Occupational therapy's role in sport: a website on promotion and education for OT's and coaches

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Occupational Therapy’s Role in Sport: A Website on Promotion and Education for OT’s and Coaches

by

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A Scholarly Project

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This Scholarly Project Paper, submitted by Alison Host, MOTS and Kaitlin Mankie, MOTS in partial fulfillment of the requirement for the Degree of Master’s of Occupational Therapy from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

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Department: Occupational Therapy

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ABSTRACT

**Purpose:** The number of individuals participating in the sport of hockey is on the rise. This rise in popularity also means the risk of injury becomes greater. Occupational therapy (OT) works to provide a holistic and client-centered approach when treating individuals that can allow them to return to play safely and effectively. However, OT is not commonly thought of when assisting in the treatment of hockey player injuries. Due to OT not being commonly utilized in the area of hockey-related injuries, such as concussion and the upper extremities, there is also a lack of literature to provide further insight into the effects of OT services.

**Methods:** A extensive literature review was done in order to gather sufficient information on the topic. Librarians at the University of North Dakota’s School of Medicine were utilized in order to obtain literature and seek education in copyright regulations for the product. The databases used to conduct the literature review included Sportdiscus and Cinahl. The authors also reached out to several NHL teams athletic trainers to gather information on use of OT with their player. The Person- Environment- Occupation Model was chosen to inform the product as it provides a holistic view.

**Product:** A website was designed using WordPress as the foundation in formatting it. The website is tailored to give occupational therapists information on the research done as well as possible assessment and interventions to utilize in practice. The website is also accessible for athletes, coaches and parents to explore in order to obtain information on what OT can offer. An electronic product allows for continuous updating as well as the
ability to reach a large audience. Additionally, the website is interactive, which allows for individuals to leave comments. Comments are encouraged for ideas for the site and how OT helped or not with athletes with hockey-related injuries.
CHAPTER I
INTRODUCTION

Rationale

Whether participation be for competition or for leisure, injuries in sports are inevitable. With just around 30 million individuals participating in some kind of sport, the need for prevention, management and treatment of injuries is a necessity (standfordchildren.org, 2017). Occupational therapy (OT) is science-driven, evidence-based and provides a unique aspect in the treatment of injuries by taking a holistic approach (Reed, 2012). Occupational therapists are versatile in their scope of practice and obtain the ability to provide many different types of treatment and education to athletes. For the purposes of the following scholarly project, only one sport was focused on in order to explore OT’s role with sport specific related injuries.

With just short of 650,000 people including coaches, players and officials in the sport of hockey, the potential for injury is high (usahockey.com, 2017). That number continues to increase as does the demands in which the sport places on the need for a quick recovery. There are several professionals contracted to a hockey team’s rehabilitation team however, occupational therapists are not recognized (Singah & Watson, 2017).
Current research is limited as to what OT can provide in terms of treating hockey-related injuries. With the two most common injuries being concussion and upper extremity injuries, there are many treatment options for occupational therapists to utilize in order to address these injuries (Fait et. al, 2013 & Harmon et. al, 2013). However, there is a lack of knowledge of OT’s role throughout the hockey community. An easily accessible means of educating occupational therapists, players, coaches and parents of OT’s role with hockey players would be beneficial in the treatment and prevention of hockey-related injuries.

**Theoretical Framework**

The person, environment, occupation (PEO) model was used as a guide to form the intervention ideas found on the website as this model takes a holistic look at the injured athlete. Occupational therapists can use the website to explore examples of how their practice with hockey players can be shaped using the PEO model. The website encourages use of this model in order to give occupational therapists a look into all of the factors that impact a hockey player’s performance following an injury. This model not only allows occupational therapists to look at the factors affecting performance, but also the athlete’s other daily activities. Factors may be missed if a theoretical framework is not followed, which could cause a higher chance of further injury and a longer period of time out of play.

The first factor contributing to the PEO model is the person. Within the model, the person is made up of affective, physical, and cognitive components. The affective aspect of the person is made up of the emotions one experiences. The physical aspect is
made up of the physical tasks that are required for the sport and the cognitive aspect is made up of all mental tasks. The second factor contributing to the PEO model is the environment. Within the model, the environment is made up of the social, physical, and cultural aspects. The social aspect includes the people the athlete interacts with. The physical environment is made up of the physical characteristics that make up the person’s natural environments. Lastly, the cultural aspect is made up of the culture’s characteristics and what is considered meaningful. The final factor of the model is occupation. An occupation is defined as any activity that occupies time and brings meaning and purpose to one’s life (AOTA, 2014). Within the model, the focus is on the meaning and value the occupation gives to the person. It also focuses on how the occupation fits within the person's daily routine and lifestyle.

Research shows that during rehabilitation of common hockey-related injuries, the main focus is put on the quickest way to decrease injury (Reed, 2011). However, without the consideration of all of the previously listed factors, the person's overall health and well-being may be negatively affected. By analyzing all of the previously listed factors in relation to a hockey player and their injury, one is able to look at more than just the rehab of the physical injury. The occupational therapist is also able to look at prevention of further injury and how one's mental health may be impacted. By combining all of these factors and focusing treatment on more than just the physical rehabilitation of the injury, statistics regarding significant hockey-related injuries could be decreased.
**Statement of the Problem**

The authors found a significant lack of research on occupational therapy in sport, more specifically, with hockey-related injuries. Throughout the process of this scholarly project, the authors found that there is a general lack of knowledge on occupational therapy and what it can bring to the treatment of any type of sport-related injury. With the continual rise in the popularity of hockey and the number of injuries that occur, a deeper look into what more can be done for the safety of these athletes is necessary.

