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## A Guide for Occupational Therapists on Mild Traumatic Brain Injury

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A GUIDE FOR OCCUPATIONAL THERAPISTS ON MILD TRAUMATIC BRAIN  
INJURY

By

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A Scholarly Project

Submitted to the Occupational Therapy Department

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## TABLE OF CONTENTS

ACKNOWLEDGMENTS.....	iv
ABSTRACT.....	v
CHAPTER I: INTRODUCTION.....	1
CHAPTER II: REVIEW OF LITERATURE.....	5
CHAPTER III: ACTIVITIES/METHODOLOGY.....	25
CHAPTER IV: PRODUCT.....	28
An Occupational Therapy Practice Guide for Sports-Related Sports-Related Mild Traumatic Brain Injury in Young Adults.....	33
CHAPTER V: SUMMARY.....	94
REFERENCES.....	97

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## ABSTRACT

### **A Practice Guide for Occupational Therapists on Mild Traumatic Brain Injury.**

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**Purpose:** The purpose of this project was to develop the occupational therapy (OT) role and a practice guide for OTs to use with their young adult client who has sustained a sports-related mild traumatic brain injury (mTBI).

**Methods:** An extensive literature review was completed on mTBI to examine risks when engaging in sports, common symptoms occurring due to mTBI, OT and rehabilitation assessments and interventions used following an mTBI. Further literature reviewed included current guidelines used in OT and other disciplines, integration of individuals affected by mTBI back into daily occupations, effects of intervention, and identifying when retirement from the sport is necessary.

**Results:** The OT role and a practice guide were created based on the Person-Environment-Occupation Model of Occupational Performance for OT practitioners. The product, *An Occupational Therapy Practice Guide for Sports-Related Mild Traumatic Brain Injuries in Young Adults*, provides the OT with education materials, assessment recommendations, secondary/tertiary prevention materials, a case study, and example goals and interventions.

**Conclusions:** Following the acute stages of sustaining an mTBI, the literature has shown that individuals continue to have persisting complaints and difficulties returning to their daily occupations. Therefore, it is important that healthcare professionals know of the risks, symptoms, guidelines, assessments, interventions, integration to daily life and when it is time for an athlete to disengage in sports following mTBI. Limitations regarding the product include that it is specific to sports-related mTBI and young adults and the guide has not currently been implemented into OT clinical practice.



## CHAPTER I

### INTRODUCTION

Each year, approximately 1.7 million people sustain a mild traumatic brain injury (mTBI) in the United States (CDC, 2013). MTBI, also known as concussion, as referred to in this research project is defined as: scoring 13-15 on the Glasgow Coma Scale, loss of consciousness for less than 30 minutes, and post-traumatic amnesia for no longer than 24 hours (American Congress of Rehabilitation Medicine, 1993). Individuals who experience an mTBI may recover within days or months; however, according to the Centers for Disease Control and Prevention, there are as many as 15% of people diagnosed with mTBI may experience persistent disability (Marshall, Bayley, McCullagh, Velikonja, & Berrigan, 2011). These statistics illustrate that mTBI is prevalent in our society today. Due to the chronic symptoms affecting individuals who have sustained an mTBI there is a need for the profession of occupational therapy (OT) to provide interventions to treat these individuals to promote success in their daily activities.

Between 1.6 and 3.8 million sports-related concussions occur in the U.S. each year (Doolan, Day, Maerlender, Goforth & Brolinson, 2012). There are current guidelines for sports-related mTBI, however there are no guidelines specific to sports-related mTBI and the role of an OT. There are only two current guidelines for the OT profession and one is specific to military service members which is multi-disciplinary in nature, and the other is *Occupational Therapy Practice Guidelines for Adults with Traumatic Brain Injury* from the American Occupational Therapy Association (AOTA, 2009). The AOTA

guidelines are targeted for more severe TBI and do not specifically focus on mTBI. An OT role with this population is essential to be developed due to the fact that an athlete participates in not only the occupation of sport, but in everyday occupations as well. Part of the OT role is to examine client roles and meaningful occupations in order help them to re-engage within these occupations. Individuals who have sustained sports-related mTBI may want to return to play as well as other meaningful occupations such as school or work. Current guidelines exist for the disciplines of neurology, athletic training, and nursing. Examples of these guidelines include the *American Academy of Neurology Guideline for Evaluation and Managing Athletes with Concussion (2013)*, *Care of the Patient with Mild Traumatic Brain Injury (2007)* and the *National Athletic Trainers' Association Position Statement: Management of Sport-Related Concussion (2004)*.

The authors chose to focus on the young adult population for the project. The authors chose this population due to a gap in the literature. The majority of the literature regarding mTBI focuses on the pediatric population. Young adulthood is defined by Bastable, Gramet, Jacobs, and Sopczyk (2011) as the ages of 20-40 years old. During the young adult stage of life, individuals begin to make transitions in their lifestyles, relationships, and new occupations (Bastable et al., 2011). The symptoms of mTBI can interfere with participating in these transitions and occupations.

The role of the OT is not clearly defined when working with clients who have sustained an mTBI. The evidence shows that individuals who sustain an mTBI can have continued disability following the acute stages of recovery. The purpose of this scholarly project is to develop a practice guide for occupational therapy practitioners to address issues specific to sports-related mTBI in order to optimize clients' participation in daily

occupations. The guide is intended to be utilized by OT practitioners who work with this specific population.

The authors created a guideline in order to assist in the therapy process entitled, *An Occupational Therapy Practice Guide for Sports-Related Mild Traumatic Brain Injury in Young Adults*. The guide includes therapist and patient education materials including information to further define the OT role and further explain the effects of an mTBI. There is an assessment and evaluation portion that consists of an occupational profile, checklists and recommended assessments. Next, there is an intervention section that contains examples of client-centered and occupation- based interventions. Lastly, there is a case study to tie all of the aspects together and to illustrate an example of how the guidelines should be used in a client-centered fashion.

The development of the project is guided by the Person-Environment-Occupation model of occupational performance (Law et al., 1996). The model defines occupational performance as the “dynamic experience of a person engaged in purposeful activities and tasks within an environment” (Law et al., 1996, p. 16). The model includes a transactive approach which views the person and environment as interdependent (Turpin & Iwama, 2011). This means that a person’s actions are interconnected to the context in which it occurs. In turn, occupational performance is specific to the person, environment and occupation (Turpin & Iwama, 2011). In this project, the person is the injured athlete (20-40 years) who is expected to be interconnected with the sports context, including culture. He/she will likely strongly desire to return to sports after an mTBI as well as other valued occupations.

The model views the *person* as subjective as well as objective, therefore the person's motivation to change and adapt is in relation to their interests and values to want the change (Turpin & Iwama, 2011). *Environment* is unique to the PEO model, as it examines physical elements as well as five other aspects of the environment. The five aspects that affect the context include culture, socioeconomic, institutional, physical and social. *Occupation* is a broad term in this model and refers to not only occupation but also task and activity. A person's occupations help them reach intrinsic motivation for maintaining their meaningful roles. The PEO model focuses on making a change in occupational performance using the three major components together (Turpin & Iwama, 2011).

The following chapters of this scholarly project are organized for the reader, supplementing the role of OT and practice guide. Chapter II provides a review of literature on mTBI in the areas of risks, symptoms, interventions, assessments, current guidelines, integration to normal life following mTBI, and when is the appropriate time to discontinue or continue engagement in sports. The activities and methodology used to conduct the review of literature and create the OT role and clinical practice guideline are discussed throughout Chapter III. Chapter IV presents the reader with the OT role as well clinical practice guide, *An Occupational Therapy Practice Guide for Sports-Related Mild Traumatic Brain Injury in Young Adults*, to better understand service delivery for the client with a sports-related mTBI. The final Chapter V summarizes the OT role and guideline to develop recommendations for implementing the information.

## CHAPTER II

### REVIEW OF LITERATURE

#### **Introduction**

Due to the high prevalence rates of sports related mild traumatic brain injury (mTBI) and their significant impact on functioning in daily life, a literature review was conducted on the effects of mTBI and current practice guidelines. The research provided risks of mTBI when engaging in sports, common symptoms following mTBI, and assessments and interventions used following an mTBI. Further literature reviewed included current guidelines used in OT and other disciplines, integrating individuals affected by mTBI back into daily occupations, effects of intervention, and identifying if retirement from the sport is necessary.

#### **Risk Factors**

There have been a wide range of studies providing a knowledge base about the risks associated with mTBI. It is estimated that there are 1.6-3.8 million cases of sports-related concussion in the United States each year (Doolan, Day, Maerlender, Goforth, Brolinson, 2012). Through the research conducted by Ponsford, Willmott, Rothwell, Cameron, Kelly, Nelms, and Curran (2002), it was found that 23% of the participants had sustained a sports-related mTBI.

Echemendia, Putukian, Mackin, Julian, and Shoss (2001) compared two groups of college athletes with the use of neuropsychological tests to identify the differences between the group of athletes who had sustained a sports-related mTBI and a group who

had not. It was found that athletes who sustained a sports-related mTBI scored significantly lower on the testing that was focused on attention, concentration, verbal learning and memory, indicating increased risks for future functioning (Echemendia et al., 2001). Sosnoff, Broglio, Shin, and Ferrara (2011) supported this information through assessing postural control including somatosensory, visual, and vestibular symptoms. They found significant differences related to balance control and cerebral functioning in the individuals who had previously sustained an mTBI.

Younger age is a risk factor for sustaining an mTBI as well as not adhering to safety precautions while engaging in sports. Hollis, Stevenson, McIntosh, Shores, Collins, and Taylor (2009) sought to identify risks in nonprofessional rugby players and found that those who didn't wear protective head gear, mouth guards, and previously had a head injury were at a higher risk for a sports-related mTBI. The younger the athlete engaging in rugby is at a higher risk of sustaining an mTBI due to the higher competitive nature of the younger athlete (Hollis et al. 2009). Reed (2011) also found supporting evidence noting that children who are engaged in organized sports are six times more likely to sustain a concussion than when engaged in other physical activity.

There have been various reports of long-term effects from repeated sports-related head injuries and concussions over time. Sedney, Orphanos, and Bailes (2011) described a syndrome called "dementia pugilistica (DP)" that was recognized in professional boxers as early as 1928. DP is a result of multiple sports-related concussions and creates symptoms such as advanced Parkinsonism, ataxia, pyramidal tract dysfunction and behavior abnormalities. Cognitive impairments may also continue to persist following

mTBI including: memory impairments, decreased attention/concentration, and personality and mood changes.

## **Symptoms**

From the research gathered there is a consistent theme of symptoms persisting past the acute stage of an mTBI. Mild traumatic brain injury can lead to symptoms which can have a significant impact on functioning in daily occupations (Reed, 2011). A variety of somatic, cognitive and emotional/behavioral symptoms have been reported which will be discussed in the following paragraphs (Reed, 2011).

**Somatic.** Physical complaints following an mTBI were identified as common symptoms found by Kraus, Schaffer, Ayers, Stenehjem, Shen, and Afifi (2005). In Kraus et al. (2005), 83% of the sample who had sustained an mTBI reported one or more physical complaints six months following the injury. Physical symptoms include but are not limited to fatigue, postural changes, muscle weakness, visual impairments, headaches/dizziness and difficulties sleeping (Kraus et al., 2005).

When an individual sustains an mTBI, it is common to experience fatigue. Fatigue was found to affect up to 70% of individuals who have sustained a traumatic brain injury (TBI), regardless of the severity of the injury (Bay & De-Leon, 2011). Norrie et al. (2010) investigated the prevalence of post-mTBI fatigue, reporting that over half of the participants reported pathological fatigue post-mTBI, with a quarter to a third of their participants reporting that the fatigue lasted three to six months later. Additionally, six months post sustaining mTBI nearly 43% of individuals reported being more fatigued in the study by Kraus et al. (2005). Further, Bay and De-Leon (2011) stated that fatigue can be persistent, and may last anywhere from one to five years. In individuals who sustained

mild-moderate TBI, 57% reported fatigue and 42% reported that they still had fatigue symptoms during a one year follow-up (Bay & De-Leon, 2011).

