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A school-based reintegration program for children with limb loss: the role of occupational therapy

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A SCHOOL-BASED REINTEGRATION PROGRAM FOR CHILDREN WITH LIMB LOSS: THE ROLE OF OCCUPATIONAL THERAPY

By

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Masters of Occupational Therapy, University of North Dakota, 2015

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This Scholarly Project Paper, submitted by Allison Sussman, MOTS and Samantha Hoy, MOTS in partial fulfillment of the requirement for the Degree of Master of Occupational Therapy from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

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A School-Based Reintegration Program for Children with Limb Loss: The Role of Occupational Therapy

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# TABLE OF CONTENTS

ACKNOWLEDGEMENTS ......................................................................................... iv

ABSTRACT ............................................................................................................... v

CHAPTER

I. INTRODUCTION .................................................................................................. 1

II. REVIEW OF LITERATURE ................................................................................. 6

III. METHODOLOGY .............................................................................................. 27

IV. PRODUCT ........................................................................................................... 29

V. SUMMARY .......................................................................................................... 114

REFERENCES ......................................................................................................... 117
ACKNOWLEDGEMENTS

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ABSTRACT

**Purpose:** The purpose of this scholarly project was to assist in treatment planning for school-based occupational therapists providing services to children who have suffered a traumatic limb loss. The goal of this scholarly project was to promote successful reintegration into the school setting as children with traumatic limb loss have been found to encounter difficulties returning to full participation in valued occupations including being a student and a friend (Michelsen, Van Wijk, & Ketelaar, 2010). There has been limited research conducted focusing on the role of occupational therapists when working with children in the school setting who have experienced traumatic limb loss.

**Methods:** A thorough literature review focused on the occupational therapists’ role in the reintegration process of children with limb loss into the school setting was conducted. Multiple databases were utilized when creating the literature review including: CINAHL, PubMed, OT Search, and Google Scholar. Textbooks and government websites were also used to gather additional information. Some key terminology used during the literature search included: “occupational therapy, school, context, amputation, limb loss, child, and integration”.

**Conclusion:** A manual was developed to guide the occupational therapy process when working with elementary-aged children with a traumatic limb loss in the school
setting. Guided by the Model of Person Environment and Occupation, the goal of this manual was to create a higher quality of life for the child with a limb loss by establishing a better fit between the student, the school environment, and his/her occupations.
CHAPTER I
INTRODUCTION

The school environment is one of the primary contexts where a large number of childhood occupations take place. The school setting is designed to provide children with the necessary tools for student success and preparation for the future by developing multiple occupational performance areas including education, activities of daily living, social participation, play, leisure, and work. Children that have experienced a traumatic injury resulting in limb loss may have difficulty meeting the challenges presented by the school environment due to the change in his or her functional ability and an increased reliance on others to complete daily activities (CDC, 2014). Occupational therapists (OTs) are equipped to assist individuals affected by limb loss, however, a large gap exists in the standardization of the types of services an OT delivers in the school setting once a child returns to his or her natural contexts following traumatic limb loss (Chen, Heinemann, Bode, Granger, & Mallinson, 2004; Dunn & Gardner, 2013; Fletchall, 2006a; Michielesen, Van Wijk, & Ketelaar, 2010).

Currently, in the United States there are approximately 2 million individuals living with limb loss with 111,600 of those individuals being children under the age of 18 (Ziegler-Graham, MacKenzie, Ephraim, Travison, & Brookmeyer, 2008; Hostetler, Schwartz, Shields, Xiang, & Smith, 2005). Children with limb loss encounter challenges
returning to full participation in previous occupations due to the physiological, psychological, and emotional changes that may occur with limb amputation (Smith, 2006). The lack of data defining the role of the OT in assisting the reintegration of a child with traumatic limb loss back to his or her school context was the primary focus of this scholarly project.

With a lack of research defining the role of the OT in the school setting for children with limb loss being the primary concern of this scholarly project, the goal was to create a product comprised of a comprehensive occupational therapy process focused on the interactive components of the child, the occupations completed each day, and the school environment. The product was designed to be implemented by skilled OTs working in the school setting and provides a reader-friendly format with specific evaluation considerations and interventions that can be adapted and customized to meet the unique needs of each client to optimize performance outcomes. OTs possess the skills necessary to complete a holistic activity analysis of meaningful occupations in the school environment and the ability to modify the task requirements of these occupations in order to promote success for children with limb loss. Since not all cases of limb loss or school environments are identical, the layout of the manual includes possible variations to the outlined interventions and the provision of external resources in order to assist the occupational therapist in facilitating the best possible outcomes for each child.

The combination of physical, psychological, and emotional stressors that can result from limb loss, the skill set of the OT to provide customized services that facilitate success in valued occupations, and the holistic ability of the therapist to address aspects of the person, their occupations, and their environments demonstrates the ideal situation
for a project of this nature to be implemented. Although there is literature to support the specific elements of this project, there is little research that incorporates all of these aspects together. Therefore, this scholarly project addresses the lack of literature detailing the abilities of the OT to implement occupational evaluations and interventions that address the unique needs of children with limb loss when returning to the school environment.

In the formation of this scholarly project, a review of relevant published literature on the aforementioned factors was completed. Additionally, the occupational therapy model of Person Environment Occupation was utilized to guide the intervention and therapeutic process (Turpin & Iwama, 2011). This model was selected due to the holistic and comprehensive nature of the theory to assess the person, environment, and occupations, and how they interact to affect the outcomes of participation over time (Turpin & Iwama, 2011). The person-environment relationship is described as how the person engages with the environment and how the barriers or facilitators of the environment affect the person. The person-occupation relationship is described as how the activity requirements match the person’s ability to meet the demands of the task, as well as the person’s perceived self-efficacy and meaningfulness of completing the occupation. Finally, the environment-occupation relationship is evaluated; in this scholarly project, this consisted of the school environment and what was necessary within the environment to complete the desired occupation successfully (Turpin & Iwama, 2011). The Person Environment Occupation model guides the therapeutic process by providing a framework for the implementation of occupational therapy services in the
school setting that promotes the child’s ability to thrive in previous roles, environments, and occupations.

The following are main concepts that are used throughout the entirety of this scholarly project.

- **Limb Loss:** Limb loss is the loss of all or part of an arm or leg due to trauma, infection, diabetes, heart diseases, cancer or other diseases (Centers for Disease Control and Prevention, 2014). Limb loss can affect the upper extremities, lower extremities, or both resulting in a change in the performance abilities of an individual.

- **Children:** From 2-5 years of age a child is categorized in the early childhood stage followed by middle childhood being between the ages of 6 to 10 years of age (Case-Smith, 2010). For the purposes of this scholarly project the focus will be on elementary school aged children between the ages of 5-11 years old as during these years a child is continually developing childhood occupations and occupational roles, participating in school, and beginning to form social friendships while discovering new contexts.

- **School Environment:** An organization or institution for the education of children (Merriam Webster, 2015b). The physical aspects of the school environment could include classrooms, hallways, lunchrooms, libraries, physical education, and recess settings. The social and psychological aspects of the school environment are addressed in this scholarly project as well.
• Person Environment Occupation Model: This model provides a framework to evaluate the interactive components of a person, their environment, and the occupations that are performed based on occupational roles and responsibilities. This model encourages a client-centered approach with a focus on the interactive properties of desired and valued occupations and the ability of an individual to perform tasks embedded in the social, cultural, physically constructed, and natural environment that he or she is involved in. The goal of this model is to enhance performance of everyday occupations in order to promote continued engagement in the activities that contribute to a higher quality of life (Turpin & Iwama, 2011).

The following chapters address the key aspects of this scholarly project. The second chapter consists of a literature review that contains the information on the main aspects of this project: children with limb loss, school environment, and occupational therapy. After the background information is addressed, the actions in which the students took to develop the literature review and product manual for occupational therapists in the school setting is explained in detail in Chapter 3. A copy of the manual for the reintegration of children with limb loss in the school setting for occupational therapists will directly follow the methodology. Lastly, a summary to highlight the purpose as well as the findings will conclude the scholarly project.
CHAPTER II
REVIEW OF LITERATURE

Introduction

Limb loss in children is a physically and psychologically disabling condition that impacts occupational performance in all contexts from onset throughout the child’s lifespan (Smith, 2006). Congenital limb deficiencies are frequent, with 2-4 children per 10,000 babies being born with either an upper or lower limb reduction defect in the United States every year (Centers for Disease Control and Prevention, 2014). Less is known about children who experience acquired limb loss, however according to Ziegler-Graham, Mackenzie, Ephraim, Travison, and Brookmeyer (2008), an estimated 2 million people are currently living with limb loss in the United States. A statistic from Hostetler et al. (2005) found that between the years of 1990 to 2002, around 111,600 children under the age of 18 were hospitalized with traumatic limb loss related injuries in the United States. Children with limb loss encounter difficulties returning to full participation in previous occupations due to changes in functional ability and physical impairment which, in turn, could negatively affect how a child perceives his or her own quality of life (Michelsen, Van Wijk, & Ketelaar, 2010).

OT enables participation in valued occupations through a holistic approach with meaningful therapeutic interventions designed to improve an individual’s quality of life.
Through creation and promotion of health, establishing or restoring a skill that has been affected by disability, maintenance of current performance capabilities, modification and compensation of context or activity demands to support success, and prevention for clients who are at risk of encountering barriers in the environment, the OT focuses on purposeful and meaningful engagement in valued occupations (AOTA, 2014). The OT being up to date and consistent with the delivery of OT services both in the acute and outpatient rehabilitation setting are imperative for the optimal success and full reintegration into the client’s previous roles and routines.

