & Stube, 2014) is an assessment used to note physical, cognitive, and emotional changes individuals have had since sustaining their mTBI. It is a subjective rating in which individuals note having experienced no difference, mild difference, moderate difference, or severe difference in the three domains listed above. Group members will take the assessment in the first and last sessions to determine if any improvements were made.

Activity Rationale

This activity will provide group members and the group facilitators with a subjective measure of whether members made improvement in physical, cognitive, and emotional functioning as a result of the program. Outcomes will be measured by participants reporting decreased symptom severity related to their mTBI as indicated by their responses to the Symptom Checklist (Lindstrom, Simmons, & Stube, 2014). This outcome measure will be used to determine program effectiveness and to make potential changes to improve the program in the future.

Symptom Checklist

Name_____   Today's Date_____

Age_____   Injury Date_____

Today's Date_____

How Injury Occurred_____

Please read the following symptoms and note the changes you have had since your injury.
Circle the number that matches the differences in symptoms. 0=No difference, 1=mild
difference, 2=moderate difference, 3=severe difference. On the line provided please note
what you are doing when you notice these changes.

Physical Changes	No difference	Mild difference	Moderate difference	Severe difference
• Tiredness	0	1	2	3
• Vision Changes	0	1	2	3
• Muscle Weakness	0	1	2	3
• Headaches	0	1	2	3
• Dizziness	0	1	2	3
• Sleep difficulties	0	1	2	3
• Balance affected	0	1	2	3
• Stomach aches or nausea	0	1	2	3
• Numbness/Tingling	0	1	2	3
• Hearing/Speech Difficulties	0	1	2	3

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(Lindstrom, Simmons, and Stube, 2014)

Other physical (body) changes you have noticed_____

_____

_____

Cognitive Changes	No difference	Mild difference	Moderate difference	Severe difference
• Paying attention	0	1	2	3
• Remembering	0	1	2	3
• Clouded Thinking	0	1	2	3
• Learning New Things	0	1	2	3
• Decision Making	0	1	2	3

Other cognitive (mind) changes you have noticed_____

_____

_____

Emotional Changes				
• Feeling sad/depressed	0	1	2	3
• Nervous	0	1	2	3
• Stressed	0	1	2	3
• Angry	0	1	2	3
• Irritable	0	1	2	3
• Moodiness	0	1	2	3

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(Lindstrom, Simmons, and Stube, 2014)

Other emotional (feeling) changes you have noticed_____

_____

_____

In what aspects of your daily life do you experience the most difficulties since your injury?

Examples include: Completing your morning routine, performing routine work tasks, communicating in a relationship, engaging in leisure activities, completing your homework etc.

_____

_____

_____

This is authentic work of the authors of this practice guide: Lindstrom, K., & Simmons, M.

APPENDIX C

INTRODUCTION TO IPAD SETTINGS

Activity Description and Directions for Completion

Group members will be introduced to iPads and how to navigate various settings. They will be asked to follow the instructions provided below on how to navigate iPad settings. The purpose of this activity is to familiarize each group member with the basic skills of how to navigate an iPad. They will adjust their iPad settings to meet their individual needs based on their own preferences (i.e., large text, screen brightness, etc.).

Activity Rationale

This session will have meaning for the group members as they will become familiar with the iPads and by learning how to navigate the different settings. Group members will individually take the Symptom Checklist. The Symptom Checklist will provide a measure so each group member can see if the course improved occupational performance. Within the session the group members will get to customize the settings to better fit their needs such as changing the brightness and enlarging the text.

In this activity, group members will identify occupational needs that they can benefit from when using their iPads (Objective 1), demonstrate how to navigate the iPad and adjust settings to meet their individual needs (Objective 2), and apply 1-2 tasks in which they will use their iPad within the next week (Objective 3). Objective 1 is achieved when the group members successfully identify where they are struggling and ways in which they can improve. Objective 2 is achieved when group members have set the iPads to best fit themselves so they can get the most performance from the assistive technology. Objective 3 is achieved when group members verbalize how they will use the apps to complete tasks.