Additional physical symptoms found from the research included headaches, dizziness and difficulty sleeping. In a study completed by Kraus et al. (2005) regarding physical complaints following an mTBI, more than 34% of their participants reported having increased headaches and dizziness. Ponsford et al. (2002) discovered that 3 months post-mTBI patients were still reporting having difficulty sleeping.

Sosnoff, Broglio, Shin and Ferrara (2011) wanted to assess the postural control of individuals following sports-related mTBI. They assessed the participant's postural control through the use of the NeuroCom and a battery of tests looking at balance, somatosensory, vision, and vestibular systems (Sosnoff et al., 2011). Individuals who had a history of mTBI showed deficits in postural dynamics in comparison to those who did not have a history of mTBI. Kraus et al. (2005) found that nearly 43% of their participants reported muscle weakness following an mTBI.

Individuals who sustained mTBI have reported various oculomotor abnormalities and vision deficits. Szymanowicz et al. (2012) investigated vergence in mTBI versus a control group. Vergence is when both eyes move together enabling an individual to see a single picture. The researchers found that a variety of vergence dysfunctions occurred in individuals with mTBI and that there were significant differences for vergence between the mTBI and control groups. This information illustrates slowed sensory processing and motor responsivity, which may suggest an underlying neurological control signal problem. The researchers concluded that damage may have occurred at additional vergence oculomotor control sites in the brain (Szymanowicz et al, 2012). Additionally,



close to 23% of participants had reported having new symptoms associated with blurred vision and 10% noted new complaints of double vision. From the previous research it was shown that deficits following an mTBI can cause vision and oculomotor abnormalities, decreased postural control, headaches, dizziness, sleep disturbance, fatigue and muscle weakness.

**Cognitive.** Even though cognitive symptoms may be specific to each individual, the literature illustrated common impairments in the areas of attention, memory, information processing and decision-making following of mTBI. Leclercq and Azouvi (2002) stated that attentional impairments were the most prevalent and persistent symptoms of mTBI. This was supported by Erez, Rothschild, Katz, Tuchner and Harman-Maeir (2009) who assessed participants using the Dysexecutive Questionnaire (DEX). The results showed that more than 50% of participants were identified to have difficulties with attention. Pontifex et al. (2012) also studied the relationship of chronic lapses of attention with mTBI. Their research identified that a history of mTBI may relate to an increased amount of sustained attention failures during a cognitive control task. The number of concussions an individual has in correlated with decreased ability to sustain attention (Pontifex et al., 2012).

Additional cognitive symptoms within the literature include decreased information processing, memory impairments and a decline in executive functioning (Reed, 2011; Erez et al., 2009; Kraus et al., 2005). Kraus et al. (2005) documented that 95% of the participants within a longitudinal study following mTBI were identified to have memory problems. When comparing healthy individuals to those who had sustained mTBI, Erez et al. (2009) found lower scores in the areas of cognitive shifting, planning,

and strategy use. Echemendia, Putukian, Mackin, Julian and Shoss (2001) used neuropsychological assessments to compare those who had sustained mTBI with a control group. They identified underlying deficits in the areas of working memory, concentration, verbal learning, and information processing (Echemendia et al., 2001). These findings add to a growing body of research demonstrating mTBI-related deficits persist beyond the acute stage of injury (Kraus et al., 2005; Matuseviciene Borg, Stalnacke, Ulfarsson and De Boussard, 2013; Pontifex et al., 2012; Sosnoff et al., 2011).

**Emotional/behavioral.** The emotional and behavior aspects of individuals who have sustained an mTBI have been shown to vary between each person through the research. Ruff (2011) found that 35% of participants reported potentially suffering from depression following mTBI. Erez et al. (2009) documented that over 50% of participants reported having difficulties in regulating their emotions following their mTBI.

Individuals who have sustained a traumatic brain injury (TBI) are at an increased risk for anxiety, a common symptom (Hiott & Labbate, 2002). It is estimated that up to 60% of individuals who have sustained a TBI will develop symptoms of anxiety (Hibbard, Uysal, Kepler, Bogdany & Silver, 1998). In fact, 24-27% of individuals who had sustained TBI were diagnosed with generalized anxiety disorder (Fann, Katon, Uomoto & Esselman, 1995; Van Reekem, Bolago, Finlayson, Garner, & Links, 1996). Ponsford et al. (2002) also found from using the post-concussion syndrome checklist that the emotional/behavioral symptoms of anxiety, paranoia, hostility, and distress were significantly present in participants following mTBI.

Emotional symptoms can also affect somatic symptoms. Norrie et al. (2010) found that depression was a significant predictor of pathological post-mTBI fatigue. As

fatigue persisted, anxiety and depression worsened (Norrie et al., 2010). Bay and De-Leon (2011) further investigated factors associated with fatigue and the impact on quality of life. They were interested in the relationships between somatic symptoms, health perceptions and the overall effect on quality of life. However, the central purpose of the study was to find whether chronic stress was positively correlated with fatigue and quality of life post mild-moderate TBI (Bay & De-Leon, 2011). The authors established that chronic situational stress and self-reported somatic symptoms were significantly associated with TBI fatigue and its relation to quality of life. Event related stress, such as Post Traumatic Stress Disorder from the injury, was not associated with poor quality of life (Bay & De-Leon, 2011). An interesting finding of the study included that mTBI is associated with more symptoms and a poorer quality of life when compared to higher severity TBI (Bay & De-Leon, 2011).

### **Evaluation of Current Practice Guidelines**

In order for professionals to treat individuals who have sustained an mTBI, it is helpful to have guidelines to assist in providing interventions and recommendations following the injury. Peloso et al. (2004) researched current practice guidelines to assess how thoroughly current practice guidelines meet the needs of patients who have sustained an mTBI. The researchers found 41 guidelines, of those 18 were sports-related (Peloso et al., 2004). Each guideline was evaluated based on 26 criterion questions; of the sports related guidelines an average of 8.3 of the 26 criteria were met (Peloso et al., 2004). None of the sports-related guidelines were evidence-based and there were discrepancies amongst guidelines in appropriate recommendations following sports-related mTBI (Peloso et al., 2004). From the data collected, Peloso et al. (2004) found that there is a

need for more high quality and evidence-based guidelines for treatment of persons with mTBI. This also shows the need for increased research and validity of appropriate recommendations following a sports-related mTBI.

Radomski, Davidson, Voydetich and Erickson (2012) summarized a set of guidelines entitled “*Clinical Practice Guidance: Occupational Therapy and Physical Therapy for Mild Traumatic Brain Injury.*” These guidelines were created by the Prepotency for Rehabilitation and Reintegration, which is an entity of the United States (US) Army Medical Department and the Office of the Surgeon General; they created a team to review existing research about mTBI. The outcome was a evidence-based occupational therapy and physical therapy evaluation and intervention recommendations to use at military medical treatment facilities and US Department of Veteran Affairs hospitals. The team’s goals aimed to prepare occupational therapists to provide rehabilitation for service members and their families. Radomski, Davidson, Voydetich and Erickson (2012) discovered three emerging themes from the creation of the *Clinical Practice Guidance: Occupational Therapy and Physical Therapy for Mild Traumatic Brain Injury*, which were discussed in the article. The first theme was that much of the population of people who have sustained mTBIs experience outcomes of the injury that affect everyday occupations. The second theme is that service members who have sustained mTBIs may benefit from occupational therapy intervention. The final theme is that there is very little evidence-based literature about occupational therapy assessment, evaluation and intervention for individuals after experiencing an mTBI.

Marshal, Bayley, McCullagh, Velikonja and Berrigan (2012) outlined new guidelines for the management of mTBI. The guidelines focused on treating persons with

mTBI and persistent post-concussive symptoms (PPCS). It was intended that the guidelines be helpful for a wide spectrum of health care professionals such as physicians, neurologists, physiatrists, psychiatrists, psychologists, occupational therapists, physical therapists and nurses (Marshall et al., 2012). A team of clinicians was created to formulate the guidelines; this team first conducted a literature review to gather existing guidelines. After reviewing literature, the team came up with 71 guidelines to use to treat persons with TBI and compared these guidelines to other existing guidelines (Marshall et al., 2012). They found that other pre-existing guidelines did not offer much information on the care of persistent symptoms of mTBI such as PPCS. The authors also looked for gaps in the research and knowledge about mTBI. They found that there are gaps in the knowledge of: ideal timing of the intervention, the effectiveness of certain interventions, the effects of coexisting injuries on mTBI outcomes, and the ideal method for implementing guidelines in practice. The 71 guidelines were intended to fill gaps in knowledge and to be a resource to a wide variety of health care professions to use with clients with mTBI and PPCS. Further research must be conducted on these guidelines to investigate the effectiveness of the guidelines (Marshall et al., 2012).

### **Integration Back Into Daily Life and Return to Sports**

One of the primary questions following an mTBI is when is a person able to return to safe completion of their daily occupations? For athletes, this question is when can the individual safely return to playing sports? As stated earlier in this literature review, it was found that mTBI deficits persist farther than only the acute stage of injury, this makes it hard to define when it is safe for an individual to return to their normal

occupations (Kraus et al., 2005; Matuseviciene et al., 2013; Pontifex et al., 2012; Sosnoff et al., 2011).

Erez et al. (2009) conducted a preliminary study to evaluate persisting symptoms of executive functioning, awareness, and participation among individuals with mTBIs during the post-acute stage of recovery. They used the Participation Index (PI) to measure outcomes measures in the areas of initiation, social contact, leisure, self-care, residence, transportation, employment, and money management, all qualifying under the occupation of social participation (Erez et al., 2009). Of the sample, 84.6% noted restrictions in initiation, 76.9% in leisure and residence, 61.5% in employment, and 23.1% in transportation (Erez et al., 2009). These statistics supported the hypothesis showing that individuals who have sustained a mTBI have restrictions in their everyday occupations, resulting in having a negative impact on their daily lives (Erez et al., 2009).

The majority of athletes who have sustained an mTBI plan to return to play and, in turn, health providers are being asked to give their written clearance (Doolan et al., 2012). Health providers need to give clearance for these athletes to return to play, so it is essential that they have a clear understanding of and ability for concussion recognition, assessment and management so the athletes can safely return to their meaningful occupations. Due to this, Doolan et al. (2012) reviewed the current literature pertaining to return to play (RTP) guidelines. They found that currently there is not a “gold standard” approach to concussion management. There are more than 25 specific approaches out there; regardless of what approach is chosen, it is imperative that the health care provider has an understanding of the course of return to play concussion management (Doolan et al., 2012). For example, a generalized RTP approach using the

“four R’s” was created in 2005 by Kissick and Johnston. The four R’s include: Recognition, Response, Rehabilitation, and Return to play. So, it is important for health care providers to understand all aspects of these “four R’s”, such as the signs and symptoms of concussion, before making appropriate recommendations. Once a concussion is suspected, the appropriate response is to remove the athlete from play immediately and begin assessment (Doolan et al., 2012). Once properly diagnosed, the rehabilitation phase begins. There are three phases of rehabilitation: relative rest, step-wise return to functional activities, and step-wise return to sport specific activities (Doolan et al., 2012). After these phases comes the last, “R”- Return to Play (Doolan et al., 2012).

Further, there are three risk factors to keep in mind when sending an athlete back to play: second impact syndrome, post-concussion syndrome and chronic traumatic encephalopathy (Doolan et al., 2012). These all have significant impacts on an athlete’s health and can be exacerbated if the athlete returns to play prematurely.