Children with acquired limb loss experience newfound limitations, difficulty and changes with normal childhood development physically, mentally, and emotionally, and require increased care and assistance to complete daily activities (CDC, 2014). OTs address these issues faced by a child and family through evaluation, intervention, and reassessment of functional outcomes, however, there is a large void in the standardization of the types of services an OT delivers following an acute rehabilitation setting once a child returns to his or her natural environments (Chen, Heinemann, Bode, Granger, & Mallinson, 2004; Dunn & Gardner, 2013; Fletchall, 2006b; Michielesen et al., 2010). The lack of information available for current practitioners identifies the purpose of this scholarly project which is to provide OT practitioners with a standardized manual designed as an outline of the therapeutic process that can be used for a child’s reintegration into the school setting after a limb loss. A top research focus of current OT practice is to determine if the interventions produce the desired result of full participation in desired activities, which fully supports this scholarly project proposal (Chen et al., 2004).
Childhood Development

Children are dynamic. A child is constantly growing, learning, and interacting with the surrounding environment through the main occupation of play. A child is defined as “a young person especially between infancy and youth” (Merriam Webster, 2014a). According to Case-Smith (2010), from birth to 2 years of age children are considered infants, followed by early childhood which is 2 to 5 years of age, and middle childhood being 6 to 10 years old. For the purpose of this scholarly project, we chose to focus on the elementary school aged children (5 years old until 11 years old) as during these years a child is continually developing childhood occupations and occupational roles, beginning school, and beginning to form social friendships while discovering new contexts. At this stage, a child realizes that he or she can have an affect on the environment around them and is beginning to become more involved with context specific occupations with feelings of self-fulfillment for participation in those occupations.

Case-Smith (2010) defined development as “the sequential changes in function that occur with maturation of the individual or species”. Physical maturation is unique for every individual. Children mature at different rates and do not follow an exact timeline. This becomes especially true for children who experience a traumatic limb loss. According to Michielsen et al. (2010), children who are physically different from their peers experience increased constraints on the types of activities they engage in. It is not a novel idea that children with physical disabilities present with complications to performing the typical tasks that their peers complete on a daily basis. Due to this change
in ability, it has been found that children with a physical disability require increased assistance for completion of normal tasks (Dunn & Gardner, 2013).

In order for a child to learn, the child manipulates his or her environment through the primary occupation of play. Play incorporates all of the different areas of development including sensory, social, affective motor, and cognitive aspects. A child learns about meaningful occupation through participation in play (Case-Smith, 2010). In order for a child to master new performance skills a child’s structural, neurological, and functional components begin to emerge based on the stimulation presented to him or her. A child with a recent acquired limb deficiency will experience a change in his or her performance skills and abilities affecting the ability to participate fully in his or her unique contexts. As the child returns home, he or she will require an adapted plan for full integration into the previous natural contexts with typically developing peers being that previous performance skills and abilities may be difficult depending on the injury.

**Effects of Limb Deficiency**

Children with limb deficiencies are also noted to struggle with decreased energy levels, skin breakdown, residual skin trauma, and overall deconditioning impacting physiological development (Fletchall, 2006a; Webster, Levy, Bryant, & Prusakowski, 2001). In turn, children may experience decreased endurance and lower muscle strength due to the associated difficulties following an acquired amputation which may further inhibit their quality of life by making participation in normal childhood occupations more grueling than enjoyable. Being that early and middle childhood is the period of a child’s life that becomes increasingly active, deficits in the ability to meet the demands of the environment make the need for a reintegration plan following the hospitalization more
apparent. In order for a child to complete age-appropriate occupations following an amputation, therapy should focus on rehabilitation, compensatory strategies, environmental modifications, and effectively utilizing the child’s intact performance skills that facilitate occupational performance. Emphasizing the individual’s strengths to develop an intervention plan by identifying his or her just right challenge is imperative for task and role fulfillment. By creating the opportunity for graded challenges, a child can feel a sense of mastery over the environment through rewarding outcomes, thus encouraging self-efficacy.

Despite advancements in technology and surgical interventions, the healing process is arduous. Children with limb deficiency or amputation encounter disruptions in not only the physical areas of functioning, but psychological and social components tend to suffer as well (Davidson et al., 2002; James et al., 2006; Liu, Williams, Hsueh-Erh, & Nai-Hui, 2010; Sjodahl et al., 2004). Following an acquired limb deficiency, it is normal for a child to experience a plethora of stressors and distressing situations. Emotions are at an all time high following a hospitalization for a child and the caregivers of a child with acquired limb deficiency, as the family must make adjustments and take time away from work and school. According to Weir, Ephraim, and Mackenzie (2010), the maintenance and rehabilitation required for residual limb health after an acute hospitalization results in significant emotional duress for caregivers and the child as the adaptation process of limb loss is not easy. This extreme life event could result in adjustment disorders and affect typical development leading to psychological difficulties for the child and family. Common reports of increased isolation, decreased independence and self-esteem, ineffective coping strategies, feelings associated with the loss of control, and increased
depressive symptoms due to the combination of stressors encountered during day-to-day tasks were found to be related to limb loss (Hermansson, Eliasson, & Engstrom, 2005; Liu et al., 2010; Melnyk et al., 2004; Varni & Setoguchi, 1993; Varni, Rubenfeld, Talbot, & Setoguchi, 1989). If these issues are not addressed, children are at higher risks of depression, substance abuse, poor academics, and negative behavioral reactions that could have either short or long lasting effects on their psychological wellbeing (Bonder, 2010; Fletchall, 2006a; Melnyk, et al., 2004). Research demonstrates that the sudden change of limb loss can be exceptionally intense and personal for every individual. In order to prevent future consequences, not only must the focus be on rehabilitating the residual physical aspects, but a vast amount of attention must be spent on the mental health of the child as well.

Coping skills at an early age can be ineffective and not mature enough to handle this type of stressor. It is important to understand that the emotional healing process is not linear and has no timeline as each individual is unique (Conyers & Prigge, 2011). Not only are children being forced to adjust to physical differences, but being unable to complete tasks as they were done before could lead to a lower perceived quality of life and cause a more negative outlook. Although children with an acquired limb amputation may have psychological issues to respond to, it has been found that there is variability in how a child responds to the new challenges (Hermansson et al., 2005; Varni & Setoguchi, 1993). Children who had increased peer support and positive interactions socially had better rates of adjustment with more positive outlooks and made more gains towards independence than those who had reduced perceived support (Liu et al., 2010; Michielsen et al., 2010). The child’s varying responses to situations and levels of peer support will
determine the route an OT should take with the intervention process. Evaluating the mental health of the child will be equally as important as identifying weaknesses in physical performance skills in order to promote longevity in the child’s psychological health. When analyzing the support network, it is imperative to address family concerns and keep them as involved as possible as they, too, will be attempting to make sense of the traumatic experience including how to regain control and return to the previous family routine.

Habilitation of the limb-deficient child is enhanced when the treatment program is based on normal growth and development guidelines (Clarke & Patton, 1980). Following injury, growth may be slowed and milestones may not be made in a sequential or timely manner. Treatment will differ for each case as every child is unique. However, understanding how an individual with limb deficiency matures in comparison to typically developing peers requires a blend of therapy styles including habilitation, accommodation, and compensation to reach occupational goals set by the family with a focus on the child’s interests. OTs are involved directly with care and treatment from the acute period to reintegration into the natural contexts. In addition to screens and assessments, encouraging play and participation in adapted occupational roles and original contexts will be key to occupational performance. Holistically approaching the physiological and psychological impact of acquired limb deficiency on a child’s development is a role that has not been defined for OT, but sets the stage for this scholarly project.
Importance of Participation and Quality of Life

A child’s sense of self and self-esteem are highly based on their interactions with family, peers, and teachers, and comparing themselves to others in areas such as physical appearance, academics, and sports (Pasek & Schkade, 1996). Participation is influenced by an individual’s functional abilities, interests, values, goals, personal characteristics, family, and environmental factors (Michielsen et al., 2010; World Health Organization, 2008). Children with a limb deficiency have lower participation in structured and unstructured social and leisure activities compared to their peers without disabilities, which negatively influences the child’s quality of life (Carter et al., 2008; Coster et al., 2013; Egilson & Traustadottir, 2009; Eriksson, Welander, & Granlund, 2007; Michielsen et al., 2010).

An individual’s quality of life is made up of self-esteem, psychological wellbeing, and happiness (Michielsen et al., 2010). The factors that can influence an individual with a disability’s quality of life include the amount of physical impairment, their general health, number of hospital visits, and how the disability affects body image (Michielsen et al., 2010). Children with disabilities have difficulty fully participating in their daily occupations, which can lead to decreased independence and social relationships (Richardson, 2002). Liu et al. (2010) found individuals had a strong need to be functionally independent because of the high correlation between needing assistance with daily tasks and low self-esteem.

An increased quality of life correlates with reduced health and social problems (Michielsen et al., 2010). One way social participation can be increased for children with disabilities is by having after school activities available to all students (Michelsen et al.
2009; Coster et al., 2013). The ability to maintain occupational engagement facilitates a child’s ability to play with their peers (Richardson, 2002). Pasek and Schkade (1996) found the meaningful activity of skiing to have a positive impact on children with an amputation. The participants had increased independence, self-esteem, satisfaction of others, relative mastery, and competence in their ability to ski (Pasek and Schkade, 1996). Participation in valued occupations in a child’s natural environment is important to increase his/her quality of life. By facilitating engagement in typical childhood occupations and supporting positive social interactions with peers, children may experience an increase in their overall health and wellbeing.

**Environment**

Engagement in an occupation occurs because of an individual’s choice and motivation within a supportive and natural environment (American Occupational Therapy Association, 2014). An environment consists of much variability including social, physical, cognitive, and emotional properties (Coster et al., 2013). Accessibility, mobility, sensory stimuli, family and peer support, positive attitudes of others, and inclusion are factors that either promote or limit participation in any given environment (Anaby et al., 2013; Coster et al., 2013). Engaging in appropriate environments is highly important for children; so much so that Richardson (2002) suggests psychological, emotional and social distress in adults can be caused by decreased engagement in appropriate environments as a child. Factors in the environment can affect a child’s participation in valued occupations within any setting; most common are the school and home context. Accessibility in the school environment is important for every child. In order for successful outcomes for children with limb-loss in school, environmental
modifications, and adaptations to teaching styles may be necessary depending on the child’s needs (Coster et al., 2013).

**Home**

The home environment is conducive to many of a child’s occupations and roles. Family is an important aspect of a child’s life as the family is able to challenge and provide support for a child by having set rituals and routines (Dunn & Gardner, 2013). This gives the child a chance to become independent and have his or her own responsibilities (Dunn & Gardner, 2013). A child with an amputation may experience difficulties returning to the home environment impacting his or her independence with the family routine. An individual’s routine gives life order while rituals create meaning, belonging, and identity for a child (Segal, 2004). The inability to participate in the context of the home environment could have a negative impact on the affective components associated with completion and performance of family rituals (Segal, 2004). Each individual in a family has their own routine which matches current life occupations, developmental stages, and personality (Segal, 2004).