**Importance of the study**

The following scholarly project allows for many individuals involved in the sport of hockey to examine how OT can be beneficial in the treatment of hockey-related injuries. A website was created to allow occupational therapists access to a tool for holistic and client-centered interventions for treatment sessions as well as access to literature for reference on the research completed. Lastly, it gives individuals an opportunity to voice their concerns about the research or interventions provided, or just to pose any ideas or questions for others. It is a versatile, easily accessible, modifiable and unique way to approach distribution of interventions and research. The project is also important as there is a passion that lies within the authors to work to keep athletes safe and prevent time away from their meaningful activities. In the future, the authors hope to expand the website and research to include other sports in order to help a greater number of people.
CHAPTER II
A REVIEW OF LITERATURE

Participation in sports is valued by many and fundamental amongst many cultures. Whether an individual is participating in a sport as a form of play, leisure, work, or social participation, sports can make a major impact in the lives of many. In the United States, there are approximately 30 million teens and children who participate in some kind of sport (standfordchildren.org, 2017). Of these 30 million children, about 3.5 million injuries are endured each year (standfordchildren.org, 2017). Although not all injuries are serious, many require some type of rehabilitation for recovery. Most high school sports have only an athletic trainer on staff and many youth sports teams have no immediate healthcare professional available, leaving the parents to find a way for their children to receive services. A typical rehabilitation team for a professional sports club consists of a doctor, physical therapist, and athletic trainer with a recreational therapist as another possible professional (Singh & Watson, 2017). In some cases there are podiatrists and massage therapists as well.

Hockey is a sport well known to the United States and can be played at almost any age. In the 2016-2017 season, it was recorded by USA hockey.com that there were
approximately 634,744 people between players, coaches, and officials involved in the sport. With the increasing number of individuals participating in hockey, there comes the possibility of more injuries for all involved. The growing demands of individuals participating in the sport promotes a need for a quick recovery and an importance is placed on ensuring players are getting individualized and holistic care.

Occupational therapy (OT) is an evidence-based and science driven profession. OT provides rehabilitation services to individuals by uniquely designing treatment around activities in which a person finds meaning. Research has shown that this perspective is important for preventing, treating, and maintaining well-being of individuals with many different types of injuries (Reed, 2012). Focusing on an individual’s meaningful activities such as sports, an approach that is holistic, or utilizes mind, body, and spirit, can be provided to aid in a decreased recovery time and also to work on preventing sport related injuries.

Occupational therapists utilize practice models as a way to guide treatment and create individualized intervention plans that incorporate a client’s meaningful occupations. There are many models that have been created to inform and guide the practice of occupational therapists. In order to choose a model, the occupational therapist must look at all aspects of a person, the environment, and the task to determine the practice model that creates a best fit for an individual's treatment (Hinojosa, Kramer, & Brasic Royeen, 2017).

When looking at a hockey player, it's important to consider the interactions between the person, the environment, the occupation of hockey, and their positive or negative impact on a player’s performance. In order to analyze these components and
guide treatment, the Person, Environment, Occupation (PEO) model can be utilized. This model considers each element and their interactions with one another in order to determine occupational performance outcomes (Hinojosa, Kramer, & Brasic Royeen, 2017). When looking at the aspect of a person, Reed (2012) proposed an examination of the elements of a hockey player and determined that hockey has a core set of skills needed to play the sport. The player needs to establish and maintain skills that include upper and lower body coordination, strength, agility and the ability to respond to stimuli in a rapid fashion. These skills also include being able to simultaneously perform physical, cognitive, and affective tasks during a game. Physical tasks of the sport include stickhandling and skating, while cognitive tasks include responding to teammates, coaches, referees, rapid decision making, and defensive responses (Reed, 2012). Additionally, affective responses include regulation of emotions such as excitement or agitation both within and around the person during a game. An occupational therapist will assess all these areas of the person through evidence based assessment to develop a plan. This plan will work to create less emotional turmoil and keep the individual's skills maintained for a quick return to play.

The environmental context of the PEO model includes a variety of factors. The social environment includes spectators, coaches, and other players. The ice, boards, high speeds, indoor arena vs. outdoor rink, and contact with others are aspects of the physical environment (Fait et. al, 2011). Cultural environment also involves the cultural atmosphere in which the sport is being played in. This includes how much emphasis the culture puts on aggression and physicality in the sport (Reed, 2012). Fait et. al (2013) found that an assessment of the environmental factors is important even if the athlete is
within normal limits on clinical evaluations and verbalizes an absence of symptoms (Fait et. al, 2013). Without looking at how an individual interacts within their environment, it is difficult to understand how all factors of the individual can affect one’s ability to participate in sport and prevent injury.

An occupation is the last aspect of PEO and can be defined as any activity that occupies time and brings meaning and purpose to one’s life (AOTA, 2014). The reasons for participation in the occupation of hockey can come from fulfillment, social interaction, connectedness, self-expression, or feelings of joy and satisfaction (Hinojosa, Kramer, & Brasic Royeen, 2017). Hockey provides not only physical activity to the players, but creates habits, roles, and routines that can bring meaning and structure to the players that find value in the sport (Hinojosa, Kramer, & Brasic Royeen, 2017).

Although there is an emphasis on the interactions between the person, environment and occupation, literature fails to address these interactions in relation to overall performance and participation after a hockey injury. Reed et. al (2016) presented a lack of research in a player’s task performance in play following a concussion. The authors determined that there was a decline in occupational performance of hockey related tasks completed in treatment, which could ultimately contribute to further injury (Reed et. al, 2016). This research focused on the personal aspects of the PEO model that affect performance after an injury. Therefore, the research leaves out the analysis and effects that the environment and occupation had on the occupational performance outcomes. Eastman and Chang (2015) discuss the lack of research with incorporating the environment into treatment. In the rehabilitation process, areas in which a person is spending his or her time and the factors that may affect their participation in activities
must be taken into account. A gap in literature discussing habits, roles, and routines was found in that individuals form from participating in hockey as well as the meaning in which it could bring to someone. The effect that the occupation’s meaning can have on one’s health and well-being is yet to be considered (Hinojosa, Kramer, & Brasic Royeen, 2017).

The meaning behind participation in hockey can also come from the social aspects of the sport (Reed, 2011). Due to this, Stein et al. (2016) discussed the role of social supports in sports and how they can affect one’s performance. However, there is a lack of literature relating to what OT can do to address these social aspects of recovery or the role it plays in prevention of a hockey related injury.