This activity requires the members to use self-awareness to understand current problems they are having in life. This session requires that the members navigate through the iPad to adjust the settings appropriately. The members will be aided if needed due to the complexity of the session. The population of college students between the ages of 18 and 30 fits the complexity level of this activity.

Introduction to iPad Settings

1. <u>Open iPad Settings</u>

Image Retrieved From: https://cdn.makeuseof.com/wp-content/uploads/2010/04/settingsicon1.png

- <u>How to Use for</u>:
    - o Notifications
        - ▪ Click on notifications.
        - ▪ Select specific app that you want to change notifications.
        - ▪ Select "lock screen," notification center," and/or "Banners" to determine how iPad notifies you.
        - ▪ Select sounds and badges on or off depending on personal preference.
    - o Voice-Over
        - ▪ Click on general.
        - ▪ Click accessibility.
        - ▪ Click Voice-Over.
        - ▪ Turn on Voice over.
        - ▪ Click "OK" to confirm.
        - ▪ Adjust speaking rate on scroll bar.
        - ▪ Adjust speech.
            - • Click on speech.
            - • Click on voice to adjust voice or click on pronunciations to set to preference.
    - o Zoom
        - ▪ Click on general.
        - ▪ Click accessibility.
        - ▪ Click Zoom.
        - ▪ Turn on zoom.
        - ▪ Click "OK" to confirm.
            - • Double tap three fingers to zoom.
            - • Drag three fingers to move magnifier around the screen.
            - • Double-tap three fingers and drag to change zoom.
    - o Magnifier
        - ▪ Click on general.
        - ▪ Click accessibility.
        - ▪ Click Magnifier.

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- Turn on Magnifier.
- Once on, triple tap home to use magnifier allowing you to view outside objects with magnifier.
- Invert Colors
  - Click on general.
  - Click accessibility.
  - Click on display accommodations.
  - Click on invert colors.
  - Turn on Smart invert to invert colors.
- Color Filters
  - Click on general.
  - Click accessibility.
  - Click on display accommodations.
  - Click on color filters.
  - Turn on color filters.
  - Adjust filter by clicking colors that best suit you.
- Larger Text
  - Click on general.
  - Click accessibility.
  - Click Larger Text.
  - Adjust text by sliding bar to appropriate levels.
- Bold Text
  - Click on general.
  - Click accessibility.
  - Turn on Bold Text.
  - Click continue
  - Wait for phone to reset
- Sticky Keys
  - Click on general.
  - Click accessibility.
  - Scroll down to select keyboard.
  - Turn on sticky keys.
- Key Repeat
  - Click on general.
  - Click accessibility.
  - Scroll down to select keyboard.
  - Turn on Key Repeat.
- Slow Keys
  - Click on general.
  - Click accessibility.
  - Scroll down to select keyboard.
  - Turn on slow keys.

- o Brightness
  - Click on Display & Brightness.
  - Adjust brightness by scrolling on bar

APPENDIX D

PSYCHOSOCIAL SUPPORT NEEDS ACTIVITY

<u>Activity Description and Directions for Completion</u>

Group members will be introduced to the Breathe 2 Relax and the Stress and Anxiety Companion iPad apps. After having time to navigate through each app, members will then complete specific activities using each app to demonstrate their knowledge and abilities to appropriately use each one. The specific activities and directions for completion are listed below:

1. **Breathe 2 Relax App:**

   a. Group members will open the app.

   b. They will rate how stressed they currently feel by using he Stress Tracker within the app.

   c. Members will complete a breathing exercise by clicking on the "breathe" button while in the app.

   d. Group members will follow the directions provided for breathing within the app and complete the exercise.

   e. Upon completing the breathing exercise, group members will then use the Stress Tracker to rate how stressed they feel at the end of the activity, and then compare this to their rating before the exercise.

   f. Outcomes will be measured by each members' full completion of the activity and subjective ratings of stress levels at the beginning and end of the activity.