Socialization and participation within families can also be facilitated by completion of routines and rituals (Dunn & Gardner, 2013). A disruption in this engagement could affect the child’s socialization patterns with the family and result in inclusion or exclusion from certain family roles (Segal, 2004). When a child develops a disability, it is the role of the OT to evaluate the home environment in order to promote a model of “best fit” or ideal level of challenge and assist in achieving successful occupational performance. Without a new structure in place, the home environment could
lead to negative psychosocial adjustment and increased family stress altering family
dynamics even further.

Having a critically ill child can have an enormous impact on the family (Melnyk
et al., 2004; Weir et al., 2010). The direct and indirect factors of having a child with an
amputation can lead caregivers to miss many days of work, possibly leave the workforce
altogether, and/or have financial problems (Weir et al., 2010). This added stress on the
family dynamics of a child with an acquired amputation could potentially have negative
long-term effects on the routines and structure of the family itself. According to Segal
(2004), participating in constructed family roles and behaviors forms routines and gives
the family a sense of stability and identity. However, when a member of the family
experiences a traumatic event, how the family operates is impacted as tasks normally
performed must be adjusted or left to another individual. This sudden shift could have a
negative impact on not only the child with the acquired injury, but the caregivers as well.

Melnyk et al. (2004) suggest the parents of a critically ill child can develop
emotional disorders and even Post Traumatic Stress Disorder (PTSD). It is important to
note that emotional maladjustment can affect the caregivers of the child as well.
Emotional maladjustment in caregivers could translate into increased difficulty with
successfully caring for the child’s new injury. With new injuries come new limitations
and the need to relearn certain tasks. According to Varni and Setoguchi (1993),
caregivers who had a child with a recent amputation could experience depression, which
interfered with the ability to be a successful caregiver leading to further psychological
maladjustment of the children. In a different study examining morning routines of
children with disabilities and their families, parents who experienced higher stress levels
also experienced an inability to successfully address the child’s new needs or adapt the tasks and activities in order to get to school on time (Segal, 2004). This in turn increased the anxiety and distress of the child (Segal, 2004). It appeared as though the parents were still having difficulty coping with the limitations of the child and were unable to adjust the family structure including increasing time needed to complete self care tasks, providing adequate levels of support for success, and finding balance between assisting the child with a disability while being available to other members of the family (Segal, 2004). This stress on the family can affect the child’s roles and routines in the home setting. The home environment can influence a child’s ability to actively engage and participate in the school context.

**School**

School is one of the most important environments for a child to participate in valued occupations. Attending school is a normal childhood experience and promotes academic and social growth (Rehm & Rohr, 2002). The school environment provides opportunities for children to discover their identity and create relationships with their peers (Rehm & Rohr, 2002). However, children that have lost a limb have a tendency to miss many days of school for limb-loss-related problems which can impair their ability to engage in normal occupations in the academic context (Weir et al., 2010). There are many barriers for a child who has lost a limb when returning to school, including the physical and psychosocial aspects of the environment. In order to facilitate successful occupational performance in the school setting, adaptations to teaching styles may be necessary depending on the child’s needs as well as being aware of how the environment affects the child physically and mentally (Coster et al., 2013).
Physical environment.

In terms of the physical environment in the school setting, it is important to address how inclusive and accommodating the educational institution is for meeting the students’ needs. For a child with physical limitations such as an amputation, the reality of barriers in the environment becomes very evident. The most common difficulties children with disabilities encounter in the physical environment included heavy doors, uneven curbs, long distances for travel, high thresholds for entering spaces, and steep ramps making it difficult to enter the building (Borrell & Hemmingsson, 2000; Palisano et al., 2003; Pivik, McComas, & LaFlamme, 2002; Tieman et al., 2004). Children with traumatic limb deficiencies are adjusting to changes in functional ability, and without supports in the natural environments, successfully accomplishing tasks becomes increasingly difficult without assistance. A study completed by Pivik et al. (2002), found that architectural barriers were a large concern for students with physical disabilities and that access was not equal for all. This included not having enough space between desks or in hallways when getting to class, not having enough time to finish school lunch, ineffective safety procedures putting the students at risk, and overall lack of access to normal, everyday school fixtures such as lockers, washrooms, locks, water fountains, and recreational facilities (Pivik et al., 2002).

From an OT perspective, it is imperative that the inhibitors and facilitators of the individual’s natural contexts are taken into account in order to promote success in the occupational tasks of the particular environment. According to Egilson and Traustadottir (2009), although the average school environment had certain areas that facilitated inclusion of all students, it was limited, as several aspects of the school setting were
found to be more challenging for children with disabilities. These included rigid school routines, lack of time to complete tasks, lack of professional knowledge of teachers on how to adapt the curriculum, and lack of advocacy and support from the school system affected the engagement of children with disabilities. Increased hindrances were found in regard to recess, field trips, transportation, and physical education classes with many school officials citing the lack of resources or time to modify the curriculum (Egilson & Traustadottir, 2009). Without support or directives from school officials to make necessary changes to the physical environment, students may experience an inability to thrive in the natural context which could further detract the child from success in academics and functional task completion.

For a child, the school environment is one of the primary environments for occupational engagement. The physical barriers encountered in the school setting can further impair or restrict successful occupational performance or the child could withdraw from participating altogether. Children with disabilities that faced increased challenges and barriers to participation in typical school activities were found to be more withdrawn and less prone to engage in activity if they did not perceive that they could succeed (Hemmingsson & Borrell, 2000; Hutzler, Fliess, Chacham, & Van den Auweele, 2002; Palisano et al., 2003; Pivik et al., 2002; Tieman et al., 2004). A lack of knowledge for adapting the basic structure of the school setting is apparent including the lack of initiative taken by school officials and educators as many of the aforementioned barriers seemed to persist in multiple studies despite concern from parents and children (Egilson & Traustadottir, 2009; Hemmingsson & Borrell, 2000; Hutzler et al., 2002; Palisano et al., 2003; Pivik et al., 2002; Tieman et al., 2004). The need for an OT and his
or her ability to advocate for an individual with physical difficulties and utilize professional knowledge to modify tasks and environments for success is extremely evident.

**Psychosocial wellbeing.**

Having a disability in the school setting can have a large impact on the psychosocial wellbeing of a child. Most children with disabilities attend mainstream schools (Lindsay & McPherson, 2012). Children with a physical disability have been found to limit their participation in play, have fewer friendships, depend on others for social activities, and have limited motivation and concentration (Brown & Gordon, 1987; Levitt & Cohen, 1997; Mulderij, 1996, 1997; Nadeau & Tessier 2006; Phillip & Duckworth, 1982; Richardson, 2002; Rubin, Fein, & Vandenberg, 1983; Salomon, 1983; Sheridan, 1975). Children with disabilities typically compare themselves socially to their peers, have decreased social support, and utilize negative self-talk which are directly correlated with depressive symptoms, poor self-esteem, and decreased participation in the school setting resulting in decreased enjoyment from engagement in childhood occupations (King, Law, Petrenchik, & Hurley, 2013; Michielsen et al., 2010).

The school environment of children at a young age can have a large impact on their social development and psychosocial wellbeing (Ladd, 1990; Richardson, 2002). The school environment can influence the availability of social supports, quality of peer relationships, and attitudes towards school (Ladd, 1990). This has been shown to have a great impact on psychological development and social abilities throughout an individual’s lifespan (Liu et al., 2010; Richardson, 2002; Varni & Setoguchi, 1993). Children that are enrolled in a fully or partially inclusive school environment are more likely to participate
in social activities than their peers who are not in an inclusive school (Orsmond, Krauss, & Seltzer, 2004). The children with disabilities in an inclusive school were found to have significantly more positive feelings towards children without disabilities (Samsoniene et al., 2006). These findings suggest children with a physical disability should have an easier time integrating into public schools that actively try to include all students (Samsoniene et al., 2006). Encouraging full inclusion in typical student activity could be a critical factor to decrease the negative consequences of isolating the child with a disability from typically developing peers.

Children with disabilities are also at a significantly higher risk of being bullied and isolating themselves compared to their peers without a disability (Asher & Gazelle, 1999; Nadeau & Tessier, 2006; Vreeman & Carroll, 2007). Being bullied may be related to difficulties in the academic setting, decreased social competence, troublesome behavior and decreased quality friendships (Luciano & Savage, 2007; Lund et al., 2006; Srabstein et al., 2008). The U.S. Department of Health and Human Services (2000) state bullying is a nationwide crisis, which has resulted in being the second leading cause of death among all youth, aged 15 to 24.

Lindsay and McPherson (2012) found four strategies to increase social inclusion in the school setting for children with disabilities including discussing the condition to create awareness of the disability, increasing self-confidence and peer support, educating teachers about improving inclusion in the classroom, and discussing bullying. OTs have the educational background and expertise to contribute to violence prevention and educate staff members about a child’s disability in the school environment (Leigh, 2013).
OTs can play a large part in the success of students with a disability, however, utilizing a multidisciplinary approach can be of even more benefit to the child.

**Multidisciplinary approach.**

Classroom teachers may have much difficulty with time limitations and the need to manage the class while trying to provide specific care to a child with a disability (Richardson, 2002). Inconsistencies were noted in Richardson’s (2002) article with teachers expressing their expectations for participation and roles to children with a disability. This has been shown to lead children with disabilities to limit their participation, which decreased their meaningful engagement in classroom occupations (Richardson, 2002). Classroom teachers are not typically equipped to manage a child with a disability on their own, which is why a multidisciplinary team is more effective in a school setting.