Despite there not being a recognized “gold standard” for RTP, for a generalized systematic approach, many articles referenced the 2008 Zurich Consensus Statement (Doolan et al., 2012). The Zurich Statement recommends a gradual RTP with 6 steps. Each step should take approximately 24 hours. If the athlete experiences symptoms within any of the steps, they should return to step one. The steps are:

- 1) No activity, complete cognitive and physical rest until the athlete has no symptoms
- 2) Light aerobic exercise such as walking or stationary biking
- 3) Sport-specific exercise

- 4) Non-contact training drills
- 5) Full contact practice
- 6) Return to play (Doolan et al., 2012).

Doolan et al. (2012) also discussed social and legal implications for RTP. The athlete's support system (i.e., parents, teachers, coaches) should be educated on the factors that impact RTP and the importance of physical and cognitive rest. It is important to note that cognitive rest includes no or small amounts of television, cell phones and other electronics (Doolan et al., 2012). An additional social factor is that it can be difficult for an athlete to discuss their hardships in academics with their teachers. This highlights the importance of ensuring teachers are included in the education process when an individual is recovering (Doolan et al., 2012). The athlete may feel pressure and stress to RTP so it is important to educate the athlete on the consequences of RTP too early (Doolan et al., 2012). There are a few states as well as college and professional teams that have legislation regarding RTP so it is important to be aware of those states and teams.

In summary, RTP involves many factors and can be a complex decision for a health care provider (Doolan, Day, Maerlender, Goforth & Brolinson, 2012). Often times, the literature can be unclear about current guidelines and there is no "gold standard" (Doolan et al., 2012). Therefore, it is important that generalized guidelines be further examined and properly selected for the contextual circumstances and client factors.

### **Education/Intervention**

It is thought that following mTBI, side effects may begin to subside with time and without intervention, however, as evident through prior information provided in this



literature review, that is unfortunately not the case. Ponsford et al. (2002) used a randomized control trial to compare the difference between traditional emergency room treatment (which included discharge when the participant became fully oriented and was told to contact the doctor if he/she experienced further difficulties) versus an intervention group given an information booklet educating individuals on symptoms and coping strategies following mTBI. What Ponsford et al. (2002) discovered was that the intervention group, which received an educational information book, was less likely to report post-concussion symptoms and experienced decreased anxiety and stress than the non-intervention group who did not receive education on symptoms and coping strategies.

Wise et al. (2012) also wanted to find a better understand the use of biomechanical exercise interventions and their effects on individuals who had sustained a TBI. Therefore, participants completed a ten-week exercise program that involved weekly exercise training with four additional exercises on the participants own time. Following the ten-week period, the participants were contacted via telephone as well as at six months post injury for a follow-up (Wise et al., 2012). Researchers found that exercise following TBI can aide in improving mood, quality of life, and mental health. This shows that using an organized exercise program can assist in educating and providing treatment to persons after mTBI, and may also provide client-centered meaningful intervention for those hoping to RTP and integrate back into their daily occupations.

Echemendia Putukian, Mackin, Julian and Shoss (2001) conducted a prospective study of college athletes to see the value of using neuropsychological tests following a

sports-related mTBI. The tests were completed prior to injury and if the athlete sustained an mTBI they were then tested at two hours post-injury, two days, one week, and one month following; the two hour test was shorter in duration due to fatigue and frustration (Echemendia et al., 2001). It was found that from the 11 neuropsychological tests administered, the results provide assistance when deciding if an athlete is safe to RTP (Echemendia et al., 2001). If an athlete RTP prior to healing it can result in a brain imbalance and can prevent a healthy recovery. This illustrates the importance of completing neuropsychological testing at different phases of recovery in order to make appropriate recommendations upon RTP (Echemendia et al., 2001).

In another RTP research study, Hollis et al. (2009) studied nonprofessional rugby players to identify incidence, risks, and protective factors to decrease sports-related mTBI. Through this research Hollis et al. (2009) found that using protective headgear and managing prior head injuries can help with decreasing the amount of mTBI sustained among rugby players. The results points to the importance of education in the use of protective headgear and on appropriate management of previous head injuries to help with decrease the high rate of sports-related mTBI in not only rugby players, but other high contact sports athletes as well. Providing the education needed on appropriate equipment as well as effects of sustaining an mTBI also helps with preventative interventions.

Along with preventative and rehabilitative education and interventions there is also the use of medications as a means to provide treatment following a TBI. Soo and Tate (2012), in a systematic review, examined current evidence for the treatment of anxiety after sustaining a TBI. The authors found evidence showing the effectiveness of

Cognitive Behavioral Treatment (CBT) for individuals with acute stress disorder after sustaining a mild traumatic brain injury (mTBI) in comparison to a supportive counseling control group. They found that CBT combined with neurorehabilitation for symptoms of anxiety in individuals with mild-moderate traumatic brain injury was effective (Soo & Tate, 2012).

### **Assessments**

In the literature reviewed, researchers used a variety of assessments and batteries of tests to identify symptoms affecting somatic, cognitive, and emotional/behavioral factors of individuals who have sustained mTBIs. As stated above, the Echemendia et al. (2001) prospective study found that using neuropsychological assessments can assist in the recovery process following an mTBI. Ponsford et al. (2002) found congruent results while studying the effects of early intervention using similar assessments to Echemendia et al. (2001) that identify the symptoms an individual may have following an mTBI. In the literature, Matuseviciene et al. (2013) and Erez et al. (2009) used similar groups of assessments measuring cognitive and emotional/behavioral symptoms. Pontifex et al. (2011) used a battery of cognitive assessments to investigate attentional functioning in individuals post-mTBI. Bay and De-Leon (2011) also used various assessments as outcome measures to document symptoms affecting quality of life post-MTBI. Additionally, Wise et al. (2012) and Norrie et al. (2010) supported the use of assessments to identify emotional/behavior outcomes following an mTBI through the use of depression, fatigue, and quality of life/vitality tests.

Through the literature review, each of the researchers used a variety of assessments were used to determine somatic, cognitive, emotional/behavioral symptoms.

Commonalities between assessments used in the literature include the Rivermead post-concussion symptoms questionnaire (Norrie et al., 2010; Matuseviciene et al., 2013), the Post Concussive Symptom Checklist (Echemendia et al., 2001; Ponsford et al., 2002) and the Digit Span Test (Echemendia et al., 2001; Ponsford et al., 2002). It noted that there was no “gold standard” assessments used. The overall common assertion in the literature was this: that in order to appropriately test and assess an individual post-mTBI it is important to not limit the use of assessments, but use a battery of assessments to achieve a more holistic view of the individuals functioning following the injury.

### **Assessments Found in the Literature**

- Fatigue Impact Scale (Bay & De-Leon, 2011)
- Fatigue Severity Scale (Norrie et al., 2010)
- McGill Pain Questionnaire-Short Form (Bay & De-Leon, 2011)
- Hospital Anxiety and Depression Scale (Norrie et al., 2010)
- Perceived Stress Scale-14 (Bay & De-Leon, 2011)
- Impact of Events Scale (IES) (Bay & De-Leon, 2011)
- Rivermead Post-concussion symptoms questionnaire (Norrie et al., 2010; Matuseviciene et al., 2013)
- ImPACT (Pontifex et al., 2012)
- Cognitive Control Task (Pontifex et al., 2012)
- Vitality scale of the short form 36 health survey-version 2 (Norrie et al., 2010)
- Beck Depression Inventory (BDI)-(Wise et al., 2012)
- Perceived Quality of Life Scale (PQOL)-(Wise et al., 2012)
- Medical Outcomes Study 12-Item Short-Form Health Survey-(Wise et al., 2012)

- Post Concussive Symptom Checklist-(Echemendia et al., 2001; Ponsford et al., 2002)
- Hopkins Verbal Learning Test/List Learning-(Echemendia et al., 2001)
- Symbol Digit Modalities Test-(Echemendia et al., 2001)
- Symbol Digit Modalities Memory-(Echemendia et al., 2001)
- Digit Span Test-(Echemendia et al., 2001;Ponsford et al., 2002)
- Penn State Cancellation Test-(Echemendia et al., 2001)
- Trail Making Test-(Echemendia et al., 2001)
- Controlled Oral Word Association Test-(Echemendia et al., 2001)
- Stroop Test-(Echemendia et al., 2001)
- Vigil Continuous Performance Test-(Echemendia et al., 2001)
- Symptom checklist-90-revised (SCL-90-R)-(Ponsford et al., 2002)
- National Adult Reading Test (NART)-(Ponsford et al., 2002)
- Wechsler Adult Intelligence Scale reading (WAIS-R)-(Ponsford et al., 2002)
- Paced Auditory Serial Addition Task (PASAT)-(Ponsford et al., 2002)
- Rey Auditory-Verbal Learning Test-(Ponsford et al., 2002)
- Participation Index-(Erez et al., 2009)
- Behavioural Assessment of Dysexecutive Syndrome (BADs)-(Erez et al., 2009)
- Dysexecutive Questionnaire (DEXS)-(Erez et al., 2009)
- Self-Awareness of Deficits Interview (SADI)-(Erez et al., 2009)
- Sensory Organization Test (SOT)-(Sosnoff et al., 2011)
- Neurobehavioral Functioning Inventory (Bay & De-Leon, 2011)

### **When to Consider Retiring an Athlete**

In some cases, mild traumatic brain injuries can have significant effects on athletes and the decision to retire them may need to be made (Sedney, Orphanos & Bailes, 2011); this decision can be both difficult and complex. Sedney, Orphanos and Bailes (2011), in their review article, described the many factors that affect the decision. Some factors described include the review of the patient's history as well as social and legal implications (Sedney, Orphanos & Bailes, 2011). An example of social implication is when the athlete is being pushed to RTP from parents, coaches and teammates. This scenario can cause the athlete to downplay their symptoms in order to RTP earlier, which is why it is important to thoroughly assess the client's injury. An example of a legal implication is in August of 2010, the National Collegiate Athletic Association (NCAA) adopted legislation that requires each team has a concussion management plan (NCAA, 2011).

To assess the athlete's physical health, the health care provider should look to see how many concussions the athlete has sustained in the past in order to make an informed decision (Sedney, Orphanos & Bailes, 2011). They should also investigate their previous symptoms, recovery time, and whether they returned to play with symptoms. Symptom severity should be recorded as well as any impairment in school or athletic functioning. Neurologic examination, neuropsychological testing, neuroimaging, and prolonged post-concussive symptoms should also be assessed (Sedney, Orphanos & Bailes, 2011).

The decision to retire an athlete does not only affect the athlete, but also their coach, parents, teammates, agents, etc., which can add stress to the athlete and health care provider (Sedney, Orphanos & Bailes, 2011). The authors also described that there can be financial implications, such as losing scholarships or losing income from a career.

This may impose financial stress on an athlete; therefore they may be inclined to downplay their symptoms (Sedney, Orphanos & Bailes, 2011). The health care provider must be aware of the pros and cons of retiring an athlete and must also be sure to educate the client on them (Sedney, Orphanos & Bailes, 2011).

Through the literature review, there was not a concrete answer as to when to retire an athlete from a sport permanently. There was no “magic number” of concussions or mTBIs to determine retirement. Therefore, the decision relies on the input of the interdisciplinary team, the athlete and their coach/family. It is necessary to communicate with the physician and interdisciplinary team in order to be aware of medical history; characteristics of symptoms and the RTP protocol being used which all influence retirement.

### **Summary of Literature**

Based on the most recent literature in the areas of sports medicine, athletic training, OT, medical, neurological, rehabilitation, and physical education journals, a need for a greater emphasis on providing appropriate care following a sports-related mTBI has arisen. Even following the acute stages of sustaining an mTBI, the literature has shown that individuals continue to have persisting complaints and difficulties returning to their daily occupations. Therefore, it is important that healthcare professionals know the risks, symptoms, guidelines, issues of integration to daily life, interventions, assessments, and when it is time for an athlete to disengage in sports following mTBI.