2. **Stress and Anxiety Companion App**

   a. Group members will open the app.

   b. They will then click on the "Relax" icon on the home screen.

   c. Next they will select "scenario specific relaxation" followed by "study" to assist them with relaxation for study related anxiety.

d. They will follow the in-app instructions and complete the activity for scenario specific relaxation.

e. Outcomes will be measured by each members' full completion of the activity and subjective ratings of anxiety levels at the beginning and end of the activity.

Activity Rationale

This group activity will have meaning for the group members as it will help to improve their psychosocial well-being (person) and help them to better engage in and perform in school (occupation). It also gives them the opportunity to practice using iPad apps to improve these skills in a controlled environment so that they can enhance their learning and carry over the skills to the classroom (environment). Addressing psychosocial support needs is pertinent because it focuses on information overload, distractibility, environmental stimuli, and isolation (Chu et al., 2013). All of these factors need to be accounted for in preparing to return to college following mTBI.

In this activity, group members will navigate through each iPad app presented to them independently (Objective 1), identify at least one way in which they feel the apps can be used to improve their psychosocial well-being (Objective 2), and identify how they can incorporate using the apps into their daily lives as college students (Objective 3). Objective 1 is achieved when the group members successfully navigate through the iPad apps on their own. Objective 2 is achieved when group members are able to verbalize how the apps can be used to improve their psychosocial well-being. Objective 3 is achieved when group members verbalize how they can incorporate the iPad apps into their daily lives.

This activity requires them to be able to follow directions and be able to read to navigate through the iPad apps independently, reflect on their experience, and identify ways in which they

can incorporate the apps into their everyday lives as college students. The population of college

students between the ages of 18 and 30 fits the complexity level of this activity.

Apps for Psychosocial Support Needs

1. Breathe 2 Relax App

Image Retrieved From: https://apps.apple.com/ro/app/breathe2relax/id425720246

- How to Download and Use:
    o Go to App Store.
    o Search "Breathe 2 Relax" on iPad and/or other mobile devices.
    o Click on "Get" next to image provided above.
    o Wait for app to download.
    o Open app on iPad and/or another mobile device and follow on-screen prompts for set-up and appropriate use.
    o Use app as prompted.

2. Stress and Anxiety Companion App

Image Retrieved From: https://apps.apple.com/gb/app/stress-anxiety-companion/id786238252

- How to Download and Use:
    o Go to App Store.
    o Search "Stress and Anxiety Companion" on iPad and/or other mobile devices.
    o Click on "Get" next to image provided above.
    o Wait for app to download.
    o Open app on iPad and/or another mobile device and follow on-screen prompts for set-up and appropriate use.
    o Use app as prompted.

APPENDIX E

TASK SUPPORT NEEDS ACTIVITY

Activity Description and Directions for Completion

Group members will be introduced to Evernote and Week Calendar iPad apps. After having time to navigate through each app, members will then complete specific activities using each app to demonstrate their knowledge and abilities to appropriately use each one. The specific activities and directions for completion are listed below:

1. **Evernote App:**

   a. Group members will open the app.

   b. They will then select the green "+" symbol located on the left-hand side of the screen.

   c. They will then personalize the note for school by clicking "Template" → "Collections" → "For School" → "Monthly Calendar".

   d. Each member will write a note of a specific task they are to complete (i.e., assignment due date, meetings, etc.) for school within the next week.

   e. Outcomes will be measured by each group members' abilities to successfully enter a note on the app for a school-related task that they need to complete within the next week.

2. **Week Calendar App:**

   a. Group members will open the app.

   b. They will then select the "Views" button on the lower left-hand side of the screen and make sure it is set to "Week".

   c. Next, have members select the "+" button on the lower middle portion of the screen to add an event.

d. Each member will type in the "Title" box one upcoming exam/presentation that they have this semester and the classroom on campus it will be at under "Location".

e. Next, they will add the date and time under "Start" and then click "First Alert" to set a reminder one day before the exam/presentation.

f. They will then select "Done" after entering the relevant information.

g. Outcomes will be measured by each group members' abilities to successfully enter the date and time of an exam/presentation and reminder one day before the date of the event.