Utilizing a multidisciplinary approach when working with children with disabilities in the school system is imperative (Raymond, 2009). The individuals in the school system that should be involved include; the student’s teacher, principal, school nurse, OT, physical therapist, speech therapist, paraprofessional, counselor, home health nurse, and the child’s caregiver (Raymond, 2009). Each individual that works with the child should be trained on the child’s disability, functional abilities, intervention goals, assistance needs, and emergency procedures (Caldwell et al., 1997; Palfrey et al., 1992; Webster et al., 2001). Richardson (2002) suggests OTs are knowledgeable about a child’s functional abilities, impacts of context on function, and activity analysis, however, since they spend little time in the classroom setting, the teachers were not conveyed this helpful information. To make sure all individuals are up-to-date, Caldwell et al. (1997) suggest
the team members should have continuous communication, and each profession should
gather information on their area of expertise and present it to the rest of the
multidisciplinary team. Utilizing each disciplines’ specialties is important for the success
of the child (Chen et al., 2004). After the team members have collaborated, they should
initiate getting the child the help he/she needs including adaptations for the school
environment to enable the best performance from the child (Caldwell et al., 1997).

A top-down approach evaluation where the quality of the child’s participation in
the environment is the main focus has been advocated for (Coster, 1998). After the
evaluation is completed, the multidisciplinary team can focus on the transition process,
designating each team member’s roles, necessary services for the child, and team member
training (Caldwell et al., 1997). Communication between the child’s primary care
provider, family, and the student, and determining the level of assistance and
modification that is required are aspects of the school environment that need to be
considered prior to the child returning to school (Caldwell et al., 1997). By utilizing a
multidisciplinary approach, the environment, occupation, and student’s performance can
successfully be taken into consideration when developing an intervention plan for the
student.

Model

The model of Person Environment Occupation (PEO) was used to guide the
scholarly project process. This model encourages a client-centered approach with a focus
on the interactive properties of desired and valued occupations and the ability of an
individual to perform tasks embedded in the social, cultural, physically constructed, and
natural environment that he or she is involved in. The goal of this model is to enhance
performance of everyday occupations in order to promote continued engagement in the activities that contribute to a higher quality of life. Although occupational performance is the main goal of this model, an emerging secondary goal is to increase the frequency of participation of an individual which includes the daily contexts an individual comes into contact with, including the aforementioned social and cultural environments (Turpin and Iwama, 2011). This model is a true fit for the scholarly project because not only is it examining the occupational performance of an individual, but it recognizes the importance of the frequency in engagement in those occupations, how contexts affects a person’s behavior, and through an interactive process how it all impacts an individual’s perception of life satisfaction. A child is continually changing as they develop and mature. PEO realizes that looking at development across the lifespan is needed in order to support lifelong abilities that can be generalized to fit novel situations. The components of person, occupation, and environment are recognized by this model as interdependent parts in which if one aspect changes, it causes a chain effect that could alter overall outcome (Turpin and Iwama, 2011). Thus it demonstrates that individuals are unique and have personalized values and occupations that are completed in varying, but individualized contexts.

Understanding that through engagement an individual is more than “doing” is a key piece of PEO. PEO identifies that an individual is comprised of both intrinsic and extrinsic factors that can either facilitate or inhibit participation in daily activities. It also emphasizes that satisfactory performance of occupations may not be the end goal, and through engagement in occupation, a client may find meaning by simply taking part in the activity (Turpin and Iwama, 2011). In order for a child to reintegrate into his or her
regular contexts following an amputation or traumatic injury, not only must the child’s abilities be evaluated, but the environments and occupations in which he or she participates must be analyzed as well being that they are all interconnected and affect occupational performance. According to Baum and Christensen (2005), although role fulfillment and occupational expectations are important to address upon return to a client’s natural contexts, the motivation behind engaging in those occupations should be taken into account as well because the meaning associated with the frequency of engagement in occupations may be just as important as successful performance. This portion of PEO is exceptionally fitting of this scholarly project as children are continually learning and exploring the environment around them. The motivation for children to execute tasks is not solely the ability to which the task is completed, but the process itself becomes equally important to the feeling of fulfillment.

PEO is made up of layers that guide an OT through the process of holistic and client-centered evaluation. These layers include the foundation that is the person and environment and how they influence one another, the desired occupation and performance, and finally the third layer that is occupational performance and participation. The intervention process is then directed by the intrinsic (physiological, cognitive, spiritual, neurobehavioural, psychological) and extrinsic (social support, social and economic systems, culture and values, built environment and technology, natural environment) factors and the interaction between them as the basis for identifying facilitators and inhibitors to performance (Turpin & Iwama, 2011). This is extremely applicable to the idea behind this scholarly project as in order to determine the appropriate intervention process to reach the goal of occupational performance for a child
with traumatic limb loss, an individualized, client-centered evaluation must be completed. Since a child is unable to describe in detail or fully understand his or her own intrinsic reasoning and impact of environment on those skills, the ability of the OT to perform a thorough and overarching evaluation of the person, contexts, and interactive pieces that contribute to occupational performance becomes a crucial piece in the rehabilitative process. Through the model of PEO, an OT is guided appropriately to successfully reintegrate an individual following a traumatic life event. This is completed through identification of an individual’s facilitators and barriers and how they interact with occupation and environment to result in participation and occupational performance.
CHAPTER III
METHODOLOGY

The process of developing this scholarly project began upon the authors’ inquiry of childhood limb loss. The authors researched what evidenced-based occupational therapy literature was available related to childhood limb loss. However, there were few evidence-based articles on this topic, which lead the authors to determine there was a need for further exploration of literature related to occupational therapy and childhood limb loss. The authors found a significant deficit of articles based on a reintegration program for students after a limb loss.

After recognizing the need, the authors decided it was important to develop a manual for OTs working with children after a limb loss when reintegrating into his/her valued occupations. A literature review was completed to determine the frequency of limb loss in children, the implications of a limb loss on a child’s life, and what research was available for OTs regarding limb loss. This lead to a further review of current research regarding the role of school-based OTs with individuals diagnosed with a severe medical condition, psychological wellbeing of a child with a traumatic limb loss, and implications of a child’s wellbeing after a traumatic limb loss in regards to the school setting. The authors located research articles by using the following terminology: “occupational therapy, school, context, amputation, limb loss, child, kid, pediatric,
integration, reintegration family, rehabilitation, environment, setting, adaptive equipment, disability, peers, and psychosocial”. Multiple databases were utilized when creating the literature review including: CINAHL, PubMed, PsychInfo, OT Search, and Google Scholar. Textbooks and government websites were also used to gather additional information.

Following a review of the current research related to childhood traumatic limb loss, the authors discovered no articles based on the reintegration process of a child after a limb loss into the school setting. The development of the manual was intended to fill this research literature deficit. This manual was designed to define the school-based OTs’ roles in providing care for a child after a limb loss, supply OTs with a guideline of the reintegration process, and possible interventions and environmental modifications to consider when providing therapy to a child after a traumatic limb loss.

The next section is the occupational therapy manual that includes information on the strategies and methods to be used during therapy with individuals after a traumatic limb loss.
CHAPTER IV

PRODUCT

This chapter consists of the manual to help guide treatment for school-based OTs working with children after a traumatic limb loss. This manual begins with a synopsis of the purpose of the product. The authors describe the individuals in the multidisciplinary team, the importance of occupational therapy for children after a limb loss, and the different types of limb loss. The authors then address the pros and cons of a prosthetic, phases of prosthetic rehabilitation, potential modifications and interventions for the school environment, and provide resources to caregivers. The authors then supply further information that can assist OTs when working with this population.
Life, Learning, and Limb Loss: Success in the School Setting

By Allison Sussman, Samantha Hoy, & Mandy Meyer, PhD

(Bing, 2015)
# Table of Contents

Introduction ........................................................................................................... 32

Multidisciplinary Team ...................................................................................... 34

Why is Occupational Therapy Important for Children Experiencing Limb Loss?..... 46

The More You Know: Limb Loss in Children ....................................................... 48
  Types of Upper Extremity Limb Loss ............................................................... 50
  Types of Lower Extremity Limb Loss ............................................................... 52

Prosthetics and Non-Prosthetics: The Ongoing Debate ...................................... 54

Phases of Prosthetic Rehabilitation ................................................................... 58

Environment ....................................................................................................... 64
  Classroom ......................................................................................................... 67
  Hallways ......................................................................................................... 73
  Lunchroom ..................................................................................................... 78
  Library ........................................................................................................... 81
  Physical Education .......................................................................................... 84
  Recess ............................................................................................................ 90
  Social ............................................................................................................. 96
  Psychological .................................................................................................. 98

Addressing the Psychological Needs of Caregivers .......................................... 100

Resources .......................................................................................................... 103

Appendices ......................................................................................................... 107

References .......................................................................................................... 112
Introduction

The purpose of this resource is to define the occupational therapist’s role for reintegrating a child with a traumatic limb loss into the school context. Acquired limb loss can be difficult to manage as the individual may experience physiological, psychological, and social difficulties as new challenges arise in familiar environments. Occupational therapy offers the unique ability to develop a holistic view of the client that addresses the needs, supports, and barriers to occupational performance of meaningful activities. This manual was created in order to assist an occupational therapist (OT) that works with children that have experienced a traumatic limb injury and how to effectively respond to the issues that the child may encounter upon return to the school environment. The manual provides an in-depth and customized occupational therapy process detailing:

- Types of limb loss and the impacts on everyday performance areas
- OT’s role on the multidisciplinary treatment team
- Advantages for prosthesis and non-prosthesis wearers and evidence-supported prosthetic regimens
- Creative modifications and adaptations specific to the school environment to facilitate success
- Effective interventions and detailed environment analysis based on the school environment
- Ways to facilitate open communication and appropriate engagement among peers and school staff
- Effect of the home environment
• Addressing the needs of the caregiver
• Inclusion of other organizations and contact resources that may be useful for future reference

In the creation of this manual, a large focus was devoted to the interactive process between the child, the occupations and activities completed each day, and the environment. The Person Environment Occupation (PEO) model structured this resource due to the holistic and comprehensive nature of the theory, including provision of an excellent outline for the occupational therapy process that aligns well with the goal to match the abilities of the person, barriers and supports of the environment, and occupation effectively. The strengths of the model include detailed assessment of the skills and interests of an individual and the aspects of the environment and how they interact to positively or negatively influence occupational performance and participation (Turpin & Iwama, 2011). The use of the PEO model provides a framework and guideline for implementation of OT services in the school setting that promotes the child’s ability to thrive in previous roles, environments, and occupations.
Multidisciplinary Team

Utilizing a multidisciplinary team approach when facilitating the successful reintegration of a child that had a limb loss into the school setting is imperative. It is important for each team member to work together and be trained on the child’s limb loss, functional abilities, intervention goals, assistance needs, and emergency procedures (Caldwell et al., 1997; Palfrey et al., 1992; Webster, Levy, Bryant, & Prusakowski, 2001).
The members of the multidisciplinary team may include:

- The child’s teacher
- Paraprofessional
- School nurse
- Counselor
- Principal
- Prosthetist
- Occupational therapist
- Physical therapist
- Child
- Caregiver
The teacher is an essential part of the multidisciplinary team because the teacher works directly with the student and regularly communicates with the child's parents. The teacher needs to know about the child’s limb loss, their assistance level, and the best way to provide accommodations for the student.