The injuries associated with sports, specifically hockey, include concussion, brain injury, visual field injuries, spinal cord injuries, and motor skill injuries. These are all injuries that occupational therapists commonly work with in treatment. However, the literature shows OT is still not commonly thought of as a component of a sports rehabilitation team (Reed, 2011). Since OT is not associated in this area, there may be a lack of education within hockey concerning what occupational therapists can do to help meet their needs and goals. According to research, it is important to look at an interdisciplinary approach involving OT with sports related injuries as being beneficial to aid in the recovery of athletes (Stephens, Williamson, & Berryhill, 2015).

**Occupational Therapy with Hockey Players**

Many injuries can occur when participating in hockey. Two of the most researched hockey related injuries are concussions and injuries to the upper extremity. Studies conducted do not focus on the rehabilitation of these injuries in relation to sport-
specific treatment. However, the information gained from the current research can be used to design treatment interventions that utilize hockey-related tasks. When looking at someone who has had a concussion, it is important to look at the physical, cognitive, and visual deficits that may have occurred. In addition, the environment and all meaningful occupations need to be incorporated into treatment for a complete recovery. This can be achieved through client-centered and evidence-based assessment, interventions, and outcomes.

**Concussion**

There are an estimated 1.6 to 3.8 million sport-related concussions that occur in the United States annually at professional and amateur levels, making it one of the most common injuries (Fait et. al, 2013 & Harmon et. al, 2013). The effects of a concussion can significantly impact occupations other than participation in sports such as school participation and work. Occupational therapists have a role in the treatment and prevention of concussion injuries that aid in return to play and other meaningful occupations.

There have been multiple studies performed on the effectiveness of OT treatments with concussion. Previously, cognitive and physical rest were recommendations for treatment of a concussion (McLeod, 2010). However, a study by Buckley (2016) questioned how much rest and limiting participation in daily activities helped with recovery. Rest was questioned as sleep disturbance was found to be a symptom post-concussion (McAllister & Arciniegas, 2002). If rest and sleep are not addressed in treatment, it could lead to fatigue, depression, and other negative effects on the body. Buckley (2016) reported that recent studies are all leading to the same conclusion in
which active daily participation and attention to sleep disturbances are norms for treatment of concussive symptoms. The results of Buckley’s (2016) study show that participation in activity is important for recovery after a concussion, however symptoms may still be interrupting one’s ability to participate. This is an area in which OT could play a role in discovering ways to aid the individual in maintaining daily participation in activity.

A study conducted in adolescents post-concussion utilized active interventions such as gradual, closely monitored light aerobic exercise, general coordination exercises, mental imagery, reassurance, normalization of recovery, and stress/anxiety reduction strategies (Gagnon et. al, 2016). Through these interventions, Gagnon et.al (2016) found that there was a significant decrease in post-concussive symptoms. The participants also had decreased fatigue and improved mood after six weeks of the interventions (Gagnon et. al, 2016). The study concluded that graded light intensity exercise in the period following concussion is safe, feasible and appears to have a positive impact on adolescent functioning (Gagnon et. al, 2016). OT intervention can play a role using these types of strategies in their interventions. Occupational therapists are trained in utilizing mental imagery and stress reduction strategies as well as use of light aerobic exercises.

Once post-concussive symptoms have come to an end, more energy can be expended (Reed, 2011). In the meantime, OT plays a role in maintaining participation in daily activities after a concussion is through education on energy conservation (Reed, 2011). Occupational therapists analyze each individual to determine areas in which physical and mental energy conservation techniques could be used to maintain participation in regular roles, routines, and activities. Energy conservation techniques
should be utilized in order to keep the individual from overexerting themselves and to prevent them from losing participation in meaningful activities. Maintaining an appropriate energy level for the stage of the concussion is important to prevent further post-concussive symptoms and for a decreased recovery time.

The focus of rehabilitation can be put on restoring skill performance in meaningful occupations once more energy can be expended. Reed et. al (2016) found that in youth, decreased strength performance was observed post-concussion with return to hockey-related tasks. A decrease was seen in handgrip strength, which is important for holding the hockey stick. A decrease was also seen in physical tasks, such as squat jumps, which are associated with ability to skate and interact with the other players on the ice (Reed et. al 2016). This decrease led to limitations in performance on and off the ice and predisposed the youth to further injuries.

OT addresses maintenance and restoration of the skills that lead to participation in daily activities by analyzing each individual person. Harmon et. al (2013) found that the type of sport, the players’ positions, and individual playing styles all contribute to the severity and prevention of a concussion. The symptoms and severity of a concussion are different among all individuals, so research has led to an emphasis on an individualized, client-centered approach to assessment and treatment. A generalized grading system and specific guidelines have been altered to an individualized assessment and management process. Research supports this individualized care in a multidisciplinary approach that includes neuropsychological testing (Stewart et. al, 2012). This development and push towards an individualized approach has led to the creation of technology that is fit to meet this need when assessing patients. One assessment that can be completed is the Nike
SPARQ Sensory Performance System. This is a computer based vision assessment that utilizes 10 sport-related visual and sensory performance skills to help develop an individualized sensory performance profile that presents an athlete’s visual strengths and deficits. (Poltavski & Biberdorf, 2014). The system analyses data from the athlete’s performance and converts it to normative data to compare athletes’ performance against each other (Poltavski & Biberdorf, 2014). Athletes are actively engaged in this assessment by using a hand-held Apple IPod Touch that is wirelessly connected to a computer monitor (Poltavski & Biberdorf, 2014). The Nike SPARQ Sensory Performance System tests visual clarity, contrast sensitivity, depth perception and target capture (dynamic visual acuity) (Poltavski & Biberdorf, 2014). The authors found that 69% of variance in goals made could be predicted by the player’s faster reaction time to visual stimulus, better visual memory, increased visual discrimination and increased ability to shift focus between near and far objects (Poltavski & Biberdorf, 2014).

Utilizing such assessment tools could be beneficial for occupational therapists in the development of interventions as results obtained can help to design evidence-based and client-centered treatments. Each assessment takes a closer look at the cognitive effects of a concussion as well as vision that are essential to consider alongside the physical effects. By using these assessments to determine the deficits at hand, a therapist can use the results to help develop an effective treatment plan.