Activity Rationale

This group activity will have meaning for the group members as it will help to improve their task support needs (person) and help them to better engage in and perform in school (occupation). It also gives them the opportunity to practice using iPad apps to improve these skills in a controlled environment so that they can enhance their learning and carry over the skills to the classroom (environment). Focusing on task support needs helps to improve group members' ability to adhere to schedules, initiate activities, perform complex tasks, learn new tasks, and successfully path find (Chu et al., 2013).

In this activity, group members will navigate through each iPad app presented to them independently (Objective 1), identify at least one way in which they feel the apps can be used to improve their task support needs (Objective 2), and identify how they can incorporate using the apps into their daily lives as college students (Objective 3). Objective 1 is achieved when the group members successfully navigate through the iPad apps on their own. Objective 2 is achieved when group members are able to verbalize how the apps can be used to improve their

task support needs. Objective 3 is achieved when group members verbalize how they can incorporate the iPad apps into their daily lives.

The members of this group have a higher complexity compared to the general public due to the deficits in task performance they are experiencing as a result of their mTBI. This activity requires them to be able to follow directions and be able to read to navigate through the iPad apps independently, reflect on their experience, and identify ways in which they can incorporate the apps into their everyday lives as college students. The population of college students between the ages of 18 and 30 fits the complexity level of this activity.

Apps for Task Support Needs

1. <u>Week Calendar App</u>

Image Retrieved From: https://apps.apple.com/au/app/weekcal-for-ipad/id434143491

- <u>How to Download and Use</u>:
  - o Go to App Store.
  - o Search "Week Calendar" on iPad and/or other mobile devices.
  - o Click on "Get" next to image provided above.
  - o Wait for app to download.
  - o Open app on iPad and/or another mobile device and follow on-screen prompts for set-up and appropriate use.
  - o Use app as prompted.

2. <u>Evernote App</u>

Image Retrieved From: https://apps.apple.com/vg/app/evernote/id281796108

- <u>How to Download and Use</u>:
  - o Go to App Store.
  - o Search "Evernote" on iPad and/or other mobile devices.
  - o Click on "Get" next to image provided above.
  - o Wait for app to download.
  - o Open app on iPad and/or another mobile device and follow on-screen prompts for set-up and appropriate use.
  - o Use app as prompted.

APPENDIX F

MEMORY SUPPORT NEEDS ACTIVITY

Activity Description and Directions for Completion

Group members will be introduced to Lumosity and Peak- Brain Training iPad apps. After having time to navigate through each app, members will then complete specific activities using each app to demonstrate their knowledge and abilities to appropriately use each one. The specific activities and directions for completion are listed below:

1. **Lumosity App:**

    a. Group members will open the app.

    b. They will then select "Games" on the bottom of the screen.

    c. Members will be presented with the following options for games: attention, problem solving, flexibility, speed, language, math and mindfulness.

    d. For this specific activity, each member will select the Memory Match game under the "Memory" section.

    e. Group members will follow on-screen instructions for completing the game.

    f. Upon completing the game, they can then select other games to play on their own with the time remaining.

    g. Outcomes will be measured by each group members' ability to complete the memory game. Their scores will be saved within the game and they will work to improve their memory by beating their previous scores.

2. **Peak- Brain Training App:**

    a. Group members will open the app.

    b. They will then select "Games" on the bottom of the screen.

c. Members will be presented with the following options for games: language, problem solving, memory, focus, mental agility, emotion, coordination, and calming.

d. For this specific activity, each member will select the Partial Match game under the "Memory" section.

e. Group members will follow on-screen instructions for completing the game.

f. Upon completing the game, they can then select other games to play on their own with the time remaining.

g. Outcomes will be measured by each group members' ability to complete the memory game. Their scores will be saved within the game and they will work to improve their memory by beating their previous scores.