**Suggestions for the Teacher:**

- Have open communication with the class about the child's limb loss
- Walk slowly to other classrooms so the child with a limb loss can keep up
- Allow child to write on a sheet of paper instead of the board
- Print notes for child with limb loss if they need assistance with note taking
- Have toys/school material accessible to the child
- Allow for child with limb loss to get extended time on in-class assignments
- Consider accessible layout of classroom
Paraprofessional:

The paraprofessional will work directly with the child with a limb loss throughout the school day. The paraprofessional will assist the student in anything they need assistance with including:

- Note taking
- Caring for the remaining limb
- Physical education class
- Fieldtrips
- Gathering materials
- Pushing a wheelchair
- Meals
- Classroom jobs
School Nurse:

The school nurse a large part of the multidisciplinary team and facilitates the success of the child when reintegrating into the school setting. The OT and school nurse will collaborate when determining the assistive devices and modifications the student may need when coming back to school.

**Role of School Nurse:**

- Organizer between teacher, paraprofessional, and caregiver
- Healthcare coordinator
- Creates the student’s individualized healthcare plan
- Initiates and facilitates multidisciplinary team meetings
- Possesses medical equipment child may need while in school

Counselor:

The counselor will work with students on psychological and psychosocial difficulties. The OT and counselor will collaborate to ensure the child has the necessary resources and feels comfortable talking about any psychological and psychosocial issues he/she may have.

Counselor will Address:

- Bullying
- Self-esteem issues
- Lack of motivation
- Isolation tendencies
- Body image problems
- Depressive symptoms
- Poor attitude towards school
- Social skills
The principal determines the modifications that the school can afford to make to the environment in order for the child with a limb loss to succeed academically (Helping the Student with Diabetes Succeed: A Guide for School Personnel, 2014). The OT should advocate for the child by suggesting modifications to be made to the school environment.

**Environmental Modifications:**

- Handicap buttons
- Elevators
- Ramps
- Wide doors
- Specialty desks
- Equipment storage
- Modified playground equipment
- Adapted gym equipment
Prosthetist:

The prosthetist will work with the child and caregivers to determine if a prosthetic will be beneficial and to assist in the selection process of the specific prosthetic.

**OT Recommendations when Working with Prosthetist**

- Open communication between the prosthetist and OT
- Develop a care/recovery plan for the child with the prosthetist
- Ask prosthetist questions such as:
  - How to take care of the prosthetic at school?
  - What to do if something malfunctions with the prosthetic?
  - How long the student should wear the prosthetic during the day?
  - How to properly take care of the remaining limb?
  - What environmental modifications are suggested?
  - Any restrictions the child may have.

(Bing, 2015)
The Roles of the OT Include:

- Evaluating the child in relation to person, environment, and occupation
- Advocating for the child
- Recommending and getting the student school specific assistive devices to insure a smooth reintegration into the school setting including, but are not limited to:
  - Adaptive pencil
  - Specialty chair
  - Specialty desk
  - Elastic shoelaces
  - Button hooks
- Communicating between all members of the multidisciplinary team
- Providing suggestions to other members of the team
- Making the school environment accessible and conducive to learning for the child
The physical therapist will work with the child on physical rehabilitation. The occupational therapist and physical therapist will need to work together and determine their individual roles with the child.

**Role of Physical Therapist:**

- Pre-prosthetic training
- Helping student with walking
- Using a prosthetic
- Increasing muscle tone
- Coordination
The student with a limb loss will be the focus of the multidisciplinary team. The child may or may not be encouraged to attend the multidisciplinary meetings.

**OT Working with the Child:**

- Help the child know his/her limits
- Assist the child when telling peers about limb loss
- Teach the child proper social skills
- Discuss isolation tendencies with the child
- Talk to the child about bullying
- Help the child define his/her abilities and disabilities
- Determine the amount of assistance the child will need
The caregivers will support the child throughout the recovery and reintegration process.

Role of OT with the Caregiver:

- Build rapport with caregivers
- Assure caregivers that OT will answer any questions they may have and will be there to support them
- Assist caregiver in determining if the student would benefit from a prosthetic
- Recommend the caregiver give a presentation about limb loss to the child’s class when the child returns to school
- Encourage caregivers to continue their roles and routines
- Recommend resources for psychological support for the caregivers
Why is Occupational Therapy Important for Children Experiencing Limb Loss?

(Bing, 2015)
Occupational therapy examines meaningful activities that individuals participate in everyday with the goal of promoting performance to increase well-being and quality of life. Areas that occupational therapy services can assist with include activities of daily living (ADLs), instrumental activities of daily living (IADLs), education, work, play, leisure, social participation, and rest and sleep. By focusing on the values and beliefs of the child and prioritizing the child’s goals throughout the entire therapy process, therapists are able to effectively design an intervention plan based on the child’s definition of success (AOTA, 2014). Children who experience a traumatic injury resulting in limb loss encounter new challenges in typical activity participation. Understanding not only the physical but psychosocial aspects that accompany this type of injury is imperative in terms of health and quality of life. With a wide range of tools and assessment procedures based on evidence-based practice, occupational therapists are in a key position to facilitate a successful reintegration to previous environments. Barriers to completing previous occupations due to the change in the child’s functional ability can be resolved through adaptations and modifications that occupational therapy can help create. Occupational therapists have the skill set to alter the environment or task to support engagement and return to meaningful occupations (AOTA, 2014).
The More You Know:

Limb Loss in Children

(Bing, 2015)
As an OT, it is your job to assist clients so that they can experience the highest quality of life and be able to complete meaningful occupations. Prior to implementing this resource, it is crucial to fully understand the types of limb loss including different levels of amputation and the impact they have on function. First, it is important to define limb loss:

- Limb loss is the loss of all or part of an arm or leg due to trauma, infection, diabetes, heart diseases, cancer or other diseases (Centers for Disease Control and Prevention, 2014).

There are several different types of limb loss, all classified by which limb or limbs were affected and the extent of surgical intervention. Limb loss can occur in either the upper or lower extremity in varying degrees. According to Smith (2003), the Amputee Coalition Medical Director, the goal of a surgeon is to save as much of the limb as possible in order to preserve function. It is important to understand that each type of amputation presents new challenges and changes in performance capacity. The following charts of upper and lower extremity limb loss include the types of amputation by location and typical functional difficulties experienced due to medical intervention.
Types of Upper Extremity Limb Loss

<table>
<thead>
<tr>
<th>Upper Extremity</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial Hand/Fingers</td>
<td>Removal of fingertips, fingers, and/or portions of the hand</td>
</tr>
<tr>
<td>Metacarpal Amputation</td>
<td>Removal of the hand, distal to the wrist joint</td>
</tr>
<tr>
<td>Wrist Disarticulation</td>
<td>An amputation removing the hand and wrist joint</td>
</tr>
<tr>
<td>Below Elbow (Transradial Amputations)</td>
<td>An amputation that is below the elbow and above the wrist</td>
</tr>
<tr>
<td>Elbow Disarticulation</td>
<td>An amputation removing the elbow joint and distal structures</td>
</tr>
<tr>
<td>Above Elbow (Transhumeral Amputations)</td>
<td>An amputation that is above the level of the elbow but below the shoulder joint</td>
</tr>
<tr>
<td>Shoulder Disarticulation or Forequarter</td>
<td>Removal of the upper extremity at the glenohumeral joint</td>
</tr>
<tr>
<td>Bilateral Upper Limb Loss</td>
<td>Both upper extremities are removed completely</td>
</tr>
</tbody>
</table>

According to Smith (2003), determining the level of removal has an enormous impact on function. For example, maintaining joints such as the knee or elbow indicates that the client may retain strength and motion capacities crucial for dynamic tasks. In terms of the upper extremity, common performance deficits include:

- Decreased grasp and pinch strength
- Decreased dexterity
- Sensory and pain management issues
• Difficulty with accuracy and precision tasks
• Decreased ROM

(Smith, 2003)

These skill difficulties can translate into performance issues in areas such as:

• Dressing
• Self-feeding
• Grooming and hygiene
• Toileting
• Play and recreation activities
• Homework completion and handwriting tasks

Limb loss is a dynamic injury that impacts all areas of life and will continue to influence future occupations. Supporting a child by completing an evaluation of person, occupation, and environment is crucial when determining the areas of need and course of intervention.
Types of Lower Extremity Limb Loss

<table>
<thead>
<tr>
<th>Lower Extremity</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial Foot/Toes</td>
<td>An amputation involving removal of a portion of the foot or toes</td>
</tr>
<tr>
<td>Ankle Disarticulation</td>
<td>An amputation removing the entire ankle joint and foot</td>
</tr>
<tr>
<td>Below Knee (Transtibial Amputations)</td>
<td>An amputation that is above the ankle but below the knee</td>
</tr>
<tr>
<td>Above Knee (Transfemoral Amputations)</td>
<td>An amputation at the level of the thigh</td>
</tr>
<tr>
<td>Hip Disarticulation</td>
<td>Removal of the entire lower extremity at the hip joint</td>
</tr>
<tr>
<td>Bilateral Lower Limb Loss</td>
<td>Both lower extremities are removed completely</td>
</tr>
</tbody>
</table>

Lower limb loss has specific implications in regard to function that differ from individuals who experience upper extremity amputations. With a majority of lower limb loss cases, the client may experience difficulties including:

- Balance impairment affecting ambulation
- Decreased strength
- Decreased range of motion (ROM)
- Decreased stamina due to lost musculature
- Decreased coordination
- Increased sensitivity of the residual stump
- Increased pain and skin breakdown during activity participation

(Smith, 2003)

Cummings (2011) identified that with increased severity of amputation, difficulties associated with resuming normal walking patterns increase as well. Due
to the wide array of occupations impacted by a disruption in the performance capacity of the lower extremity, it is necessary to keep in mind that evaluation will be trans-environmental with a focus on the occupational obligations of the child based on the types of roles he or she is fulfilling such as son or daughter, student, friend, etc.
Prosthetics and Non-Prosthetics: The Ongoing Debate

(Bing, 2015)
Following an amputation, caregivers will have many questions concerning prosthetics and how having a prosthesis would impact the abilities of the child. These may include:

- Does my child require prosthetic?
- What will happen if we don’t choose to use a prosthetic?
- How much does a prosthetic device cost?
- How often should the prosthetic be worn during the day?
- What are the options for types of prosthetic devices? What is the difference between an electric and body-powered prosthetic?
- In what environments and during what activities should I encourage prosthetic use?