Based on recent literature findings, the OT role and a basic clinical guideline for treating young adults who have sustained a sports-related mTBI is needed to assist OT

practitioners in addressing the appropriate assessments and interventions during recovery stages. There is currently limited literature addressing the role of OT and assessments that are applicable to this population. There are current general guidelines for this population; however there are very limited guidelines specific to OT service delivery. Through the literature review, there was one OT guideline for mTBI for OT; however it was specific to U.S. Service Members who sustained their mTBIs while serving in the military. Due to the limited guidelines and literature, an OT service delivery role and guidelines are essential with a clear need for development. This is important for this population due to the fact that not only does an athlete engage in the occupation of sport, but also in everyday occupations as well. By developing an OT role and clinical guideline it can provide interventions and recommendations for preparing the athlete to not only safely RTP, but return to engagement in their everyday occupations without persisting disability. The methodology used to develop this role and clinical guide, along with an overview of the assessments and interventions that can be used, will be addressed in depth in the following chapter.



## CHAPTER III

### METHODOLOGY

The occupational therapy (OT) role and practice guideline, *An Occupational Therapy Practice Guide for Sports-Related Mild Traumatic Brain Injury in Young Adults*, was created to provide education, assessment, and treatment recommendations to address the needs of young adults who have sustained a sports-related mild traumatic brain injury (mTBI). The need for this product was found by conducting a thorough literature review on the topics of mTBI, concussion, and occupational therapy or rehabilitative aspects for those who have sustained a TBI. The literature was found using research databases including CINAHL, PubMed, OT Search, Sports Discus and SCOPUS. Key words used when searching the databases for articles included: mTBI, concussion, occupational therapy, guidelines, sports head injury, and return to play. Following the search of articles, summaries were completed to include the purpose, research design, sample size and characteristics, measurement tools, and to identify the need for an OT role and practice guideline for individuals who sustained a sports-related mTBI.

Through the literature review, the definition of mTBI; its risk factors; cognitive, emotional/behavioral, and somatic symptoms; current multidisciplinary guidelines; integration back into daily life, return to play, education, intervention, assessments used; and when to consider retiring an athlete were further understood. Prevalent themes of the literature identified symptoms which continued following the acute stages of recovery;

variety of assessments used, and other healthcare multidisciplinary roles called up to provide treatment following an mTBI. Current research on mTBI is directed toward other disciplines such as neurology, nursing, and athletic training. These disciplines focus only on when it is safe to return to sport and do not address the need to return to other occupations following the injury. Therefore the OT role and practice guideline bridges the gap of young adults who have sustained a sports-related mTBI and using the OT skills to promote wellness when returning to all daily life occupations. These findings supported the need for an OT role to be identified as well as a practice guideline to assist occupational therapy practitioners in enhancing an individual's integration back into daily life following a sports-related mTBI. The OT guideline will facilitate successful reengagement in meaningful occupations for young adults after mTBI.

Before developing the OT role and practice guideline, *An Occupational Therapy Practice Guide for Sports-Related Mild Traumatic Brain Injury in Young Adults*, an occupation-based model was chosen to guide the construction. The Person-Environment - Occupation (PEO) Model of Occupational Performance was used to organize the practice guideline (Law et al., 1996). The PEO model was selected because it uses the components of person, environment, and occupation and aims to understand how the three work together to create an occupational “fit” (Turpin & Iwama, 2011). The PEO model views the components as “transactive”, meaning that they are interdependent and together influence occupational performance (Turpin & Iwama, 2011). The young adult who sustained an mTBI has many contextual and personal factors such as the sports environment and symptoms from the injury that influence the occupation of sport as well as other meaningful occupations. The authors believe that using the PEO model will

allow them to dissect each of the three components in order to create beneficial interventions and make adaptations/modifications in order to create the best occupational performance for the young adults.

This OT practice guideline is intended to be used for those who have sustained a sports related mTBI and are young adults between the ages of 20-40. Current research addresses the needs of children and adolescents who have sustained an mTBI, but there is a gap in the literature for the young adult population. This population should not be overlooked because it is a critical time for beginning the formation of new relationships and transitions into new roles.

Together the authors developed the OT role and practice guideline by completing a thorough literature review, choosing an occupation-based model, and creating the product. Chapter IV will present the product, *An Occupational Therapy Practice Guide for Sports-Related Mild Traumatic Brain Injury in Young Adults*.

## CHAPTER IV

### PRODUCT

Evidence has shown that young adults who have sustained a mild traumatic brain injury (mTBI) may continue to have symptoms that are present past the acute stage of the injury; they are at risk for future deficits in performing their daily occupations (Erez, Rothschild, Katz, Tuchner, & Harman-Maeir, 2009; Reed, 2011). This shows the need for an occupational therapy (OT) role to be described so that individuals can manage their persistent symptoms and return to daily occupations without further disablement. Therefore the following guideline is intended to be used by OTs working with young adults who have sustained a sports-related mTBI. The OT guideline provides therapist and client education materials, assessment recommendations, secondary/tertiary prevention materials, a case study, and example goals and interventions.

The OT guideline is organized to provide information beneficial to OTs as well as clients and families. The information is organized in the following manner.

- Background including: mTBI statistics and terminology associated with mTBI are to be used by the OT prior to encounter with client. These materials may also be given to the client for further clarification on mTBI if needed.
- Education Materials including: client and family handout, therapist handout, and prevention handouts. Client and family handout is to be provided upon initial encounter with the client and may be used for family members as needed. Therapist handout is to be used prior to the first encounter with the client.

- Occupational therapy role associated with identifying the use of activity analysis on understanding needs and their effect on daily occupations. Prior to encounter with client the OT should be competent and understanding of the role when working with the intended population.
- Assessment/Evaluation including: symptom checklist, symptom checklist: outcome tracker, occupational profile, recommended assessment, symptom log, and outcome log. The symptom checklist is intended to be used upon initial evaluation of the client and throughout treatment as the OT feels the client is having a change in symptoms; the OT will provide the client with the symptoms checklist. Upon completion of the symptoms checklist the therapist will complete the symptom checklist: outcome tracker. The occupational profile is to be completed upon initial evaluation to learn more about the client's meaningful occupations, and current occupational performance. The recommended assessments provide optional assessments which the OT may use at any point during treatment to assist in better understanding the client's needs. The symptom log is given and explained to the client by the OT following the initial evaluation; the client is to complete the symptom log on their own time. The outcome log is given to the client by the OT following the creation of the treatment plan; the client is to fill out the outcome log based on their areas of difficulty which they are working to improve.
- Example OT interventions and reimbursable goals are provided for to use when developing treatment plans and safe return to occupation. These parts of the guideline can be used to assist in goal writing and treatment planning.

- A case study provides an overarching example of how the practice guideline can be used in OT practice. This is to be used as an over-arching example as to how one may carry out the guideline.

The guideline's development was based upon the Person-Environment-Occupation (PEO) model of occupational performance (Law, Cooper, Strong, Stewart, Rigby, & Letts, 1996). The PEO frame of reference was chosen because it uses the components of the person, environment, and occupation and how a change in one of these areas can create a change in the occupational performance (Turpin & Iwama, 2011). The PEO model supports the population of young adults who have sustained a sports related mTBI because it addresses optimal occupational performance to help minimize dysfunction following the injury, while allowing for remediation of person elements through the rehabilitation process.

The *person* aspect refers to the client who has sustained an mTBI and refers to the client's subjective needs as well as the objective areas the therapist is able to identify and promote remediation. Allowing a subjective approach helps identify the intrinsic motivator for the client. This is essential for the population as young adults are beginning transition into their roles and developing the occupations which are most motivating and meaningful to them.

The *environment* aspect includes cultural, socioeconomic, institutional, physical and social (Turpin & Iwama, 2011). These areas of the *environment* help identify which environments the individual engages in. The practice guideline assists in identifying the individual's contexts meaning such as playing fields, classrooms, or home. From this

knowledge the OT will be able to use the *environment* to make treatment more client-centered.

*Occupations* are the activities and tasks that the client engages in such as sport, homework, socializing with peers, or preparing meals. In the *occupation* component of PEO, OTs identify what the person does in their daily life and the degree of meaning for the person. For a young adult who has sustained a sports related mTBI, an OT must look at the meaningful ways in which the person performs these occupations. The *occupation* component remained integral for the development of creating this practice guide through identifying the OT role in recognizing meaning of a person's life roles. This is important so that the tasks a person engages in are meaningful to the individual.

Together these PEO components develop into a transactive approach meaning that a change in one of these areas also has an effect on the others. In order to have the most optimal occupational performance, each aspect must work collaboratively (Turpin & Iwama, 2011). The transactions can be made between the person-occupation, occupation-environment, and person-environment (Turpin & Iwama, 2011). This understanding enables a person who has sustained a sports-related mTBI to be able to make transitions back into daily occupations. For example, the occupation-environment aspect is able to demonstrate what the needs of the client's job role (*occupation*) are and how the client's office (*environment*) set up affects the ability to return to this role. PEO, as a framework, provides the OT and the client the ability to work in a client-centered approach to develop an appropriate treatment plan addressing all aspects of the PEO for a well-rounded approach. This collaboration provides structure for those who have sustained an mTBI as they experience difficulties in being able to return to their occupations following

their injury. The PEO enables the intervention to focus on all three aspects to improve the individual's occupational performance (Strong, Rigby, Stewart, Law, Letts, Cooper, 1999).

The goal of this practice guideline is to allow young adults who have sustained a sports-related mTBI be able to return to their daily occupations with their highest level of occupational performance. Therefore the guideline provides OTs with the ability to understand their transactive role in treating these individuals. It also provides the education and tools to develop appropriate treatment following a sports-related mTBI injury.

The OT role and practice guideline are presented in the following pages. The use of this OT role and practice guideline is designed to help enable OTs provide optimal client-centered care to young adults who have sustained a sports-related mTBI.



# An Occupational Therapy Practice Guide for Sports-Related Mild Traumatic Brain Injury in Young Adults



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## Table of Contents

<b>Introduction.....</b>	<b>36</b>
<b>Background Information.....</b>	<b>38</b>
Mild Traumatic Brain Injury (mTBI) Research Statistics & Facts.....	39
Terminology.....	41
<b>Education Materials.....</b>	<b>43</b>
Client Handout: Common Symptoms of mTBI.....	44
Occupational Therapist Fact Sheet.....	47
<b>Occupational Therapist Materials.....</b>	<b>49</b>
Return to Sports.....	50
Prevention.....	51
<b>Occupational Therapy Role.....</b>	<b>53</b>
<b>Assessment/Evaluation.....</b>	<b>55</b>
Symptom Checklist.....	56
Symptom Checklist: Outcome Tracker.....	60
Occupational Profile.....	64
Recommended Assessments.....	67
Symptom Log.....	71
Outcome Log.....	73
<b>Example Occupational Therapy Intervention &amp; Goals.....</b>	<b>75</b>
Intervention & Goal Examples.....	76
Goal Writing .....	81
<b>Case Study.....</b>	<b>82</b>
Case Study Introduction.....	83
Completed Symptom Checklist.....	83

Completed Occupational Profile.....	85
Completed Symptom Log.....	87
Intervention Plan.....	88
Outcome Chart.....	90
References.....	92

## Introduction

*An Occupational Therapy Practice Guide for Sports-Related Mild Traumatic Brain Injury (mTBI) in Young Adults* is organized to provide beneficial information to occupational therapists (OT) as well as clients and families on sports-related mild traumatic brain injuries (mTBI). OTs will be able to use this information to guide the treatment process with the intended population.