Activity Rationale

This group activity will have meaning for the group members as it will help to improve their memory support needs (person) and help them to better engage in and perform in school (occupation). It also gives them the opportunity to practice using iPad apps to improve these skills in a controlled environment so that they can enhance their learning and carry over the skills to the classroom (environment). Memory support needs are important to address with this population as using simple things such as setting early reminders and using immediate prompts has shown to be beneficial following TBI (Chu et al., 2013).

In this activity, group members will navigate through each iPad app presented to them independently (Objective 1), identify at least one way in which they feel the apps can be used to improve their memory support needs (Objective 2), and identify how they can incorporate using the apps into their daily lives as college students (Objective 3). Objective 1 is achieved when the

group members successfully navigate through the iPad apps on their own. Objective 2 is achieved when group members are able to verbalize how the apps can be used to improve their memory support needs. Objective 3 is achieved when group members verbalize how they can incorporate the iPad apps into their daily lives.

The members of this group have a higher complexity compared to the general public due to the memory deficits they are experiencing as a result of their mTBI. This activity requires them to be able to follow directions and be able to read to navigate through the iPad apps independently, reflect on their experience, and identify ways in which they can incorporate the apps into their everyday lives as college students. The population of college students between the ages of 18 and 30 fits the complexity level of this activity.

Apps for Memory Support Needs

1. Lumosity App

Image Retrieved From: https://apps.apple.com/ua/app/lumosity-daily-brain-games/id577232024

- How to Download and Use:
    o Go to App Store.
    o Search "Lumosity" on iPad and/or other mobile devices.
    o Click on "Get" next to image provided above.
    o Wait for app to download.
    o Open app on iPad and/or another mobile device and follow on-screen prompts for set-up and appropriate use.
    o Use app as prompted.
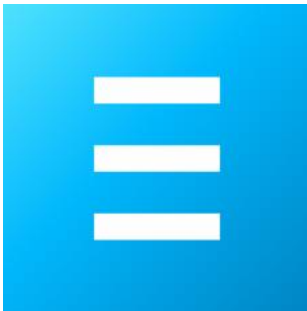
2. Peak- Brain Training App

Image Retrieved From: https://apps.apple.com/in/app/peak-brain-training/id806223188

- How to Download and Use:
    o Go to App Store.
    o Search "Peak- Brain Training" on iPad and/or other mobile devices.
    o Click on "Get" next to image provided above.
    o Wait for app to download.
    o Open app on iPad and/or another mobile device and follow on-screen prompts for set-up and appropriate use.
    o Use app as prompted.

APPENDIX G

COLLEGE SCENARIOS

Activity Description and Directions for Completion

Group members will be provided with various scenarios they may encounter while in college. They will have to apply the knowledge that they have gained throughout the course to select the most appropriate iPad app(s) that can be used to address their specific needs. Group members will be provided with individual handouts (see below) to complete the activity.

Activity Rationale

This session will have meaning for the group members as it allows them to apply what they have learned from previous sessions. Members will use the iPad to perform tasks. According to Leopold, Lourie, Petras and Elias (2015), there is a positive association between assistive technology and the ability to perform tasks. This session will also allow the college students (person) to visualize that these apps have meaning and are applicable to the college setting (environment). Applying use of these apps to different scenarios allows the college students to increase their performance in school (occupation).

During this activity, group members will identify occupational needs that they can benefit from when using their iPads (Objective 1) and apply 3-4 tasks in which they will use their iPad within the next week. (Objective 2). By the end of the program, each member will be able to navigate through the 6 apps described in previous sessions (objective 3). Objective 1 is achieved when the group members successfully identify where they are struggling and ways in which they can improve. Objective 2 is achieved when group members apply what they have learned from previous sessions. Group members will achieve objective 3 when they successfully identify the correct apps to use during the given scenarios and navigate the app appropriately

This activity requires the members to remember what has been addressed in previous session and apply it to real world scenarios. This session requires the most out of the members as

they must take every app learned and navigate through to use it successfully. The members will

be provided assistance if needed due to the complexity of the session. The population of college

students between the ages of 18 and 30 fits the complexity level of this activity.