Being that prosthetics are not an area of expertise for OTs, it is important to validate the concern of the caregivers and emphasize that the issue of prosthetics is one that requires input from their physician, prosthettist, prosthetic therapist, physical therapist, OT, and their personal goals in order to best meet the needs of the child. However as an OT it is beneficial to be knowledgeable about the factors that affect prosthetic selection in order to describe the fitting process to the caregivers so they feel empowered to contribute. When determining whether or not a prosthetic would be beneficial for the child, there are advantages and disadvantages to consider including:
<table>
<thead>
<tr>
<th>Advantages of <strong>Not Being</strong> Fitted with a Prosthesis</th>
<th>Advantages of Being Fitted with a Prosthesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased costs and no obligations for upkeep of device</td>
<td>Avoid overuse syndrome: the repetitive and excessive strain on residual limb caused by compensatory strategies and poor body mechanics</td>
</tr>
<tr>
<td>Increased comfort due to less irritation from ill-fitting prosthetic and growing pains</td>
<td>Able to select from a wide range of prosthesis that are effective in different contexts</td>
</tr>
<tr>
<td>Encourages adaptive capacity of the child to respond to environmental challenges</td>
<td>Cosmetically pleasing, decreasing negative self-image and stigmas</td>
</tr>
<tr>
<td>Facilitates better sensory feedback mechanisms</td>
<td>Reduction in risk of re-injury to residual limb</td>
</tr>
<tr>
<td>No strain and hassle to don and doff a prosthetic device for initiation of activity</td>
<td>Early and effective fitting has demonstrated increased functional gains</td>
</tr>
</tbody>
</table>

There continues to be debate on whether or not being fitted with a prosthetic device is the most beneficial route of action. In many instances, the type of amputation is the determining factor as to whether or not a prosthetic is needed. For example, an individual who experienced a partial digit amputation may opt to not have a prosthetic made as it will not improve function so much as to serve a cosmetic purpose to the wearer.

**Final Takeaway:** The final decision of whether or not to use a prosthetic is up to the caregivers and the child. In many cases, specialized prosthetics have been found to increase the performance capacity of the individual. However, there are many other options for families that choose to ergo a prosthetic device. In this
manual, each setting in the school environment will include a prosthetic and non-prosthetic section to address both choices.

According to research and evidence-based practice, here are some guidelines to the prosthetic decision-making and fitting process:

**Prosthetic Decision-Making and Fitting Process Guidelines:**

- Collaboration between the caregivers, child, and OT is essential in determining meaningful areas of occupation impacted by limb loss.

- A multidisciplinary approach that includes assessing the child’s current level of function, factors impacting performance, and the child’s body mechanics will influence the selection of prosthesis.

- According to Peterson (2015), the most opportune time to fit a prosthesis is 30-40 days following the incident, however, due to individual client factors, timing can vary.

If the caregivers choose to acquire prosthesis for the child, different phases of prosthetic rehabilitation shall be initiated.
Phases of Prosthetic Rehabilitation

This section of the manual is for the OT working with a child who has chosen to be fitted with a prosthetic. Each phase includes a different portion of the fitting process detailing specific precautions, various aspects of rehabilitation particular to that stage, and typical interventions seen at this point of therapy post-hospitalization.
Phase I: Healing

In this stage, the OT’s focus is:

- Ensuring wound healing and scar management
- Observing for edema
- Pain Management
- Evaluating the child’s current performance skills including ROM, strength, and endurance for completion of activities

**Precaution:** Do NOT initiate strength or endurance activities until the incision is healing well and the multidisciplinary team has agreed on the treatment plan.

It is also a time for psychological healing, and validating the concerns of the child and caregivers becomes crucial. This can be done through open communication of the healing process while including the caregivers in the evaluation. The OT can assess the child in the clinic by providing similar opportunities for play and leisure that simulate typical occupations the child completes at home or school. In order to choose activities, it is important to complete an in-depth interview including the caregivers’ and child’s input about typical activities completed during the day, expectations in terms of ADLs and IADLs, usual habits and routines completed, and what a regular schedule from morning to night entails. The next section describes the OTs role at this phase of the healing process.
**Typical Interventions:**

- Client-centered evaluation process, rapport building, development of comprehensive and holistic occupational profile

- Observe child in natural environments to determine barriers and supports to occupational performance in areas of self-care, education, play, and leisure

- Outline with the assistance of the caregivers and child what activities are a part of the child’s typical routine (refer to Appendix A for sample)

- Teach parents coping strategies, and empower them and the child to improve psychological wellbeing

- Wound and pain management, providing education for caregivers regarding residual limb care

- Validating caregivers and client’s concerns with limb loss and assisting with acceptance of limitations

- Assess readiness to participate in therapy and determine motivation to engage in rehabilitation process

- Encourage client and caregivers that all activity goals are achievable

(Smurr, 2010)
Phase II: Pre-Prosthetic Training

This will be initiated by the prosthetist and physical therapist through completion of pre-prosthetic exercises. The OT is able to provide education and expectations to the caregivers and child in types and use of specific prosthetic devices in regards to how each type would facilitate independence. Completing pre-prosthetic exercises is also important in occupational therapy sessions, however, they should be specific to the occupations that were previously prioritized during the client evaluation process. This phase also includes practice of adaptive techniques and compensatory strategies with ADLs for further remediation of functional skills.

Typical Interventions:

- Create customized treatment plan based on changing rehabilitation needs including prosthetic selection, fitting, and use
- Prepatory, purposeful, and occupation-based activities addressing strength, ROM, and endurance
- Promote proper posture during ADL’s, play, and leisure tasks
- Integrate typical routine tasks into therapy session to simulate home and school environments
- Encourage prevention of overuse syndromes through education of caregivers and child on proper body mechanics
- Re-assess endurance, pain, function, and frequency of difficulty with prioritized occupations

(Smurr, 2010)
Phase III: Intermediate Prosthetic Training

In this stage, the prosthetic device is fitted and a specific wearing schedule is implemented. ADLs are practiced with use of the prosthetic.

**Precaution:** Through integration of the new prosthetic, the residual limb may be subjected to skin breakdown and irritation. Constant vigilance of the stump is necessary to assess for wellness of fit of the device. Increased redness, pain, bruising, or skin breakdown should be reported to the prosthetist *immediately* for a refitting.

Through integration of a multitude of age-appropriate activities, repetitive practice of functional skill with use of the prosthetic device is initiated. This includes teaching of controls and potential prepositioning patterns that would assist with task completion.

**Typical Interventions:**

- Encourage use of prosthesis during routine tasks in the home environment to pattern behavior

- Provide education to caregivers and child on components of prosthetic, donning/doffing procedure, and care and maintenance

- Initiate prosthetic wearing regimen with selected ADLs for practice and integration into daily movement patterns

- Warn about initial wear and to check skin integrity- typical initial wear schedule includes slow progression.
  - Ex. 30 minutes of wear followed by assessment of residual limb

  (Smurr, 2010)
Phase IV: Advanced Prosthetic Training

The final phase includes specific adaptations of the natural contexts following completed environmental assessments. For a child, the home and school environments are where the majority of occupations occur. Following a home and school assessment, the identified challenges and supports of the environment will be outlined, and those will be used to make recommendations. This could include assistive technology recommendations, reducing hazards or health risks, and contacting the school to determine the types of changes that have to be made in order to return to the classroom setting.

**Typical Interventions:**

- Advocate for the client in the school setting for increased time to complete required activities including classroom work and getting to and from different classrooms
- Promote a collaborative, open communication between health professionals and educational staff, educating staff on nature of disability and how to create an environment facilitating success
- Encourage identification of continuing environmental challenges to promote participation in the school environment and avoid withdrawn behaviors
- Address self-image and social difficulties through group activity
- Re-assess client and caregiver goals to determine if changes need to be made to the intervention plan based on functional outcomes and current goal completion
- Explore other meaningful occupations such as recreational activities that may require specialized training

(Smurr, 2010)
Environment

(Bing, 2015)
Early assessment is necessary to make modifications that successfully integrate a child into his or her particular setting. Different types of adaptive equipment can also be provided to promote task completion. Adaptations are completed based on:

1. Child’s performance skills
2. Environmental supports and barriers
3. Occupational obligations and task requirements

(Turpin & Iwama, 2011)

Depending on the type of amputation, prosthetic or non-prosthetic use, and need for a wheelchair, modifications will vary. The following section in the manual identifies how to modify different physical contexts within the school environment using the classifications of:

- Evaluation considerations
- Upper extremity limb loss
  - Non-prosthetic use
  - Prosthetic
- Lower extremity limb loss
  - Non-prosthetic use
  - Prosthetic
  - Use of wheelchair

The most common problem areas to inclusive education of children with limb loss include heavy doors, uneven surfaces, ramps with high inclines, travel
distances within the building, and entrance thresholds (Egilson & Traustadottir, 2009; Pivik, McComas, & LaFlamme, 2002). In order to promote participation and occupational performance, each setting within the school should be evaluated for potential challenges to students’ success.
The classroom is one of the most important settings for a child's occupational performance. A child spends the majority of his or her time in classrooms because education is one of their primary areas of occupation. The physical environment can present challenges to children who have experienced limb loss due to changes in functional capacity. Examples of potential barriers in a classroom setting are listed below.