This OT guide will take the reader through background information, education materials, the OT role with young adults with sports-related mTBI, assessment and evaluation resources, examples of interventions and goals, and lastly, a case study. The practice guide includes handouts for both therapist and client use to increase their understanding of mTBI.

Throughout the materials provided you will see the incorporation of the Person-Environment- Occupation (PEO) model of occupational performance (Law, Cooper, Strong, Stewart, Rigby, & Letts, 1996). The PEO frame of reference was chosen because it uses the components of the person, environment, and occupation and how a change in one of these areas can create a change in the occupational performance (Turpin & Iwama, 2011). The PEO model supports the population of young adults who have sustained a sports related mTBI because it addresses optimal occupational performance to help minimize dysfunction following the injury, while allowing for remediation of person elements through the rehabilitation process.

The procedure is as follows for using *An Occupational Therapy Practice Guide for Sports-Related Mild Traumatic Brain Injury in Young Adults*:

- Background including: mTBI statistics and terminology associated with mTBI are to be used by the OT prior to encounter with client. These materials may also be given to the client for further clarification on mTBI if needed.
- Education Materials including: client and family handout, therapist handout, and prevention handouts. Client and family handout is to be provided upon initial encounter with the client and may be used for family members as needed. Therapist handout is to be used prior to the first encounter with the client.
- Occupational therapist materials is made for the OT to use as additional resources and education on recommendations on return to sports and prevention following mTBI.
- Occupational therapy role associated with identifying the use of activity analysis on understanding needs and their effect on daily occupations. Prior to encounter

with client the OT should be competent and understanding of the role when working with the intended population.

- Assessment/Evaluation including: symptom checklist, symptom checklist: outcome tracker, occupational profile, recommended assessment, symptom log, and outcome log. The symptom checklist is intended to be used upon initial evaluation of the client and throughout treatment as the OT feels the client is having a change in symptoms; the OT will provide the client with the symptoms checklist. Upon completion of the symptoms checklist the therapist will complete the symptom checklist: outcome tracker. The occupational profile is to be completed upon initial evaluation to learn more about the client's meaningful occupations, and current occupational performance. The recommended assessments provide optional assessments which the OT may use at any point during treatment to assist in better understanding the client's needs. The symptom log is given and explained to the client by the OT following the initial evaluation; the client is to complete the symptom log on their own time. The outcome log is given to the client by the OT following the creation of the treatment plan; the client is to fill out the outcome log based on their areas of difficulty which they are working to improve.
- Example OT interventions and reimbursable goals are used when developing treatment plans and safe return to occupation. These parts of the guide can be used to assist in goal writing and treatment planning.
- A case study provides an overarching example of how the practice guide can be implemented in OT practice. This is to be used as an over-arching example as to how one may carry out the guide.

This section provides the occupational therapist (OT) with research statistics and facts, and common terminology regarding mild traumatic brain injury (mTBI).

# Background Information



## Mild Traumatic Brain Injury (mTBI) Research Statistics and Facts

- It is estimated that there are 1.6-3.8 million cases of sports-related concussion in the United States each year (Doolan et al., 2012).
- Each year, approximately 1.7 million people sustain an mTBI in the United States (CDC, 2013).
- About 75% of TBIs that occur each year are concussions or other forms of mild TBI (CDC, 2013).
- The most common type of sport injury is mTBI (Harvey, Freeman, Broshek, & Barth, 2011).
- According to the Centers for Disease Control and Prevention, there are as many as 15% of people diagnosed with mTBI that may experience persistent disability (Marshall et al., 2011).
- In a study of individuals who sustained mild-moderate TBI, 57% reported fatigue and 42% reported that they still had fatigue symptoms during a one year follow-up (Bay & De-Leon, 2011).
- More than 34% of their participants reported having increased headaches and dizziness after sustaining an mTBI (Kraus et al., 2005).

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## Terminology

**Mild Traumatic Brain Injury/Concussion:** A person who has had a traumatically induced physiological disruption of brain function, as manifested by at least one of the following:

1. any period of loss of consciousness;
2. any loss of memory for events immediately before or after the accident;
3. any alteration in mental state at the time of the accident (eg, feeling dazed, disoriented, or confused); and
4. focal neurological deficit that may or may not be transient but where the severity of the injury does not exceed the following:

- 13-15 on Glasgow Coma Scale
- Loss of Consciousness for less than 30 minutes
- Post-traumatic Amnesia for no longer than 24 hours

(American Congress of Rehabilitation Medicine, 1993)

**Glasgow Coma Scale (GCS) 13-15:** Describes the person's level of consciousness following a head injury. Scores are determined through testing eye opening, verbal response, and motor response. Scoring 13-15 identifies the head injury mild. (Silver, McAllister, & Yudofsky, 2011).

**Post-Traumatic Amnesia:** "is the time after a period of unconsciousness when the injured person is conscious and awake, but is behaving or talking in a bizarre or uncharacteristic manner" (Headway, 2013).

### Second-Impact Syndrome

Second-Impact Syndrome (SIS) occurs when an athlete returns to play while still symptomatic from first mTBI and experiences a second injury. SIS results in edema and potential for a fatal cerebral hemorrhage.

The second injury can be mild, sometimes unnoticeable to the athlete and others observing play. However, relatively soon after the second injury, the athlete can experience confusion, loss of function and possible death.

### Post-Concussion Syndrome

Post-Concussive Syndrome (PCS) occurs when there is prolonged recovery from the initial concussion or following concussions. Athletes with PCS can experience confusion on the "field". PCS may result in the athlete retiring for the season or retiring from the sport entirely.

## **Chronic Traumatic Encephalopathy**

Chronic Traumatic Encephalopathy (CTE) is the result of repeated traumatic brain injury. CTE results in decreased intellect, memory, balance and behavior changes. The result is similar to Parkinson's disease or Alzheimer's disease. The symptoms commonly present several years after mTBI, usually when the athlete is in their 40's or 50's.

### **Sources:**

- American Congress of Rehabilitation Medicine (ACRM). (1993). Definition of mild traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 8, 86-87.
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This section provides handouts for both clients and OTs regarding common symptoms following an mTBI.



# Education Materials



## **Common Symptoms of Mild Traumatic Brain Injury (mTBI)**

*For Adults 20-40 Years Old*

### **What is an mTBI?**

An mTBI is a mild brain injury that can change the way your brain works. You can get a concussion from hitting your head. This can happen through sports or everyday activities.

### **What are some signs that you may have an mTBI?**

#### **Signs from your body**

- Being unusually tired
- Changes in your eyesight  
(Ex. blurry, double or sensitive vision)
  - Muscle weakness
  - Headaches
  - Dizziness
- Changes in sleeping  
(Ex. difficulty falling/staying asleep, sleeping more than usual)
- Changes in your ability to stay balanced
  - Upset stomach or feeling nauseous
  - Numbness or tingling
  - Not feeling “right”

### **Signs from your mind**

- Trouble paying attention
- Difficulty remembering things
- Not thinking clearly
- Problems learning new things
- Difficulty with making choices

### **Signs from your feelings**

- Feeling sad or depressed
- Not feeling like yourself
- Feeling nervous
- Feeling stressed or angry
- Feeling irritable

### **Everyday Examples of Symptoms**

- Can't remember things from before or after hitting your head
- Going to the grocery store multiple times because you forgot to get items
- Forgetting to do important things for school, work or around the house
- Needing questions to be repeated or repeating yourself
- Needing more time than usual to complete tasks

### **What should you do if you think you have an mTBI?**

- Go to the doctor right away
- Avoid driving (ask your doctor about when it is safe to drive)
- Notify teachers, bosses, coaches and friends/family
- Do not play any sports or physically tiring activities
- Do not drink alcohol
- Get enough rest
- Avoid spending too much time on the computer

#### **Sources:**

Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control. Report to Congress on mild traumatic brain injury in the United States: steps to prevent a serious public health problem. Atlanta (GA): Centers for Disease Control and Prevention; 2003.

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- traumatic brain injury: A preliminary study. *The American Journal of Occupational Therapy*, 63(5), 634-640.
- Faul M, Xu L, Wald MM, Coronado VG. (2010). Traumatic brain injury in the United States: emergency department visits, hospitalizations, and deaths. Atlanta (GA): Centers for Disease Control and Prevention, National Center for Injury Prevention and Control; 2010.
- Kraus, J., Schaffer, K., Ayers, K., Stenehjem, J., Shen., & Afifi A. (2005) Physical complaints, medical service use, and social and employment changes following mild traumatic brain injury a 6-month longitudinal study. *Journal of Head Trauma Rehabilitation* 20(3), 239-256.
- Reed, N. (2011). Sport-related concussion and occupational therapy: Expanding the scope of practice. *Physical & Occupational Therapy in Pediatrics*, 31(3), 222-224.
- Sosnoff, J., Broglio, S., Shin, S., & Ferrara, M. (2011). Previous mild traumatic brain injury and postural-control dynamics. *Journal of Athletic Training* 46(1), 85-91.

## **Fact Sheet for Occupational Therapist Regarding: Education for Sports-Related Mild Traumatic Brain Injury (mTBI)**

Mild traumatic brain injury is also known as concussion is defined as:

13-15 on Glasgow Coma Scale

Loss of Consciousness for less than 30 minutes

Post-traumatic Amnesia for no longer than 24 hours

(American Congress of Rehabilitation Medicine, 1993)

Symptoms identified through research to look for in your patients:

Somatic changes in:

- Fatigue
- Postural changes
- Muscle weakness
- Vision (double vision, blurred vision, vergence)
- Headaches
- Dizziness
- Sleeping

Cognitive changes in:

- Attention
- Information processing
- Memory
- Planning
- Strategy use
- Concentration
- Verbal learning

Emotional/Behavioral changes with:

- Depression
- Emotional regulation
- Anxiety
- Paranoia
- Hostility

Patient recommendations may include:

- Slowly increase back into daily occupations
- Take additional rest breaks to avoid becoming over fatigued
- Do not drink alcohol or do any recreational drugs
- Do not engage in physical activity or contact sports until cleared to return
- Avoid driving until all symptoms have subsided
- Get enough sleep, and add additional rests if needed
- Limit time using the computer, watching television, or using cell phones or tablets
- Avoid large crowds and loud noises
- If symptoms worsen during recovery see a doctor immediately

Sources:

- American Congress of Rehabilitation Medicine. Definition of mild traumatic brain injury. (1993). *Journal of Head Trauma Rehabilitation*, 8, 86-87.
- Erez, A. B-H., Rothschild, E., Katz, N., Tuchner, M., & Harman-Maeir, A. (2009). Executive functioning, awareness, and participation in daily life after mild traumatic brain injury: A preliminary study. *The American Journal of Occupational Therapy*, 63(5), 634-640.
- Kraus, J., Schaffer, K., Ayers, K., Stenehjem, J., Shen., & Afifi A. (2005) Physical complaints, medical service use, and social and employment changes following mild traumatic brain injury a 6-month longitudinal study. *Journal of Head Trauma Rehabilitation* 20(3), 239-256.
- Reed, N. (2011). Sport-related concussion and occupational therapy: Expanding the scope of practice. *Physical & Occupational Therapy in Pediatrics*, 31(3), 222-224.
- Sosnoff, J. , Broglio, S., Shin, S., & Ferrara, M. (2011). Previous mild traumatic brain injury and postural-control dynamics. *Journal of Athletic Training* 46(1), 85-91



This section provides a resource for the OT on when it may be safe for an athlete following a sports-related mTBI to return to sports and prevention resources and recommendations.