A treatment plan consists of client-centered goals, interventions, and outcomes and is also evidence-based. Interventions not only need to include the return of physical abilities lost post-concussion, but also cognitive and visual abilities. Schwab and Memmert (2012) concluded that certain visual and/or cognitive abilities that could be
affected post-concussion are retrainable. These abilities include peripheral perception and choice reaction time.

Research has shown that the combination of cognitive, physical, and vision interventions can also be effective. The Interactive Metronome (IM) is a tool designed to measure and improve neurotiming, which ultimately improves physical performance (interactivemetronome.com). Neurotiming is the neural impulses’ synchronization within the brain’s networks contributing to cognitive, communicative, sensory and motor performance (interactivemetronome.com). The IM is a computerized training tool that gives a person different auditory or visual stimuli that they react to through performing a certain movement. This initiation, stopping or switching of an action that occurs while using the IM is a phenomenon known as mental flexibility (Zoltan, pg. 289). Mental flexibility is a skill that is in high demand in the sport of hockey for shifting attention between players, offensive vs. defensive play, line shifts, processing the coach’s feedback, and to switch one's actions in a split second. As participation with IM continues, the individual sees the gradual increase in mental flexibility, visual processing and physical motor skills. With adequate knowledge in vision and its impact on the body while performing tasks, occupational therapists can utilize this tool in treatment as a way to increase neurotiming with hockey players. Settings can be adjusted to provide hockey players with stimuli mimicking a real game such as the sights and sounds as the players react. The tool can be used at time of evaluation to establish a baseline for the player and used continuously throughout therapy as activity-based treatment to improve skills. The FitLight Trainer is another tool that combines cognitive and vision intervention with physical interventions. This tool can not only increase an athlete's speed, agility and
precision, but also increases accuracy in their ability to process the stimuli in their visual field by measuring their reaction time. The FitLight Trainer contains eight luminous discs that are controlled by a tablet that is deactivated by full or nearby contact on disc (fitlighttrainer.com). The discs are programmed for athletes to visualize reaction time (fitlighttrainer.com). In a study done by Zwierko, Florkiewicz, Fogtman, & Kszak-Krzyżanowska (2014) it was found that when using the FitLight Trainer, athletes had a faster reaction time and shorter task execution time as compared to non-athletes. Additionally, they report that there are “marked differences” comparing elite athletes versus non-elite athletes in a variety of visual processing skills which include the of speed conductivity in the visual pathway (Zwierko, Florkiewicz, Fogtman, & Kszak-Krzyżanowska, 2014). Occupational therapists can utilize this tool to improve task execution, cognitive, and visual skills attaching discs to the corners of the hockey net. As the discs light up the players then shoot towards the illuminated light, occupational therapists can use this occupation-based activity to test reaction time and develop strategies to improve upon visual deficits.

It is important to look at specific skills and abilities that may decrease in an individual with a concussion, however, occupational therapists provide treatment in relation to other factors that may inhibit performance in occupations. McLeod and Register-Mihalik (2011) conducted a study on an individual’s symptoms post-concussion which had impacted school and social participation, and family life. The study found that concussion is typically evaluated by symptoms, balance, and cognition, but there is a lack of evaluation in other areas of individual’s lives (McLeod & Register-Mihalik, 2011). Stein (2016) reported that individuals who have had a concussion reported loss of activity
as the most detrimental part of the injury in comparison to the symptoms. Concussions have been shown to lead to anxiety, depression and have other psychosocial effects that greatly alter individual’s participation in occupations (Leddy et. al, 2012). Kontos (2012) determined that collegiate athletes showed a significant increase in depression 14 days postconcussion as compared to high school athletes. Due to this, a more comprehensive approach to concussion assessment involving physical, cognitive, emotional, social, and educational elements is necessary to lead to better management and treatment (Leddy et. al, 2012). Additionally, assessment of mood and emotional regulation is suggested as a way to monitor and enhance recovery. The combination of cognitive and emotional interventions have proved to be effective when working with someone post-concussion in speeding up recovery and giving a more complete treatment (Mateer, 2005). Since areas of cognition and emotion interact, it's important that they be addressed simultaneously in brain injuries of any severity (Mateer, 2005). Because OT provides holistic assessment and treatment for individuals, addressing depression, anxiety and how injuries impact other areas of life are all within the scope of an occupational therapist’s practice.

**Upper Extremity**

Secondary to concussion, the upper extremity is commonly impacted with game-ending injuries. An upper extremity injury requires a treatment plan as comprehensive as one for someone with a concussion. An occupational therapist will not only address the physical deficits from an upper extremity injury, but also emotional and psychological deficits. Although there is minimal research directly relating OT to addressing these components, the need is there as injuries continue to occur.
Many athletes, especially hockey players, face upper extremity (UE) injuries. These injuries not only put a decline in their participation in the sport, but also in their activities of daily living. The upper extremity includes injuries to the hand, wrist, elbow, and shoulder. Injuries in these areas can lead to a decrease in range of motion, fine motor, gross motor, and coordination skills. Keightley, Reed, Green and Taha (2013) explored hockey injuries in women at all stages of progression in the sport. The authors found that injury to the hand, wrist, elbow, or shoulder was one of the top three injuries that hockey players endure (Keightley, Reed, Green & Taha, 2013). The authors also found that the number of injuries sustained in women's hockey did not differ much from men's hockey even with the different restrictions for play (Keightley, Reed, Green & Taha, 2013).

Another study done by Moslener and Wadsworth (2010) found that injury rates were four to six times more likely to occur in tournament play as compared to regular season games in youth hockey. The risk of injury is shown to increase with age progression (Molsa, 2003). Moslener & Wadsworth (2010) found that the number of injuries peak through adolescence as body checking becomes introduced. The top injuries to this area of the body included fracture, sprain or strain, and dislocation (Moslener & Wadsworth, 2010). These types of injuries can lead to chronic pain and take time to heal which creates a lack of participation in the individual's occupations.