College Scenarios - FACILITATOR VERSION

Name: _____ Date: _____

1. John is a first-year college student struggling to regulate his level of anxiety due to an upcoming test. Which iPad app would help John during this scenario?

    - Psychosocial Support Needs – Breathe 2 Relax or Stress and Anxiety Companion

2. Shawna is struggling to stay organized with her everyday tasks. She is often forgetting times that she has scheduled to meet with her professors. Which app would assist Shawna in the given scenario?

    - Task Support Needs – Week Calendar or Evernote

3. Sean is having difficulty remembering things and is looking for a way to help increase memory over time. Which app may help him?

    - Memory Support Needs - Lumosity or Peak-Brain Training

4. Sarah has recently been feeling stressed about all of the upcoming assignments due in her college classes. She is feeling as if she can't do anything and wants to give up due to the stress. Which app could Sarah use to help her in this situation?

    - Psychosocial Support Needs - Breathe 2 Relax or Stress and Anxiety Companion

5. Jenna has a lot of upcoming assignments and is worried she won't be able to remember everything that is due. Which app could Jenna use to address this situation?

    - Memory Support Needs - Week Calendar or Evernote

6. Dan is struggling to keep his anger under control due to a recent score he received on a class project that he had been working hard on. Which app is appropriate to address Dans anger?

    - Psychosocial Support Needs – Breathe 2 Relax

7. Jan states that she has been scheduling some tasks to complete on her iPad and some on her phone but often misses dates of things because she doesn't know which device to check. Which app would allow her to share a calendar between devices?

- Task Support Needs - Week Calendar or Evernote

8. Hank is looking for an app that will improve his memory, attention and problem solving. Which app will you recommend to him?

- Memory Support Needs- Lumosity or Peak-Brain Training

College Scenarios- STUDENT VERSION

Name: _____ Date: _____

Directions: Please identify the appropriate app(s) for the following scenarios. Once you have selected an app please demonstrate how you would navigate it.

1. John is a first-year college student struggling to regulate his level of anxiety due to an upcoming test. Which iPad app would help John during this scenario?

    App: _____

2. Shawna is struggling to stay organized with her everyday tasks. She is often forgetting times that she has scheduled to meet with her professors. Which app would assist Shawna in the given scenario?

    App: _____

3. Sean is having difficulty remembering things and is looking for a way to help increase memory over time. Which app may help him?

    App: _____

4. Sarah has recently been feeling stressed about all of the upcoming assignments due in her college classes. She is feeling as if she can't do anything and wants to give up due to the stress. Which app could Sarah use to help her in this situation?

    App: _____

5. Jenna has a lot of upcoming assignments and is worried she won't be able to remember everything that is due. Which app could Jenna use to address this situation?

    App: _____

6. Dan is struggling to keep his anger under control due to a recent score he received on a class project that he had been working hard on. Which app is appropriate to address Dans anger?

    App: _____

7. Jan states that she has been scheduling some tasks to complete on her iPad and some on her phone but often misses dates of things because she doesn't know which device to check. Which app would allow her to share a calendar between devices?

App: _____

8. Hank is looking for an app that will improve his memory, attention and problem solving. Which app will you recommend to him?

App: _____

APPENDIX H

SATISFACTION SURVEY

Program Satisfaction Survey

1. **How satisfied were you with the services that you were provided with in this program?**

   Not Satisfied   Satisfied   Very Satisfied

2. **How would you rate your improvement related to psychosocial support needs after this program?**

   Poor   Good   Excellent

3. **How would you rate your improvement related to task support needs after this program?**

   Poor   Good   Excellent

4. **How would you rate your improvement related to memory support needs after this program?**

   Poor   Good   Excellent

5. **How valuable do you feel the information you learned from the program was?**