# Occupational Therapist Materials



## Return to Sports

- Discuss with the physician and interdisciplinary team to determine what Return to Play (RTP) guidelines are being followed for the individual.
- A general rule of RTP guidelines is that individuals should not return to play if they are still symptomatic.
- Individuals should have adequate physical and cognitive rest in order for faster symptom resolution.
  - Including rest from television, cellphones, computers.
- Consider social and legal implications of RTP.
  - An athlete may feel pressure or stress to RTP quickly
  - Some states/colleges have legislation regarding RTP guidelines

### Sources for RTP Guidelines

McCrory, P, Meeuwisse, W., Johnston, K, et al. (2009). Consensus statement on concussion in sport: 3<sup>rd</sup> international conference on concussion in sport held in Zurich, November 2008. *Clinical Journal of Sport Medicine*, 19, 185-200.

Echemendia, R.J. Cantu, R. (2004). Return to play following cerebral head injury. In Lovell, M.R., Echemendia, R.J., Barth, J.T. et al., *Traumatic brain injury in sports:*

*A neuropsychological and international perspective* (479-498). Netherlands: Swets and Zeitlinger.

### Other Sources:

Doolan, A.W., Day, D.D., A.C. Maerlender, Goforth, M. & Brolinson, P.G. (2011). A review of return to play issues and sports-related concussion. *Annals of biomedical engineering*, 40(1), 106-113. DOI:10.1007/s10439-011-0413-3.

## Prevention

### Recommendations from the Center for Disease Control (CDC)

- 1) Using the correct personal protective equipment (PPE) for each activity consistently
- 2) Observance of sport-specific rules for safety
- 3) Practice of good sportsmanship

### Other Recommendations

- Proper maintenance of equipment
  - Inspect helmets and other PPE regularly for defects (Powell & Barber-Foss, 1999).
- Strengthening of neck muscles to reduce forces and impact to the brain (Johnston et al., 2001).
- The environment where the sport is played should be inspected regularly to reduce hazards and the risk of injury (Powell & Barber-Foss, 1999).
- The use of shock absorbing material when able. For example, padding hard surfaces, such as goalposts.
- Removing hazards on the sidelines
- Available education about mTBI: Posters, brochures, other handouts (CDC, 2013).

### Other Information

- Collaboration with coach
- Seeking professional resources on neuropsychology, testing for disability, advocacy, and legal representation
- School supports and work human resources

### Sources:

Center for Disease Control (2013). Injury prevention and control: Traumatic brain injury. Retrieved from: [www.cdc.gov/concussion/index.html](http://www.cdc.gov/concussion/index.html).

Collins, M.W., Iverson, G.L. & Lovell, M.R., et al. (2003). On-field predictors of neuropsychological and symptom deficit following sports-related concussion. *Clinical Journal of Sports Medicine*, 13, 222-229.

Doolan, A.W., Day, D.D., Maerlender, A.C., Goforth, M. & Broolinson, P.G. (2011). A review of return to play issues and sports-related concussion. *Annals of Biomedical Engineering*, 40(1), 106-113.

Harvey, D.J., Freeman, J., Broshek, D.K. & Barth, J.T. (2011) Sports injuries. In Silver, J.M., McAllister, T.W. & Yudofsky, S.C. (Eds.), Textbook of traumatic brain

- injury (2<sup>nd</sup> ed.), 427-438. Arlington, VA: American Psychiatric Publishing, Inc.
- Johnston, K.M., McCrory, P., Mohtadi N.G. et al. (2001). Evidence-based review of sport-related concussion: clinical science. *Clinical Journal of Sports Medicine*, 11, 150-159.
- Powell J.W., Barber-Foss, K.D. (1999). Traumatic brain injury in high school athletes. *Journal of the American Medical Association*, 282, 958-963.

This section describes elements of the OT role when working with young adults who have sustained a sports-related mTBI.



# Occupational Therapy Role



## Occupational Therapist Role When Working with Young Adults with a Sports-Related Mild Traumatic Brain Injury

- Occupational therapists (OT) work with individuals who have impaired daily functioning. Individuals who have sustained an mTBI have impaired daily functioning in physical, cognitive and psychosocial areas.
- Activity Analysis: OT's have special activity analysis training and skills. OTs can analyze daily occupations and their environmental demands. OTs can create client-centered treatment plans based off of the analysis to increase occupational performance.
- Energy Conservation: Individuals with mTBI need both physical and cognitive rest until symptoms resolve. Many individuals in this population may not know how to incorporate rest into their daily routines. OTs can assist these individuals with energy conservation and sleep strategies in order for them to have appropriate an adequate rest and facilitate the best recovery.
- Return to School/Work/Sport: OTs can use activity analysis in order to assess physical/cognitive/psychosocial, task and environmental demands of school, work or sport. OTs can create client-centered treatment plans and recommend modifications as necessary.
- Advocate: OTs can act as an advocate for the client by educating teachers, coaches, bosses/supervisors, family members about the client's injury and needs as well as any modifications necessary.

Source:

American Occupational Therapy Association (2008). Occupational therapy practice framework: Domain and process (2<sup>nd</sup> ed.) *American Journal of Occupational Therapy*, 62, 625-683.

Reed, N. (2011). Sport-related concussion and occupational therapy: Expanding the scope of practice. *Physical & Occupational Therapy in Pediatrics*, 31(3), 222-224. DOI: 10.3109/01942638.2011.589719

This section provides the OT with resources to assist in the assessment and evaluation process. This section also provides materials that allow the OT to track outcomes with more ease.

# Assessment and Evaluation



# *Symptom Checklist*

The occupational therapist will give and explain the symptom checklist to the client. The client will fill out the checklist; however the occupational therapist can work with the client as needed. The symptom checklist was developed as a means of measuring the severity of the client's symptoms. The symptom checklist should be used in the initial assessment of the client as well as continuously through treatment in order to keep track of increasing or decreasing symptom severity.

## Person-Environment-Occupation Model of Occupation Performance:

Symptoms are broken down into physical, cognitive and emotional/behavioral aspects. The symptoms are viewed as the *person* component of the model. The person and occupation transaction is also investigated on the checklist where the client is asked to note the occupations that he/she is participating in when experiencing the symptoms as well as the following question that is asked, "In what aspects of your daily life do you experience the most difficulties since your injury?"



## 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

Other physical (body) changes you have noticed\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### Cognitive Changes

	<i>No difference</i>	<i>Mild difference</i>	<i>Moderate difference</i>	<i>Severe difference</i>
• 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

Other emotional (feeling) changes you have noticed\_\_\_\_\_

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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.

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

# *Symptom Checklist: Outcome Tracker*

The occupational therapist will fill out the symptom checklist: outcome tracker as they compile the client's symptoms checklist. The symptom checklist: outcome tracker was developed as an easy way for the occupational therapist to organize and record the progression of the client's symptoms. The tracker is used to organize various symptom checklist responses in one location. This tracker can be used as a convenient resource to document changes. It can be used to illustrate to the client the stages of their symptoms.

Person-Environment-Occupation Model of Occupation Performance: The symptoms are viewed as the *person* component of the PEO model. There is space provided to note specific environmental or occupational transactions that influence the symptom severity.

## Symptom Checklist: Outcome Tracker

Use the charts below to organize the symptom severity throughout treatment in order to track outcomes.

Example:

<b>Physical Changes</b>	<b>1<sup>st</sup> Completion</b>	<b>2<sup>nd</sup> Completion</b>	<b>3<sup>rd</sup> Completion</b>	<b>4<sup>th</sup> Completion</b>
Tiredness	3	2	2	0

### Physical Changes

<b>Physical Changes</b>	<b>1<sup>st</sup> Completion</b>	<b>2<sup>nd</sup> Completion</b>	<b>3<sup>rd</sup> Completion</b>	<b>4<sup>th</sup> Completion</b>
Tiredness				
Visual Changes				
Muscle Weakness				
Headaches				
Dizziness				
Sleep Difficulties				
Balance affected				
Stomachaches/Nausea				
Numbness/Tingling				
Hearing/Speech Difficulties				

Other: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### Cognitive Changes

<b>Cognitive Changes</b>	<b>1<sup>st</sup> Completion</b>	<b>2<sup>nd</sup> Completion</b>	<b>3<sup>rd</sup> Completion</b>	<b>4<sup>th</sup> Completion</b>
Paying Attention				
Remembering				
Clouded Thinking				
Learning New Things				
Decision Making				

Other: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### Emotional Changes

<b>Emotional Changes</b>	<b>1<sup>st</sup> Completion</b>	<b>2<sup>nd</sup> Completion</b>	<b>3<sup>rd</sup> Completion</b>	<b>4<sup>th</sup> Completion</b>
Feeling Sad/Depressed				
Nervousness				
Stressed				
Angry				
Irritable				
Moodiness				

Other: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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# *Occupational Profile*

The occupational profile resource is to be used by the occupational therapist as an outline to create the occupational profile and to assist in the evaluation process.

## Person-Environment- Occupation Model of Occupational Performance:

The occupational profile was designed to view the components of PEO both separately and transactively.

### Person:

- Reason for services
- Medical History
- Client factors & Performance Skills
- Client personal goals

### Environment:

- Living accommodations
- Common environments (Physical, Socioeconomic, Institutional, Cultural)
- Environments that support occupational performance
- Environments that inhibit occupational performance

### Occupation:

- Meaningful occupations
- Successful areas of occupation following injury
- Affected areas of occupation following injury

P x O: “successful areas of occupation following injury”

E X O: “environments supporting/inhibiting occupational performance”



## Occupational Profile

**Reason for  
Services:**\_\_\_\_\_

\_\_\_\_\_

**Medical  
History:**\_\_\_\_\_

\_\_\_\_\_

### *Environmental Aspects*

**Lives (alone,  
spouse):**\_\_\_\_\_

\_\_\_\_\_

**Notes:**\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Common Environments** (Physical, Socioeconomic, Institutional, Cultural):\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### *Meaningful Occupations*

**Sport(s):**\_\_\_\_\_

\_\_\_\_\_

**Work/School:**\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**IADLs:**\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Leisure/Social  
Participation:**\_\_\_\_\_

\_\_\_\_\_

*Summary of Occupational Performance*

**Successful Areas of Occupation following injury:** \_\_\_\_\_

\_\_\_\_\_

**Affected Areas of Occupation following injury:** \_\_\_\_\_

\_\_\_\_\_

**Impaired Client Factors & Performance skills:** \_\_\_\_\_

\_\_\_\_\_

**Environments supporting occupational performance:** \_\_\_\_\_

\_\_\_\_\_

**Environments inhibiting occupational performance:** \_\_\_\_\_

\_\_\_\_\_

**Client's Personal Goals:** \_\_\_\_\_

\_\_\_\_\_

Sources:

American Occupational Therapy Association. (2008). Occupational therapy practice framework: Domain and process (2nd ed.). American Journal of Occupational Therapy, 62,625–683. Golisz, K. ( 2009). Occupational therapy practice guidelines for adults with traumatic brain injury. Bethesda, MD: AOTA Press.

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# *Recommended Assessments*

There are several assessments that are recommended for the occupational therapist to use during the evaluation/assessment phase of treatment. They are recommended to assess somatic, cognitive and emotional/behavioral symptoms that the client may have, the client's occupational performance and their self-perception of their performance. The occupational therapist can pick and choose which assessments are appropriate for their client.

## Recommended Assessments

### **Behavioural Assessment of Dysexecutive Syndrome**

Purpose: This assessment is used to assess executive functioning skills

Time: 1.5 hours to score and administer

Guide Authors Recommendation: This assessment is recommended for therapists to use as an adjunct to therapy when symptoms are noted in the areas of executive functioning. This assessment not only identifies these areas, but simulates daily occupations which an individual may engage in.

Price: Includes manual, 25 record forms, 5 stimulus books, stimulus cards, three-dimensional plastic materials, timer, 25 (Dysexecutive Questionnaire) DEX questionnaires self-rater and 25 DEX questionnaire independent-rater, \$435.00

Source:

<http://www.pearsonassessments.com/HAIWEB/Cultures/enus/Productdetail.htm?Pid=015-8054-350&Mode=summary>

### **Behavior Rating Inventory of Executive Function for Adults (BRIEF-A)**

Purpose: Help determines a client's executive functioning and self-regulation abilities.