**Evaluation Considerations:**

- Ease of opening the door to enter/leave the classroom
- Desk height, leg space, ample room to complete homework and classroom activities at the child’s desk and within the classroom itself
- Chair height, depth, and level of support
- Access to toys and supplies
- Adequate space in-between desks to move from one destination to the next
- Use of appropriate writing utensils and craft materials
- Time allotted to complete required tasks
- Availability of aid from teacher, paraprofessional, or fellow students
Upper Extremity Limb Loss:

Without Prosthetic

Necessary modifications may include:

- Place a basket of items the child uses everyday either in the desk or next to the desk for quick access
- Move all crafts and toys to lower shelves or cabinets to ensure they are easy to reach
- Modify routine to address risk of overuse syndrome
  - Be careful of repetitive motions that put strain on the body
  - Have class notes written or pre-printed for the student instead of the student needing to write quickly allowing more time to focus on content
- Allow more time for task completion including homework for self-efficacy and independence
- Increase assistance with note taking, homework assignments, writing, etc.
- Modifications to homework assignments

With Prosthetic

- Importance of two-handed tasks; including both limbs during functional activities to prevent learned nonuse
- Reaching, growing accustomed to mechanism of prosthetic whether body powered or myoelectric
- Prosthetic Process: Work on coordination of placement of terminal device, action of either body motion or muscle firing/isolation, and final activity performance
  - Body Powered: reaching mechanism associated with opening and adjusting clamp, motor planning, precision and accuracy tasks, specific terminal devices for handwriting and typing tasks
- Myoelectric: work on activating sensors and practicing isolation of particular muscle groups for more effective use of myoelectric prosthesis. Practice during functional activities particular to the classroom including handwriting, scissor use, object manipulation, grasping different shaped and sized objects, using a mouse at the computer, and typing tasks.
Lower Extremity Limb Loss:
Without Prosthetic

Doors:

• Create a buddy system to have one peer be designated “door helper” each week to hold open classroom doors when the child is entering or exiting the classroom

• Provide a doorstop for entering and exiting the classroom

Desks & Chairs:

• Observe the child seated in desk/chair to ensure proper positioning with feet flat on the floor, knees and hips bent at 90 degrees, and back straight and fully supported by the chair

• If there is not enough room or it is difficult to maneuver from sitting to standing, utilize a more spacious table when possible
  
  o Having a sturdy, supportive surface nearby to assist with sitting and standing could also be provided to facilitate transitional movement

• Providing a rolling chair to help roll away from the desk versus a more labored pushing and scooting method may assist with energy conservation and time management

• Position the child towards the front of the classroom for increased maneuverability to avoid narrow pathways between desks; this also decreases energy expenditure and time requirements to reach the door for leaving the classroom.

Access to Materials:

• When possible, keep a basket of items the child uses everyday either in the desk or next to the desk for quick access

• Move all crafts and toys to lower shelves or cabinets to ensure they are easy to reach
With Prosthetic

- Encourage as much wear time as possible during occupational performance tasks to strengthen remaining muscles to become accustomed to a different workload.

- Practice the class schedule with the child to work on endurance and strength needed to walk to different parts of the classroom.

- Encourage play and leisure activities with peers in the classroom with use of the prosthetic device including Simon Says, hide-and-go-seek, and tag.

- Remove all clutter and rugs from the floors to facilitate safe movement around the classroom.

- Schedule time to don and doff the prosthetic if still in the early phases of prosthetic integration.
  
  o For example, begin to don prosthetic device ten minutes before leaving the classroom and remove the prosthetic when seated at the desk.

**Tip:** Observe for appropriate body alignment and body mechanics when wearing and using the prosthetic. Abnormal patterns could lead to increased body strain and maladaptation leading to poor postural habits and increased pain (Kahle & Highsmith, 2006).

Use of Wheelchair

- Ensure the child has ample space at his or her desk including working surface area and that the child is able to access it fully. Standard desks may not accommodate a wheelchair to fit underneath it. Assess leg space to make sure the child is comfortable and can easily maneuver in and out of the desk area.

- Assess the wheelchair to ensure best fit for extended sitting including:
  
  o Elimination of pressure points

  o Freedom to reach to the front, to the sides, and below towards the floor

  o Comfort when seated for longer durations

  o Correct postural alignment
- Normal spinal curvature and neck extension
- Child’s body is in midline
- No obliquity or rotation is observed in the pelvis
- Feet are well supported by footrests

(Di Marco, Russell, & Masters, 2003)

- Have the child seated where he or she can easily maneuver around the classroom such as in the front of the classroom or provide a large enough pathway to reduce difficulty with movement
- Measure door width making sure it is adequately wide enough to allow the passage of a wheelchair
- Remove all clutter and rugs from the floors to facilitate safe movement around the classroom
- Keep a specialized storage area of frequently used items in a desk drawer, a bag attached to the wheelchair, or in a separate storage bin that can be easily reached to complete class assignments
Hallways

The hallways are common pathways for all students to get from one destination to the next. Hallways can present challenges to students with limb loss due to crowding and not having ample time to get to his/her destination. Examples of potential barriers found in hallways are listed below.

**Evaluation Considerations:**

- Crowding of hallways
  - May lead to pushing, shoving, and bumping associated with potential harm
- Width of pathways
  - Narrower hallways may make it difficult to maneuver, especially during heavy trafficked times
- Presence of handrails on the walls
- Time allotted to get from one destination to the other
- Height of drinking fountains
  - May be too high for reach if seated in wheelchair
• Difficulty of holding objects such as class materials or backpacks during transit

• Depending on the natural terrain and your geographical location, floors may be a slipping or tripping hazard due to tracking of sand, gravel, snow, rain, mud, etc.
Upper Extremity Limb Loss

Without Prosthetic:

- For both prosthetic and non-prosthetic use, close access to handrails may be helpful to avoid bumping into others or other objects.
- Finding a path less utilized may be beneficial so the child feels less pressured to get to class on time if hallways are crowded.
- Prevent overuse syndrome for carrying of class items by providing a backpack with adequate strapping or a rolling backpack for less strain.

With Prosthetic:

- It may be needed to address the child’s spatial body awareness to avoid damaging the prosthesis when maneuvering in busy crowds and avoid bumping others or other objects.
- It may be easier to transport materials in a backpack or rolling backpack.
Lower Extremity Limb Loss

Without Prosthetic

• Practice route to classrooms and normal transitions within the school building to strengthen muscles and use of prosthesis in busy situations

• Allow child more time to get to and from class by meeting with the multidisciplinary team and advocating for the child’s needs

• Identify access points to handrails and elevators as needed to reach certain destinations

• Assess hallway for potential hazards or barriers including cracks, ridges, slippery surfaces, extra rugs, and clutter and attempt to remove as many as possible

With Prosthetic

• Practice route to classrooms and normal transitions within the school building to strengthen muscles and use of prosthesis in busy situations

• Allow child more time to get to and from class by meeting with the multidisciplinary team and advocating for the child’s needs

• Identify access points to handrails and elevators as needed to reach certain destinations

• Assess hallway for potential hazards or barriers including cracks, ridges, slippery surfaces, extra rugs, and clutter and attempt to remove as many as possible

Use of Wheelchair

• Practice use of ramps, making sure that the child can easily utilize them and they are not too steep

• Find elevator access, if needed, and coordinate with teachers the expectations for being on time as waiting for an elevator may require a few minutes of leeway
• For carrying of materials, have backpack that either is attached to the wheelchair, or invite a helper to assist in bringing the child’s materials to class

• Measure door width making sure it is adequately wide enough to allow the passage of a wheelchair

• Measure the water fountain height and provide recommendations as necessary
  - For example, if too high, the child may need to have a fellow peer or helper fill a water bottle in order to have access to water and maintain proper hydration

**Tip:** The most common barrier associated with full participation and inclusion in the school environment was identified as a lack of expertise of the teaching and educational staff in terms of how to adapt the environment for children with special needs (Pivik, McComas, & LaFlamme, 2002). OTs are extensively trained in this area and can support the needs of the child and provide increased assistance to educational staff to make needed accommodations.
Students use the lunchroom everyday for at least one meal. Lunch is typically a time where children socialize and create friendships. The lunchroom can present challenges to children with limb loss due to the tight spaces between tables, hard to reach food items, and holding trays while trying to put food items on his/her tray.

**Evaluation Considerations:**

- Accessibility of food
- Ease of holding food/tray while in line
- Difficulty of paying for meal
- Maneuverability around tables and lines
- Usability of tables/chairs
- Ability to reach food while in wheelchair
- Amount of time required to stand in line
- Amount of time allotted to eat the meal
- Use of utensils
Upper Extremity Limb Loss

Without prosthetic

Necessary modifications may include:

- A paraprofessional holding the tray while the child decides what he/she would like to eat
- Adaptive eating utensils or a universal cuff
- A paraprofessional to cut food for the child with limb loss
- Rails so student can set down tray while in line
- More time for the child to eat lunch

With Prosthetic

Necessary modifications may include:

- Specific terminal device to hold eating utensils
- Adaptive eating utensils or a universal cuff
- A paraprofessional holding the tray while the student decides what he/she would like to eat
- Rails so student can set down tray while in line
- More time for the child to eat lunch
Lower Extremity Limb Loss

**Without prosthetic**

Necessary adaptations may include:

- Paraprofessional getting meal for the child
- Changing the location of tables/chairs in order for the student to maneuver in the lunchroom
- Place to store crutches
- Rail to set down tray while in line

**With prosthetic**

Necessary adaptations may include:

- Paraprofessional getting meal for the child
- Use of tables and chairs versus benches so a chair can be pulled out if the child needs room for the prosthetic
- Rail to set down tray while in line

**Use of Wheelchair**

Necessary modifications/adaptations may include:

- Paraprofessional getting meal for the child
- Paraprofessional pushing the wheelchair
- Use of tables and chairs versus benches so a chair can be pulled out
- Rail to set down tray while in line
- Lower food to allow a child in a wheelchair to access it
The library is where students learn how to find books, read books, and use the computer. Whole classes or individual students may go into the library. The library may present the challenges of maneuvering around the bookshelves, accessibility of high books, and computer usage for students with limb loss.