For hockey players, the acromioclavicular (AC) joint of the shoulder is the most commonly injured UE structure (Popkin, 2017). Non-operational treatment with any injury of the UE is the preferred treatment option. When this type of shoulder injury occurs, the initial treatment protocol is ice and a sling to be used for comfort. Depending on the severity of the injury, management can mean progressive range-of-motion (ROM)
exercises, strengthening, cryotherapy, and rest. However, research suggests that return to play requires full motion, normal strength, and minimal discomfort and any sort of damage in the shoulder creates a higher chance of reinjury or further injury.

A study done on non-operative management of shoulder instability found that 9 out of 10 hockey players were able to return to play the same season by meeting the criteria of full motion, normal strength, and minimal discomfort (Popkin, 2017). Six of the 10 required surgery at the end of the season (Popkin, 2017). However, return to play is measured by physical ability and what the individual verbalizes. This assessment is missing the emotional and psychological aspects that need to be assessed in order to understand if an individual is able to return to play. Athletes are able to return to play when their motivation and drive to participate is great, which contributes to the number of individuals returning to play earlier. Assessment utilizing observation of athletes performing hockey specific tasks has not been researched as a way to decrease this early return to play. Additionally, these assessments do not incorporate graded interventions to meet the individual’s level of function to work the muscles and manipulate parts of the body that will be used the most during play.

Occupational therapists can address upper extremity injuries through sport-specific interventions to assist individuals regain function and continue to maintain participation during recovery. Decreased performance in both cognitive and physical aspects of hockey related tasks can be seen with increased task complexity. A study by Fair et. al (2010) suggests that adding complexity to an environment influences hockey skill performance. Skating, stick-handling, and obstacle avoidance were all observed and analyzed in the study. Analyzing skill performance by performing meaningful
occupations is the core of OT. Occupational therapists have the ability and creativity to simulate environments as closely as possible to the real one. Performing hockey related tasks in a specific environment and analyzing the tasks by breaking them down to gross, fine motor, or coordination tasks, will give a better idea on how to grade tasks to meet the athlete’s level of function. From this, interventions can be made to build upon their coordination, motor, and endurance skills.

**Product**

In order to reach a large audience and have the ability to provide resources and information to all parties, a website is proposed to assist coaches, parents, athletes and occupational therapists in the treatment of hockey-related injuries. The website will be designed to provide coaches and parents with information and research on how OT can assist their athletes in a client-centered, evidence-based fashion. This will provide these individuals with background information on what OT can offer in terms of hockey related injuries as well as a resource for how they can aid in their athlete’s recovery.

The website will also be designed specifically as a resource tool for occupational therapists interested in an athlete's return to sports participation. This section of the website will provide therapists with evidenced-based and client-centered interventions for common hockey related injuries that can be used in practice. Intervention ideas as well as research to back up interventions will all be accessible for occupational therapists to use. The authors will also demonstrate the use of the PEO model as a way to assess individuals and center treatment towards all aspects of the individual and their sport.

In addition, the website will contain a comment section. This would allow for the authors to gather information from users on what assessment tools and interventions work
and which ones do not. Allowing comments would also let therapists, coaches and parents share their ideas or questions. The authors will check the comments periodically in order to gather data and contribute to the discussion.

Having a website that contains information for occupational therapists, coaches, athletes, their family members and other individuals associated with the sport of hockey gives the authors a means of distributing rich information in the treatment of hockey injuries. Displaying research and intervention options to thousands of people will not only provide many people with information on the topic, but it provides a means for occupational therapists, coaches, and parents to advocate the need for OT services within their team. Another benefit of having a website is that the information should never be outdated. An electronic product allows the authors to continuously update the website, as needed, to provide the most up-to-date research and interventions.

Synopsis

Hockey is a sport growing in popularity with individuals of all ages and skill levels (Popkin, 2017). There are high levels of contact which allows for serious injury to happen in an instant. Despite its growing popularity and the increasing number of injuries, research is still lacking in what OT can do to aid in an athlete's return to the sport after injury (Reed, 2011). Incorporating a rehabilitation program that focuses on evidence-based practice and client-centered treatment is key to ensure athletes are motivated to engage in rehabilitation. Additionally, doing further research in creating sport-specific, client-centered interventions has the potential to reduce the number of individuals requiring surgery after returning to play. In order to assess and fully understand if an individual is ready to return to play, a battery of assessments that
includes physical, psychosocial, and affective areas of a person is essential (Reed et. al, 2017). While assessing these areas, the environment should also be looked to determine how a person’s skills interact with the environment and influence performance. With the assistance of the PEO model, occupational therapists can ensure they are addressing all elements of the person, environment, and occupation (Reed, 2012). Once assessment has concluded, interventions can be formed to meet the needs of the individual. Although, interventions can vary greatly as every injury is different, they are designed to be unique for each individual. Therefore, further research is needed on the value of OT in specific sports and the assessments, evaluations, and interventions that can aid in recovery and prevention of injury. Forming a website to present current research and ideas is a valuable tool to ensure easy and timely access. The authors are provided with the opportunity to provide visitors with the most up-to-date research, assessment and intervention ideas. The website also allows for practitioners and coaches alike to share their own ideas, comments, or stories of how the information helped or hindered them. The authors wanted to design a tool in which interaction between occupation therapists, athletes and coaches is readily available to provide tips for a faster recovery and to get players back in the rink.
CHAPTER III

METHODOLOGY

The purpose of this chapter is to provide an overview of the process taken to form Occupational Therapy’s Role in Sport: A Website on Promotion and Education for OT’s, Coaches, and Athletes. The information below is described in the order in which it occurred to complete the product. The process of creating the product included an extensive review of literature that provided evidence of the need for it, determination of content needed within the product, meetings with a librarian, emails to professionals associated with hockey, emails to occupational therapists that work with athletes, and an evaluation of layout and content within the product.

Creating the product began with a review of the relevant literature that was conducted with the assistance of a librarian at the University of North Dakota School of Medicine and Health Sciences (UND SMHS). The authors determined search terms relevant to the topic that would reveal literature used to inform the formation of the product. The search terms consisted of: sports and OT, cognitive rehabilitation and OT, hockey-related injuries, concussion and OT, and upper extremity injuries and hockey. There was limited information found relevant to the topic after trying various terms and combinations of terms. Search engines utilized consisted of Cinahl and SportsDiscus. The combination of terms and search engines led to the finding of 74 articles. Additionally, data was gained through textbooks and additional web searches. The authors utilized the
Perspectives on Human Occupation textbook to gain further information on the use of the PEO model. Web searches consisted of interactivemetronome.com, fitlightrainer.com and king-devick.com. The focus of these web searches was on finding research relating to types of hockey-related injuries that occupational therapists work with, OT models used to inform practice with athlete injury rehabilitation, interventions associated with sports injury recovery, and the recovery process after sustaining a concussion or upper extremity injury.