   Not at all Valuable   Somewhat Valuable   Valuable   Very Valuable

6. **How likely are you to apply the new information you learned from this program into your everyday life as a college student?**

   Not at all Likely   Somewhat Likely   Likely   Very Likely

7. **How likely are you to recommend this program to other people who have had a mTBI?**

   Not at all Likely   Somewhat Likely   Likely   Very Likely

8. **What suggestions do you have to improve this program in the future?**

   _____

   _____

   _____

CHAPTER V:

SUMMARY

Traumatic brain injury (TBI) is a major cause of death and disability in the United States, with the number of emergency department visits, hospitalizations, and deaths related to TBI increasing by 53% from 2006 to 2014 (CDC, 2019). People who have sustained a TBI can have impairments associated with thinking or memory, movement, sensation, and emotional functioning which significantly impacts their lives. Mild traumatic brain injury (mTBI) is a common type of TBI with symptoms that include memory loss, visual disturbances, and poor attention/concentration (Mild TBI Symptoms, 2019). Additionally, mTBIs result in a loss of consciousness and/or confusion and disorientation for less than 30 minutes (Mild TBI Symptoms, 2019). The population that is focused on for the purposes of this scholarly project are college-aged students who have had a mTBI. These individuals often experience deficits in occupational performance within their college settings as a result of mTBI, specifically with psychosocial support needs, task support needs, and memory support needs (Chu et al., 2013). The use of iPad apps as AT can be used to address these specific areas. Therefore, there is a need for OTs to address occupational deficits experienced by college students with mTBI to improve their occupational performance in the college setting related to psychosocial, task, and memory support needs.

An extensive literature review was conducted to further investigate the impacts of mTBI on occupational performance of college students and the role of OT in treating this population. It was found that OT plays a key role in addressing challenging ADL areas through the use of AT (Wang et al., 2016). Additionally, psychosocial support needs, task support needs, and memory support needs are three areas where increased support is needed for people with TBI of all

severities, including mTBI (Chu et al., 2013). It was also found that while iPad apps as AT can play a crucial role in addressing the needs of people who have had a mTBI, adequate training on how to properly use them is needed.

The authors created *Assistive Technology for Mild Traumatic Brain Injury: A Group Protocol for Improving Occupational Performance* to fill the gaps found in the literature and to define the role of OT in this area. This group protocol is intended to be implemented with college students between the ages of 18 to 30 years old. This product is guided by the Person-Environment-Occupation (PEO) model (Law et al., 1996). The PEO model will be used to help focus on the needs of college students and how they interact within a college environment while participating in the occupation of school. The OT leading the group will use this model to guide each session by finding an optimal "fit" between the person, environment, and occupation to improve each group member's occupational performance. The role of the OT is defined in the group protocol to help them understand how to assist group members in achieving individual session objectives and overall goals. There are recommended procedures to follow in facilitating the group protocol; however, it can also be adapted to meet the needs of group members based on the judgement of the OT.

While there are several benefits of this group protocol, it also presents limitations. Given that it has not yet been implemented, it is difficult to determine the overall effectiveness it will have for individuals with mTBI. Another limitation is that the group will be open to only six members. This will limit the number of people with mTBI that can be reached and assisted. Finally, the protocol addresses three specific areas: psychosocial support needs, task support needs, and memory support needs. Individuals with mTBI may also be experience deficits in

other areas associated with college, therefore, it will be important for them to learn how to apply the skills they learn to other aspects of their lives.

For therapists who will implement this group protocol in the future, it is recommended that they first familiarize themselves with the specific iPad apps used so that they are better prepared in teaching the group members. The protocol is intended to be implemented by OTs; however, there is potential for other healthcare professionals to be trained by OTs in implementing it as well. This will assist in providing services to as many people with mTBI as possible. The protocol will likely need to be further developed and improved after first being implemented and identifying its strengths and weaknesses. Based on the existing evidence, this group protocol may help to fill the gaps in current literature regarding the use of iPad apps as AT to improve the occupational performance of college students.

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