Time: 10-15 minutes administer, 15-20 minutes to score

Guide Authors Recommendation: This assessment is recommended for therapists to use as an adjunct to therapy as it is able to assess the individual's ability to plan, problem solve, and use their memory to engage in their routine occupations.

Price: 5 BRIEF-A self-report/informant, \$17.50

Source: <http://www4.parinc.com/Products/ProductIC.aspx?ProductID=IC-BRIEF-A>

### **Occupational Self-Assessment (OSA)**

Purpose: Identify individual's self-perception of occupational competence, importance of occupational functioning, and environmental adaptation.

Time: 10-20 minutes

Guide Authors Recommendation: This assessment is recommended for the use of therapists to use with the practice guide provided to be able to identify the

importance of occupational performance as well as the environmental adaptation. The OSA connects with the Person-Environment-Occupation model of occupational performance to better understand the person and their subjective views of their ability to perform their occupations as well as the environment in which they are performed.

Price: \$43.50

Source: <http://www.cade.uic.edu/moho/productDetails.aspx?aid=2>

### **Canadian Measure of Occupational Performance**

Purpose: This assessment may be used to measure outcomes and allows the client to identify occupational areas they are experiencing difficulty.

Time: 10-20 minutes

Guide Authors Recommendation: This assessment is recommended to be used complimentary with the practice guide to provide client-centered care and find where the client feels they are experiencing the most occupational performance deficits. The use of this assessment measures not only the occupations but can assist to determine what environment the deficits occur. This is congruent with the use of the Person-Environment-Occupation model of occupational performance in using the client's perception to increase outcomes and client's awareness of their performance.

Price: \$43.95

Source: <https://www.caot.ca/ebusiness/source/orders/index.cfm?task=0>

### **Person-Environment-Occupation Model of Occupational Performance (PEO) Memory Aid**

Purpose: This memory aid is to be used by occupational therapists as another means to organize information for the occupational profile. It includes questions that are used to analyze events that are meaningful and relevant to the client as viewed by the PEO model.

Time: 10-20 minutes

Guide Authors Recommendation: This memory aid is recommended to be used while creating the occupational profile. The memory aid is a helpful tool for an OT as a means of integrating all of the elements of the PEO theory into practice.

Price: \$44.02 [www.amazon.com](http://www.amazon.com) (the memory aid is included in: *Using Occupational Therapy Models in Practice: A Field Guide*).

Source: Turpin, M. & Iwama, M.K. (2011). Using occupational therapy models in practice: A field guide. UK: Elsevier.

Sources:

Asher, I.E. (2007). Occupational therapy assessment tools: An annotated index (3<sup>rd</sup> ed.). Bethesda, MD: AOTA Press.

# *Symptom Log*

The symptom log was developed for the occupational therapist to give to the client to document symptoms that occur during their day. It should be used during the intervention phase of treatment. The symptom log includes the symptom, date, time, what activity the client was doing when the symptom occurred, environment where they were when the symptom occurred, and other things that were going on when the symptom started.

Person-Environment-Occupation Model of Occupation Performance: The symptoms are viewed as the *person* component of the PEO model. The occupation is documented in the activity/occupation “what were you doing” section and the environment is illustrated through the date and time, context/environment “where were you” and “what else was going on.” The tractions are exemplified through:

- Person x Occupation: documenting the symptom and activity/occupation (what were you doing)
- Person x Environment: documenting symptom and date and time, context/environment, (what else is going on)
- Environment x Occupation: documenting the date and time, context/environment (where were you), what else was going on and the activity/occupation (what were you doing)

## Symptom Log

*Please fill out this during your day when you experience a new symptom since your injury.*

Symptom	Date and Time	Activity/Occupation (What were you doing?)	Context/Environment (Where were you?)	What else was going on?
Ex. Headache	10/20 1:00p.m.	Doing homework	Living room in my apartment	Listening to music, TV on, and using the computer

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# Outcome Log

The outcome log is to be completed by the client as a way to measure their completion of goals and success of intervention. The client will fill in the date in which they engaged in the occupation and report what strategies they used to complete the difficult occupation and how successful it was. The occupational therapist will give the client this log to be completed in between therapy sessions and then the client will return the log at the next session. The transactive approach at the bottom of the log is for the occupational therapist to fill out in order to dissect the PEO transactions.

## Person-Environment-Occupation Model of Occupational Performance:

The outcome log is a way to view the interconnectedness of the person, environment and occupation. The log allows the client and therapist to view the occupation with all of the elements of the PEO model separately as well as a big picture in order to see what is inhibiting or facilitating occupational performance.

The *person* and *occupation* components can be seen in the “Area of difficulty” section as well as the “What did you do?” section. For example, in the “Area of difficulty” the symptom of “not being able to fall asleep” is listed which illustrates the *person’s* symptoms during a certain *occupation*. For the “What did you do?” area, it gives the client an opportunity to show what he/she did to influence an *occupation*.

The *environment* is viewed concretely as the client has the opportunity to describe the aspects of the environment where the occupation took place.

The outcome shows the transaction between all three person, environment and occupation components.

## Outcome Log

When a new routine has been established mark routine and date used and how successful you were implementing the new routine.

Date	Area of difficulty	Environment	Success/What did you do?	Outcome
<i>Ex.10-25</i>	<i>Not being able to fall asleep and stay asleep. Currently only getting about 4 hours of sleep.</i>	<i>Home</i>	<i>Turned off all electronics at least 1 hour before bed. Completed self-cares. Laid in bed and completed muscle relaxation and deep breathing exercises.</i>	<i>Completed 6 full hours of sleep.</i>

### Transactive approaches:

Person-Environment: \_\_\_\_\_

Person-Occupation: \_\_\_\_\_

Environment-Occupation: \_\_\_\_\_

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This section provides example goals, interventions, and goal writing format for the OT.

# Example Occupational Therapy Intervention & Goals

## O.T. Goals and Intervention Examples

### Areas of Occupation

#### *Activities of Daily Living (ADLs)*

##### Symptoms:

- Balance Impairment
- Dizziness
- Headaches
- Cognitive Impairments Affecting Safety

Problem Statement: The client demonstrates impaired balance which increases the safety risk while completing the ADL of showering.

Goal: By 2 days, the client will be able to verbalize 3 safety techniques to use while performing ADLs and functional transfers such as transferring in/out of the shower.

##### Intervention Examples:

- Balance interventions:
  - Reorganizing cupboards
  - Using the Nintendo Wii
- Education implementation of safety techniques while performing ADLs
  - Sitting down during dressing/showering
- Education on adaptive equipment that will aid in increased balance and safety
  - Grab Bars
  - Shower chair

#### *Instrumental Activities of Daily Living (IADLs)*

##### Symptoms:

- Difficulty remembering
- “Cloudy” thinking
- Depression
- Anxiety

Problem Statement: The client is having difficulty with the IADL of shopping due to forgetting items needed to purchase and lack of motivation due to depression and anxiety.

Goal: The client will be able to complete the IADL of grocery shopping with the use of visual memory aids by discharge.

Intervention Examples:

- Cognitive Intervention
  - Memory tasks
  - Managing a checkbook
  - Simulated grocery shopping
- Memory techniques
  - Visual memory aids-checklists
  - Assistive Technology
- Education on positive coping skills
  - Relaxation techniques
    - Deep Breathing
    - Yoga
    - Positive affirmation boxes
- Community outing to grocery store

***Rest and Sleep***

Symptoms:

- Difficulty falling asleep
- Fatigue
- Cognitive Symptoms

Problem Statement: The client has difficulty falling asleep which results in fatigue and impaired participation in daily occupations.

Goal: By discharge, the client will implement a healthy sleep routine for at least 5 days in a row in order to decrease fatigue.

Intervention Examples:

- Educate the client on relaxation techniques.
  - Breathing techniques
  - Progressive muscle relaxation
  - Visual imagery
- Create a healthy sleep routine.
  - Sleep routine log
- Education on environmental modifications to facilitate rest and sleep.
  - Lighting, temperature modifications
- Education on energy conservation techniques.

## ***Education***

### Symptoms:

- Difficulty paying attention
- Difficulty remembering things
- Difficulty learning new things
- Clouded thinking

Problem Statement: The client has difficulty paying attention in class, learning new things and remembering to complete assignments which is affecting his/her grade.

Goal: Prior to discharge, the client will utilize a planner to write down assignments and other important notes for one week.

### Intervention Examples:

- Cognitive Interventions
  - Memory tasks
  - Using pen and paper to take notes
  - Reviewing notes
- Educate the client on memory strategies
  - Creating lists
  - Use of a planner
  - Taking notes
- Environmental modifications
  - Sit in the front of the classroom
  - Highlighting or listing important topics/examples
  - Use of attentional or memory strategies

## ***Work***

### Symptoms:

- Fatigue
- Muscle Weakness

Problem Statement: The client is unable to perform the job task of lifting 50 pounds due to fatigue and muscle weakness.

Goal: By discharge, the client will be able to complete the essential job tasks of lifting 50 pounds.

### Intervention Examples:

- Increase muscle strength
  - Upper extremity, core, and lower extremity exercise
  - Taking out the garbage
  - Emptying salt into the soft water tank
- Increase endurance
  - Obstacle courses
  - Folding Laundry
  - Engage in heavier home tasks: vacuuming, making beds, washing floors, cleaning garage
- Education on energy conservation techniques
  - Proper lifting techniques
  - Sitting when completing activities
- Complete ergonomic assessment
- Job Analysis
- Educate employer about client's current condition and diagnosis

### *Leisure*

#### Symptoms:

- Visual Impairments
- Headaches
- Moodiness

Problem Statement: Due to multiple mTBIs, the client cannot return to meaningful sports.

Goal: By discharge, the client will identify two ways to stay involved in the sport without playing.

#### Intervention Examples:

- Identify community resources
  - Youth coaching
  - Statistician
  - Referee
  - Fundraising
- Positive coping strategies
  - Exercise
  - Pilates
  - Visual Imagery
  - Nintendo Wii
- Identify other positive leisure interests

- Interest checklists
  - Identify community resources
- Advocate the client's needs to coaches, supervisors or family members

### ***Social Participation***

#### Symptoms:

- Increased irritability
- Increased stress
- Increased anger

Problem Statement: The client's increased irritability, stress and anger are causing him/her to have verbal outbursts which are affecting the relationship with his/her significant other.

Goal: By one week, the client will be able to demonstrate three positive coping mechanisms to use when the client experiences heightened emotions.

#### Intervention Examples:

- Positive coping and anger management techniques
  - Spend time outdoors
  - Keep a journal
  - Healthy leisure activities
  - Healthy routines
  - Healthy eating
- Seek school or work support services
  - Minimize stressors
  - Positive coping strategy usage
  - Use positive communication techniques



## Goal Writing

Goals were created using the RHUMBA method.

R- Relevant/Relates

H-How long

U-Understandable

M-Measureable

B-Behavioral

A-Achievable

Other methods of goal writing include: ABCD (Audience, Behavior, Condition, Degree), FEAST (Function, Expectation, Action, Specific Conditions, Timeline) and SMART (Significant/Simple, Measurable, Achievable, Related, Time-Limited)

Additional information regarding these methods of goal writing can be found in:

Sames, K. M. (2010). Documenting occupational therapy practice(2<sup>nd</sup> ed). Upper Saddle River, NJ: Pearson Education, Inc.

### Sources:

American Occupational Therapy Association (2008). Occupational therapy practice framework: Domain and process (2<sup>nd</sup> ed.) *American Journal of Occupational Therapy*, 62, 625-683.

Sames, K. M. (2010). Documenting occupational therapy practice(2<sup>nd</sup> ed). Upper Saddle River, NJ: Pearson Education, Inc.