Our web searches led us to finding articles based in Canada discussing the use of the Person-Environment-Model (PEO) model to inform treatment of hockey-related injuries. After reading the articles, it was determined that PEO would be utilized in the development of concussion and upper extremity injury assessment and interventions. PEO was chosen as the authors analyzed the physical, affective, and cognitive components of the person, the social, physical, and cultural components of the environment, and the occupational components of personal meaning, habits, roles, and routines related to participation in hockey. These areas can be addressed through the interaction of these elements that fit individual hockey players. Interactions can then be utilized to analyze one's occupational performance and any deficits that may be occurring. This information can determine if the athlete is returning to play before fully recovered. By determining a model, the authors were able to research further from the perspective of PEO and how it would inform practice.

The authors could then narrow down information obtained by utilizing critical review forms for assessing relevance, reliability, and credibility. Critical review forms showed which articles were relevant and informed the product and which did not. This
narrowed down the number of articles used to 26. Once the review of literature was completed, the authors went to the University of North Dakota’s writing center. One hour was spent with a professional to review grammar and formatting of the literature review.

To obtain further information, the authors contacted St. Cloud Orthopedic via email as well as two previous students from the University of North Dakota that specialize in sport-related injuries and concussion at Methodist Hospital in Minnesota. Emails contained a brief introduction to the purpose of the product and asked if the practicing occupational therapists had any additional insight to the topic. The authors received return emails from St. Cloud Orthopedic and from one of the currently practicing occupational therapists that specialize in sports-related injuries. The St. Cloud Orthopedic therapist that replied specialized in hand therapy and did not detail what is done in practice at that facility in regard to hockey-related injuries in hand therapy. Additionally, it was requested to be in contact with the other occupational therapists on site, however, there was no response. The occupational therapist from Methodist was not able to comment about her role with specifically hockey players, however, she did discussed her role working with people who have had a concussion. She described her work in adapting and modifying the environment to reduce symptoms related to a concussion.

Once all information and data was gathered the authors put together a PowerPoint presentation to present to a class of 21 second year occupational therapy students in an Assistive Technology class. The presentation contained the main points from the literature review, information about the authors product, and technology that is used as an intervention with the injuries discussed in the literature review. Presenting this
information worked to inform the group of students of the work of the authors and promote the use of the website. The authors were also able to gain feedback on the information and style of the presentation. The feedback gathered contained all positive remarks. The students provided feedback including, “very interesting with fun hands-on activities,” “awesome! I loved how you talked to us like peers,” and “loved the apps, the interactiveness, and the videos provided, very professional.” The feedback was used to confirm that the information and data gained from the literature review was relevant and informative.

Upon completion of the review of literature, the authors began development of a product. The product created is a website titled, *Sports Rehabilitation: Occupational Therapy’s Role with Hockey-Related Injuries*. The website was designed to provide information to coaches, athletes and parents alike on how OT can benefit players in the recovery of hockey-related injuries. More specifically, the website was tailored towards providing information on recovery from concussion as well as upper extremity injuries as these are the two most common injuries sustained in hockey. The website was also designed to provide occupational therapists with interventions that have an occupation-based approach.

In order to start the process of developing a website, the authors met with a librarian from UND SMHS. The purpose of meeting with the librarian was to receive guidance in selecting an appropriate foundational site. The meeting also consisted of education on copyrights and citations within the website. Information on copyrighting gained included the copyrights of videos and images to be displayed on the website. The librarian introduced websites to assist in finding images and information for the website.
such as Flickr, Pixabay, National Institute of Mental Health (NIMH) and Openi. Additionally, the librarian provided information on marketing of the website with the use of social media, the School of Medicine’s journal and through word of mouth.

During the meeting with the librarian, WordPress was chosen as the source to obtain the domain name and build the website. Within WordPress, the authors selected the format, images, the number of tabs, and overall design of the website. The format and colors of black and dark red were chosen to be professional and sophisticated yet inviting. Additionally, the authors chose pictures related to hockey to pose a sense of comfort and familiarity to those visiting the site. There are four main tabs on the site to provide navigation throughout. It was essential to provide tabs relevant to coaches, athletes and parents as well as a tab for occupational therapists. In addition, a tab with information on the authors was provided to allow visitors to gain information about who is behind the website and to give it credibility. Lastly, there is a tab to contact the authors for any questions, concerns or additional ideas.

Throughout the website, there are links provided to the literature review, YouTube videos relevant to the treatment of hockey-related injuries for occupational therapists, and additional tools to utilize in treatment. In order to gain additional information that would add to the credibility of the website, the authors reached out to UND’s men’s hockey head athletic trainer and various professional hockey teams via email seeking information on their association with occupational therapists, if any. At this time, the authors received responses from three professional hockey team athletic trainers. Two of these teams reported no use of an occupational therapist within their rehabilitation team, not have they used outside OT services. Another team reported that
they employ certified hand therapists for the rehabilitation of hand-related injuries. Information obtained from these teams will be utilized in the product to further present the opportunity for OT services within the sport. The authors are hopeful in receiving additional information from other National Hockey League (NHL) and the American Hockey League (AHL) teams in near future.

Once the previously described aspects of the website were laid out, information technology (IT) professionals at UND were contacted. The authors hoped to gain information on features of the website and to discuss any issues that may occur. The IT professionals were able to provide information regarding branding of the website as it is a school affiliated project, however they suggested that there was no need to add any affiliation with UND.

The authors reached out to the librarian to seek advice on marketing the website in the near future. The librarian gave the author’s contact information for the director of alumni and community relations at the UND SMHS. This contact was determined as useful to give the authors instruction on how to utilize the SMHS blog and various media outlets throughout the SMHS such as UND news to promote the use of the website. The librarian also suggested that the authors post links to the website on their social media pages in hopes of reaching family, friends, and a larger number of people that are involved in hockey.

The author's intended for chapter III to provide the reader with background information regarding the process used when developing chapter IV, the product. A literature review was conducted to determine current research on the topic and what research was lacking in regard to the product. Information gathered also helped determine
what was needed in the product to educate occupational therapists, coaches, athletes, and their families. The theory chosen to inform the treatment process of hockey players used in the website is presented in chapter IV. This chapter consists of a brief product description. The product (i.e. screenshots of the website pages) is located in the appendix, and will provide the reader with a look at examples of interventions and assessments that can be used by an occupational therapist in working with this population and a guide to educate coaches, athletes, and families on the use of occupational therapy services and what they should know in regard to hockey related injuries.
CHAPTER IV

PRODUCT

The product for the present scholarly project is a web-based design made to be easily accessible across a large population. Located in the appendix, are screenshots of the website created for a brief synopsis of its design. To view the website in its entirety, please visit the following website: www.occtherapyhockey.wordpress.com.
CHAPTER V

SUMMARY

The screenshots located in the appendix give a brief look at the online version of the website created for occupational therapists as well as others working with individuals who have sustained a hockey-related injury. The website was created due to the significant lack of research on OT interventions to treat hockey-related injuries, as well as a lack of education on what the profession can bring to those suffering from these types of injuries. The website created utilized the Person-Environment-Occupation Model (PEO) as these concepts work to create a holistic treatment process. The concepts of the model were integrated into the interventions selected and posted on the site to showcase how the model is being utilized throughout.

The project was designed to allow occupational therapists as well as coaches, parents, and athletes to have an easy and accessible means for education on what OT can bring to treatment. It was designed with therapists in mind to allow them to be able to retrieve intervention ideas for upper extremity and concussion injuries sustained by hockey players. It was also designed with coaches, parents, and athletes in mind to educate them on how OT would treat their injuries and still allow for them to be engaged in the sport they enjoy. For viewers convenience, both sections of the website will contain a link to the author’s full literature review. This will allow individuals to access
the research that developed the information found on the site. The authors also wanted to
give the website an inviting and discussion-like feel by allowing a comments section as
well as a contact page. This allows for anyone to share their ideas, questions, or concerns
for all visitors on the site or just for the authors.

There are several factors that contribute to limitations of the research and project
done. Primarily, there is a significant lack of research on OT practice and hockey-related
injuries. This created difficulty in being able to create valid and reliable interventions for
athletes. Secondary to that, there is a general lack of knowledge of the field of OT as a
whole. Due to the lack of research on OT’s treatment of hockey-related injuries, there are
few statistics and evidence on the effectiveness of OT treatment with athletes. Lastly, a
limited number of teams were contacted to determine their use of occupational therapists
for treating hockey-related injuries. As there were a small number of teams contacted,
there was an even smaller number of responses.

Based on the ease of access for the website, one of the main future actions is to
promote the website on a larger scale. The authors plan on posting the website’s link on
social media pages for others to look at and share on their own pages. Additionally, the
authors plan to reach out to UND’s School of Medicine and Health Sciences (SMHS)
marketing team for suggestions on marketing strategies for the site. The authors also plan
to contact the SMHS newsletter and online blog to request a slot for our website to be
posted there. Over time, the authors will begin to network throughout the field of OT and
the hockey community and the website will also be promoted through word of mouth.
Lastly, the authors have intentions of reaching out to more NHL, AHL, as well as local
community and school hockey leagues to seek out information on their use of occupational therapists. This will allow the authors to share and discuss the website to promote its use.

Development of the website will be ongoing as the authors continue to navigate and develop their careers. A web-based product was utilized to ensure the authors were able to keep it up to date with the latest information on OT and hockey-related injuries. It is the authors hope to expand the website to include research and interventions on other sports to allow it to be versatile and reach the needs of many individuals. The website will also continue its development through the feedback of others. It will be made a priority to accept the feedback given and add more research, interventions, or make changes as needed to ensure the site is up to date, valid, and most importantly useful to others.

As the project is in its early stages of research and development, there is potential to grow. It is with optimism that the website will be utilized as an effective tool to educate, promote and advocate for OT’s role in the treatment of sport-related injuries. While the product focuses on one sport, the interventions can be modified to fit any sport-related injury.
APPENDIX

Sports Rehabilitation
- Occupational Therapy for Hockey-Related Injuries -

Welcome!

Occupational Therapy (OT) is a form of rehabilitation that utilizes activities meaningful to individuals and incorporates them into treatment. It is our hope that with this site we are able to show you how research favors occupational therapists as an effective team member to help your hockey players heal and return to play!

“Let me start with issuing you a challenge: Do better than you are. Set a goal that seems unattainable, and when you reach that goal, set another one even higher.” — Herb Brooks

~ Header image: ~

Occupational Therapists

Welcome OTs!

Hover over the 'Occupational Therapists' tab above to find our intervention ideas. When you hover over "Interventions," select one of the options to explore concussion or upper extremity treatment ideas or PEO case study examples. Please leave comments!

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About

Hello and welcome to our site! Our names are Kaitlin Mankie and Alison Host, both graduate students in the Master’s of Occupational Therapy Program at the University of North Dakota. As part of the curriculum, we are to complete a scholarly project in our 3rd and final year of the program. We brainstormed several options before agreeing on one we knew we would be passionate about: sports. Having both grown up in the Midwest, both of us were exposed to the world of hockey from a very young age. That being said, we took our passion in sports and occupational therapy to do some research and make this website to share with the world! We hope to become pioneers in advocating for occupational therapists to become key players on rehabilitation teams across all sports, but are starting here with hockey.

We encourage coaches, players, parents and occupational therapists to share your feedback on our research, treatment ideas and voice your experiences with OT and hockey as well!