This section provides the OT with a description of a client and a completed symptom checklist, occupational profile, symptoms log, outcome log and example goals and interventions

## Case Study

## CASE STUDY

John is a 22 year old who attends the local University. John is majoring in computer science and plays football on the University team. One week ago, during football practice, John took a hit to the head. John's coach took him to the emergency room as he noted increased confusion. John had post-traumatic amnesia for 30 minutes and a score of 14 on the Glasgow Coma Scale. He was diagnosed with an mTBI. John has reported ongoing symptoms including headache, nausea and vision impairments that are affecting his participation in daily occupations. John was referred to occupational therapy for evaluation and treatment of post-mTBI symptoms.

The occupational therapist used the practice guide *An Occupational Therapy Practice Guide for Sports-Related Mild Traumatic Brain Injury in Young Adults* to direct evaluation and intervention planning.

Name: John W.

Today's Date: 9-2

Age: 22

Injury Date: 8-26

How Injury Occurred: during football practice; was hit in the head

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.

John's responses are as follows:

### Physical Changes

	No difference	Mild difference	Moderate difference	Severe difference	
• Tiredness	0	<u>1</u>	2	3	
					<u>Reading for class causes increased tiredness more than normal</u>
• Vision Changes	0	1	<u>2</u>	3	
					<u>Double vision when completing assignments on the computer or reading off the board in class or studying plays from playbook</u>
• Muscle Weakness	<u>0</u>	1	2	3	
• Headaches	0	1	<u>2</u>	3	
					<u>When getting ready for bed or doing computer programing assignments</u>
• Dizziness	0	<u>1</u>	2	3	
• Sleep difficulties	<u>0</u>	1	2	3	

- Balance Affected                      0      1      2      3  
\_\_\_\_\_
- Stomach aches or nausea            0      1      2      3  
Doesn't feel like eating  
\_\_\_\_\_
- Numbness/Tingling                    0      1      2      3  
\_\_\_\_\_
- Hearing/Speech difficulties          0      1      2      3  
Around loud noises it causes increased headaches and difficulty focusing  
\_\_\_\_\_

Other physical (body) changes you have noticed \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### Cognitive Changes

- Paying attention                      0      1      2      3  
Becoming distracted during class and team scouting  
\_\_\_\_\_
- Remembering                          0      1      2      3  
Unable to remember when team practices and new class assignments are due  
\_\_\_\_\_
- Clouded Thinking                      0      1      2      3  
\_\_\_\_\_
- Learning New Things                0      1      2      3  
Unable to retain information presented in lecture in class, frequent headaches following class  
\_\_\_\_\_
- Decision Making                      0      1      2      3  
\_\_\_\_\_

Other cognitive (mind) changes you have noticed: Getting lower scores on assignments and taking longer to complete assignments  
\_\_\_\_\_

### Emotional Changes

- Feeling sad/depressed                0      1      2      3  
\_\_\_\_\_
- Nervous                                  0      1      2      3  
\_\_\_\_\_
- Stressed                                  0      1      2      3  
Wanting to return to his previous position on the football team  
\_\_\_\_\_

- Angry 0 1 2 3

---

- Irritable 0 1 2 3  
Difficult to watch practice and not participate

---

- Moodiness 0 1 2 3

---

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.

Completing homework in a timely fashion (needs increased amount of time). Being able to spend time on the computer without having blurred vision. Not being able to participate in football games and having headaches due to the loud noises of the fans.

---

## Occupational Profile

**Reason for Services:** Sports-Related mTBI during football practice.

**Medical History:** Right ankle fracture over 2 years ago. No known allergies. No previous history of mTBI.

### *Environmental Aspects*

**Lives (alone, spouse):** with roommate

**Notes:** John lives in an apartment building on the first floor and shares bathroom with his roommate. John has a regular bathroom set-up.

**Common Environments** (Physical, Social, Institutional, Cultural): Apartment, Classrooms, Computer lab, coffee shop, football field/locker room.

*Meaningful Occupations*

**Sport(s):** College Football player, plays golf/Frisbee for leisure

**Work/School:** Computer Science major, currently not employed

**IADLs:** Money management (pays rent and tuition, manages loans)

**Leisure/Social Participation:** Golf, enjoys hanging out with teammates and friends

*Summary of Occupational Performance*

**Successful Areas of Occupation following injury:** Being able to continue to pay bills, and complete meal prep and clean up around the apartment.

**Affected Areas of Occupation following injury:** Homework, playing football, Frisbee, hanging out with large groups of people.

**Impaired Client Factors & Performance skills:** Attention during class and team film, remembering to complete assignments, controlling emotions about not being able to participate, headaches, nausea, organizing school work, engaging in social activities

**Environments supporting occupational performance:** Quiet apartment, campus lounge areas, quiet football locker room

**Environments inhibiting occupational performance:** Classroom, football field, crowded coffee shops, cafeteria

**Client's Personal Goals:** Return to playing football (practice, film scouting, reading plays, etc.). Be able to learn information being taught in class through lecture and complete assignments on time. Return to social activities with friends and teammates.

## Symptom Log

*Please fill out this during your day when you experience a new*

Symptom	Date and Time	Activity/Occupation (What were you doing?)	Context/Environment (Where were you?)	What else was going on?
Headache	9/3 1:00p.m.	Doing homework	Living room in my apartment	Listening to music, TV on, and using the computer
Double Vision	9/4 8:20a.m.	Note Taking	Web Design Class	Lecture on a PowerPoint Projector
Stressed/Irritability	9/4 3:30p.m.	Football Practice	Film Room	Coach Discussing Game Film, Plays from previous game
Dizziness	9/5 9:00a.m.	Walking to class	Outside Around Campus	Birds Chirping, Lawn Mowers, Students in the Hallway and sidewalks
Difficulty Sleeping	9/5 10:00p.m.	Getting Ready for Bed	Bedroom at Apartment	TV from Neighbors, Roommate playing Videogames, Light in Bathroom

## Intervention Plan

The client is a 22 year old male who is diagnosed with an mTBI. The client is a collegiate football player and reports increased difficulties in the following symptoms: tiredness, blurred vision, dizziness, nausea, attention, remembering, learning new things, stress, and irritability. The client would like to return to play, classroom learning, and engage in his social activities again.

Problem Statement: John uses his computer to take notes during class and has a difficult time attending to the professor due to increased headaches, blurred vision and distraction of other students in the room.

Goal: By one week, John will develop 2 school-related adaptations in order to increase his learning.

### Interventions:

- John will use pen and paper to take notes to avoid excess light from his computer screen.
- John will sit in the front of the class to avoid attending to other students sitting in front of him.
- John will enroll in University's support services.
- John will contact his instructor on having paper copies (if available) of information presented during lecture to review on his own time.

Problem Statement: John is currently unable to return to playing football due to current symptoms following his mTBI which is also causing increased stress.

Goal: Within two days, John will be able to identify 2 strategies in order to decrease the amount of stress from not being able to participate in football practice and games.

### Interventions:

- John will complete a list of ways in which he can effectively relieve stress. Examples: going for a walk, call plays during practice
- John will complete relaxation techniques. Examples: visual imagery (going through football plays), progressive muscle relaxation

Following completion of John's goals a new symptoms checklist will be completed to evaluate the effectiveness of John's treatment and develop new goals if necessary.



Sources:

American Occupational Therapy Association. (2008). Occupational therapy practice framework: Domain and process (2nd ed.). *American Journal of Occupational Therapy*, 62,625–683. Golisz, K. ( 2009). Occupational therapy practice guidelines for adults with traumatic brain injury. Bethesda, MD: AOTA Press.

## Outcome Chart

When a new routine has been established mark routine and date used and how successful you were implementing the new routine.

Date	Area of difficulty	Environment	What did you do?	Outcome
9/4	Not being able to fall asleep and stay asleep. Currently only getting about 4 hours of sleep.	Apartment-Bedroom	Turned off all electronics at least 1 hour before bed. Completed self-cares. Laid in bed and completed progressive muscle relaxation and deep breathing exercises.	Completed 6 full hours of sleep.
9/5	Feeling irritable due to not being able to participate in football and difficulty falling asleep and staying asleep.	Apartment-Bedroom	I could hear the neighbors TV and I didn't close my door and was able to see the bathroom light on.	Completed 4 full hours of sleep.
9/6	Falling asleep and staying asleep.	Apartment-Bedroom	Made sure all lights were off in the apartment, turned off all electronics about 1 hour prior to bed. Laid in bed and completed progressive muscle relaxation and visualization of current football plays.	Completed 7 full hours of sleep.

### Transactive approaches:

Person-Environment:Physical fatigue causing stress due to John's room context.

Person-Occupation:Physical fatigue causing stress resulting in John having a difficult time going to sleep.

Environment-Occupation:John's bed next to the connecting neighbors wall preventing him to sleep when there are loud noise.

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## CHAPTER V

### SUMMARY

Each year, approximately 1.7 million people sustain a mild traumatic brain injury (mTBI) in the United States (CDC, 2013). According to the Center for Disease Control and Prevention, as much as 15% of people diagnosed with mTBI may experience persistent disability (Marshall, Bayley, McCullagh, Velikonja & Berrigan, 2012). This supports the evidence that individuals who sustain an mTBI may experience difficulties participating in their everyday occupations (Berrigan, Marshall, McCullagh, Velikonja & Bayley, 2011; Erez et al., 2009). Consequently, the evidence illustrates the need for occupational therapists (OT) to be included on the team to work with individuals who have sustained mTBIs; however, due to a lack of practice guidelines and clinical research of this population, the OT role is unclear. Therefore, there is a need to define the role of the OT in serving delivery for individuals with mTBI.

A literature review was conducted to investigate further information regarding mTBI. It was found that playing sports increased the risk of sustaining an mTBI (Doolan, Day, Maerlender, Goforth, & Brolinson, 2012); between 1.6 and 3.8 million individuals sustain a sports-related mTBI in the U.S. each year. The majority of the literature regarding mTBI focuses on the pediatric and adolescent populations illustrating a gap and a need for attention directed toward the young adult population. This population should not be overlooked because it is a critical time for beginning the formation of new relationships and transitions into new roles.

To fill the gaps in the literature and the need to define the OT role in mTBI, the authors created an *Occupational Therapy Practice Guide for Sports-Related Mild Traumatic Brain Injury in Young Adults*. This OT practice guideline is intended to be used for those who have sustained a sports related mTBI and are young adults between the ages of 20-40 years. This guide has been designed to be utilized by OT practitioners who work with this specific population. The product is guided by the Person Environment Occupation (PEO) model of Occupational Performance (Law, Cooper, Strong, Stewart, Rigby, & Letts, 1996) and provides the OT with therapist and client education materials, assessment recommendations, secondary/tertiary prevention materials, a case study, and example goals and interventions. The OT role is defined in the guide to help the OT be able to understand the clinical reasoning and activity analysis associated with mTBI. The guide is set up with the recommended procedure but is able to be adapted based on the client needs and the OTs clinical judgment.

The practice guide includes many beneficial resources for OTs, however there are a few limitations. For example, the product is specific to sports-related mTBI and young adults. Therefore, the resources in the practice guide are created for this specific population and do not address the pediatric, middle or older adult population, particularly non-athletes. Another limitation is that the PEO model does not have any specific assessments to guide the evaluation process or include in the guide. Additionally, the guide has not been yet used in practice; therefore the efficacy of the product is unknown at this point.

Based on the evidence, this practice guide may be able to fill the gaps in current OT and rehabilitation literature. In addition, it will identify the role, need, and resources

for an OT to use with the intended population. In order to promote the practice guide, the authors suggest that the product be used within appropriate facilities to assist in determining the efficacy. The product is to be presented to potential users during a poster presentation at the University and/or regional level. Overall, the authors feel that the future recommendations include conducting future research and using the practice guide within practice setting.

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