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Research

In the 2016-2017 hockey season, there were a total of 634,744 people between players, coaches, and officials involved in the sport of hockey (USA hockey.com). With the number of individuals participating in the sport increasing, it opens the door for more injuries to occur. With OT's unique perspective in utilizing a person's meaningful activities in practice, the evidence-based and client-centered profession is a must when it comes to treatment for hockey-related injuries. Occupational therapists assess all important aspects of the person, their environment and the occupation at hand in order to develop effective and individualized interventions (Hinojosa, Kramer, & Brasic Royeen, 2017).

The following link connects to a full review of present literature expressing the value of occupational therapy on hockey related injuries.

Literature Review

Interventions

Occupational Therapy is a profession that strives to provide clients with the most effective, client-centered, and occupation-based interventions. As concussion and upper extremity injuries are two of the most common hockey related injuries, we have provided occupational therapists with links, videos and research information on these injuries.

As you hover over the 'Occupational Therapists' tab above, then hover over 'Interventions' to find our treatment ideas for concussion and upper extremity

Share this:

- Press This
- Twitter
- Facebook
- Google

Like

See the post to like this.
Concussion

The PEO model was chosen to inform the choice of assessments and interventions. When working with an athlete that is recovering from a concussion, it is important to analyze the person, environment, and occupation to determine a more accurate representation of readiness for return to play. Below are assessments and interventions that the authors found to assist with the analyses of these components.

Assessments:

The King-Devick (K-D) test:

- can be used as a sideline assessment to evaluate processing speed, visual tracking, and saccadic eye movements in hockey players to determine the possibility of a concussion. (https://kingdevicktest.com/concussions/)
- Looks at the physical and cognitive aspects of the person component

Upper Extremity

Many upper extremity injuries can be treated without surgery, however, athletes may be returning to play too early, causing further damage and need for surgery. This keeps athletes away from meaningful occupations even longer which can create problems within the psychosocial aspects of the person as well. To prevent the need for surgery, a thorough analysis of the person, environment, and occupation is recommended after sustaining an upper extremity injury.

Assessment: Utilize interview and observation to gain information regarding the person, environment, and occupation

- Formal assessments of the physical aspect of the person include MMT, provocative testing, dynamometer testing, 9 hole peg test, etc
- Formal measurements of strength, dexterity, and coordination are necessary for assessment related to stick-handling and the ability to maintain endurance of upper extremity muscle use during play
- Interview questions to assess the athlete’s position in the game, how often he/she plays and meaning the athlete puts behind participation in the sport
- Examine DFO transactions under Upper Extremity tab above
Coaches and Athletes

Knowing the importance of returning to play in a reasonable amount of time, we recognize the necessity for an effective treatment plan. It is important during recovery to still engage in activities that are meaningful, which makes therapy so much better! We have researched treatment methods that will allow athletes to recover from concussions and upper extremity injuries in ways that are supported by evidence and will allow them to still engage in hockey-related activities in treatment.

Coaches and families are around their athletes often, therefore, are crucial to understanding symptoms and behaviors of the athlete. Your input and knowledge of typical patterns and routines of an athlete can help therapists to determine true recovery and make for a safer return to play.

Occupational therapists specialize in treating the person holistically. We look at all aspects of a person, their occupations and the environments surrounding them that may contribute to or hinder their recovery. We can help to treat physical injuries, assist with psychosocial limitations, and are experts in cognitive and visual rehabilitation. With our expertise in several areas of treatment, occupational

Contact

This is a contact page with some basic contact information and a contact form.

**Name** (required)

ocotheryphockey

**Email** (required)

ahot39@gmail.com

**Website**

https://ocotherapyhockey.wordpress.com

**Comment** (required)
PEO Interaction

**Example Case Study:** Jack is a 28-year-old male professional hockey player who recently sustained a concussion. He is experiencing difficulty performing hockey-related tasks at his previous level due to concussion symptoms including dizziness, slowed reaction time, headaches, visual deficits, and slowed decision-making and defensive responses. Jack identified his goal as returning to or increasing his hockey performance level and increasing his endurance to maintain his normal routine.

<table>
<thead>
<tr>
<th>Person</th>
<th>Environment</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affective</td>
<td>Social</td>
<td>Leisure</td>
</tr>
<tr>
<td>• More agitation during hockey related tasks</td>
<td>• Teammates, hockey staff (medical team, rehab team, etc), family</td>
<td>• Hockey, development of skills, workouts</td>
</tr>
<tr>
<td>• Limited coping strategies</td>
<td>Cultural</td>
<td>Work</td>
</tr>
<tr>
<td>Physical</td>
<td>• High cultural emphasis on aggression in sport</td>
<td>• Hockey (long hours)</td>
</tr>
<tr>
<td></td>
<td>ADLs</td>
<td></td>
</tr>
</tbody>
</table>

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**Example Case Study:** Jill is a 12-year-old female who participates in her community hockey league. She sustained a rotator cuff tear and has just recently been cleared for removal of sling. She is experiencing minor depression and a loss of performance ability in hockey-related tasks. Jill identified her goal as returning to playing hockey as soon as possible either at or greater than the performance level she had previously.

<table>
<thead>
<tr>
<th>Person</th>
<th>Environment</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affective</td>
<td>Social</td>
<td>Leisure</td>
</tr>
<tr>
<td>• Mild depression</td>
<td>• Family, friends, coaches, teammates, teachers</td>
<td>• Playing outside with peers, hockey</td>
</tr>
<tr>
<td>• Determined to play without pain</td>
<td>Cultural</td>
<td>ADLs</td>
</tr>
<tr>
<td>Physical</td>
<td>• Low emphasis on aggression</td>
<td>• Difficulty with self cares due to decreased ROM</td>
</tr>
<tr>
<td>• Unable to flex and abduct shoulder past 45 degrees</td>
<td></td>
<td>IADLs</td>
</tr>
<tr>
<td></td>
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REFERENCES


Interactive Metronome. (n.d.). Retrieved September 10, 2017, from https://www.bing.com/cr?IG=C936237B606745FBA7C9546D0A810939&CID=29D67C609693666A298B769997956756&rd=1&h=NHwmE_mSbNZp7VOkkFkLk-hMxeh0g8eLIO2xWMQsPCc&v=1&r=https%3a%2f%2fwww.interactivemetronome.com%2f&p=DevEx,5064.1