**Evaluation Considerations:**

- Accessibility of books for student
- Maneuverability around bookshelves, tables, chairs, and computers
- Height of computers
- Ease of use of the computer
- Undue strain to reach book
- Ability to remove chair for wheelchair
Upper Extremity Limb Loss

Without a Prosthetic

- Move relevant books lower for ease of access
- Provide student with a step stool
- Assistance from peers, teacher, or paraprofessional when reaching books
- Use of a bookstand to keep the book open while reading
- Assistance when using the computer
- Assistive devices for typing on the computer:
  - A type aid
  - Alternative keyboards
  - Joystick
  - Speech-to-text software

(Microsoft Accessibility, 2015)

With Prosthetic

- Move relevant books lower for ease of access
- Provide student with a step stool to reach books
- Assistance from peers, teacher, or paraprofessional when reaching books
- Use of a bookstand to keep the book open while reading
- Assistance when using the computer
- A specific terminal device for typing on the computer
Lower Extremity Limb Loss

Without Prosthetic

• Have a place to put crutches if necessary
  • Placement of books for students to be able to reach them reaching too far
  • Move bookshelves, tables, and chairs so a child with crutches can maneuver without problems

With Prosthetic

• Use movable chairs when in front of the computer

Use of Wheelchair

• Move bookshelves, tables, and chairs so a wheelchair can maneuver without problems
  • Placement of books for students to be able to reach them without getting out of their wheelchair or reaching too far
  • Use movable chairs when in front of the computer
  • Adapt height of the computer and keyboard to fit the child in a wheelchair
Physical education class is important for children with a limb loss to participate in so the student develops social relationships with their peers. Keeping active and feeling a part of something is crucial for the healing process and for the child’s psychosocial wellbeing.

**Evaluation Considerations:**

- Ability for child to use equipment
- Analysis of specific tasks
- Amount of energy expenditure the activities requires
- Environmental factors
- Comfort level of the student in participating in physical education class with peers
- Physical abilities and disabilities of the child
- Restrictions of the child
- Use of prosthetic, crutches, or wheelchair
- Possible modifications that can be made to the equipment
Upper Extremity Limb Loss

Without Prosthetic

- Physical education teacher will need to have an understanding of the child’s abilities and disabilities in regards to physical participation
- Children without a prosthetic will need to learn compensatory and adaptive techniques in order to participate in physical education class
- Adaptations will have to be made when the child:
  - Jumps rope
  - Plays baseball/softball
  - Plays volleyball
  - Plays basketball
  - Does pushups
  - Climbs
  - Plays Frisbee
  - Dances
- Adaptations/ accommodations may include:
  - A paraprofessional to assist the student in the class requirements
  - Having other students twirl the rope when jump roping
  - Having another student bat but having the student with a limb loss run to the different bases when playing baseball

With Prosthetic

- Physical education teacher will need to have an understanding of the child’s abilities and disabilities in regards to physical participation
• Children without a prosthetic will need to learn compensatory and adaptive techniques in order to participate in physical education class

• Adaptations will have to be made when the child:
  o Jumps rope
  o Plays baseball/softball
  o Plays volleyball
  o Plays basketball
  o Does pushups
  o Climbs
  o Plays Frisbee

• Adaptations/ accommodations may include:
  o A specialized terminal device for a specific sport
  o A paraprofessional to assist the student in the class requirements
  o Having other students twirl the rope when jump roping
  o Having another student bat but having the student with a limb loss run to the different bases when playing baseball
Lower Extremity Limb Loss

Without Prosthetic

• Depending on if the student uses crutches and how well they are at using this equipment will affect the adaptations that need to be made to the equipment or class

• Physical education teacher will need to have an understanding of the child’s abilities and disabilities in regards to physical participation

• Children without a prosthetic will need to learn compensatory and adaptive techniques in order to participate in physical education class

• Adaptations will have to be made when the child
  o Jumps rope
  o Plays a sport
  o Runs
  o Walks
  o Jumps
  o Rollerblades
  o Climbs
  o Dances

With Prosthetic

• Depending on if the student uses crutches, a prosthetic and how well they are at using this equipment will affect the adaptations that need to be made to the equipment or class

• Physical education teacher will need to have an understanding of the child’s abilities and disabilities in regards to physical participation
• Children without a prosthetic will need to learn compensatory and adaptive techniques in order to participate in physical education class

• Adaptations will have to be made when the child
  o Jumps rope
  o Plays a sport
  o Runs
  o Walks
  o Jumps
  o Rollerblades
  o Climbs

**Use of Wheelchair**

• Physical education teacher will need to have an understanding of the child’s abilities and disabilities in regards to physical participation

• Children without a prosthetic will need to learn compensatory and adaptive techniques in order to participate in physical education class

• Adaptations will have to be made when the child
  o Jumps rope
  o Plays a sport
  o Runs
  o Walks
  o Jumps
  o Rollerblades
- Dances
- Climbs

**Tip:** Participation in typical sports and recreation activities has been found to be crucial to the rehabilitation of children with limb loss. Inclusion in meaningful sports and physical activity can contribute to improved psychosocial wellbeing, cognitive functions, self-esteem, coping strategies, social interactions, physical development, and quality of life (Webster et al., 2001).

- OTs play an important role in encouraging full participation of children with limb loss and communicating with physical education staff to modify activities in order for the child to fully participate with his or her peers
- Communicate clear goals, expectations, and be aware of the child’s tolerance for additional stress on the prosthetic or residual limb (Webster et al., 2001)
Recess is where students learn social skills and intrapersonal skills such as self-esteem so it is important for the child to feel included in recess. Ideally all playgrounds would be universally designed so all students will be able to use the equipment no matter if they have a limb loss, prosthetic, or wheelchair.

**Evaluation Considerations:**

- Safety considerations
- Analysis of entire playground including:
  - Materials used
  - Height, width, depth of equipment
  - Railings
  - Flooring
  - Accessibility
- Weather conditions
- Use of prosthetic, crutches, or wheelchair
- Amount of open space for games
- Potential modifications that can be made to the playground equipment
Upper Extremity Limb Loss

Without Prosthetic

The OT will then advocate for modifications to the playground equipment to the principle of the school.

The child may have troubles using the playground equipment of:

- Monkey bars
- Swings
- Climbing rope
- Ladders
- Poles
- Climbing walls
- Nets

It will be difficult to modify the actual equipment however there are many things the child with an upper extremity limb loss can do on the playground equipment and on the ground including:

- Playing tag
- Climbing the stairs
- Going down the slide
- Playing lava tag
- Double Dutch jump rope
- Hopscotch
With Prosthetic

The OT will then advocate for modifications to the playground equipment to the principle of the school. The child may have troubles using the playground equipment of:

- Monkey bars
- Swings
- Climbing rope
- Ladders
- Poles
- Climbing walls
- Nets

If the child uses a prosthetic he/she may get a specialized terminal device to hold onto rope or hook to use the monkey bars. It will be difficult to modify the actual equipment however there are many things the child with an upper extremity limb loss can do on the playground equipment and on the ground including:

- Playing tag
- Climbing the stairs
- Going down the slide
- Playing lava tag
- Double Dutch jump rope
- Hopscotch
Lower Extremity Limb Loss

Without Prosthetic

The child with a lower extremity limb loss will have troubles using the equipment of:

• Stairs
• Slides
• Swings
• Ladders
• Climbing walls
• Bridges
• Nets

The OT will then advocate for modifications to the playground equipment to the principle of the school. Some of the modifications may include:

• Ramps instead of stairs
• Swings that a wheelchair can fit in
• Slides a wheelchair can fit on
• Using rubber flooring instead of woodchips, sand or small rocks on the ground

If a child does not have a prosthetic he/she may have a difficult time getting up onto the equipment.
With Prosthetic

The child with a lower extremity limb loss will have troubles using the equipment of:

- Stairs
- Slides
- Swings
- Ladders
- Nets
- Climbing walls
- Bridges

The OT will then advocate for modifications to the playground equipment to the principle of the school. Some of the modifications may include:

- Ramps instead of stairs
- Using rubber flooring instead of woodchips, small rocks or sand on the ground

The child may not even be able to get the wheelchair to the playground due to woodchips or small rocks on the ground.

Use of Wheelchair

The child with a lower extremity limb loss will have troubles using the equipment of:

- Stairs
- Slides
• Swings
• Ladders
• Climbing walls
• Nets
• Bridges

The OT will then advocate for modifications to the playground equipment to the principle of the school. Some of the modifications may include:

• Ramps instead of stairs
• Swings that a wheelchair can fit in
• Slides a wheelchair can fit on
• Using rubber flooring instead of woodchips or small rocks on the ground

There may not be any playground equipment a child with a wheelchair can utilize. The child may not even be able to get the wheelchair to the playground due to woodchips, sand, or small rocks on the ground. If a child does not have a prosthetic he/she may have a difficult time getting up onto the equipment.
Positive socialization with peers is extremely important for children with a limb loss especially since they tend to have decreased participation, fewer friends, get bullied, and isolate themselves (Asher & Gazelle, 1999; Nadeau & Tessier, 2006; Vreeman & Carroll, 2007). Perceived social support has been found to improve self-esteem and decrease depressive symptoms (Michielsen, Wijk, & Ketelaar).

**Evaluation Considerations:**

- Amount of friends and perceived support
- Participation in class and with peers
- Isolation tendencies
- Quality of friendships
- Signs of being bullied
- Psychological wellbeing
**Intervention Ideas:**

- Talking to peers about the limb loss to create an awareness of the disability
  - Send out a letter to schoolmates and their families describing the limb loss before the student gets back to school
  - Have the child’s parents or teacher talk to the class about the limb loss
- Discuss bullying with the student and the class
- Encourage social participation by playing games with peers in therapy
- Work with student on social skills including eye contact and appropriate behaviors

**Tip:** OTs should alert the multidisciplinary team to watch for signs of the child becoming increasingly withdrawn. Withdrawn behavior patterns were associated with symptoms of depression in children with limb loss and could be a potential outcome of peer curiosity or bullying (Michielsen, Wijk, & Ketelaar).
A child’s psychological wellbeing is likely to be affected after a limb loss. The psychological factors a child with a limb loss may experience include decreased self-esteem, depression, and negative self-talk (King, Law, Petrenchik, & Hurley, 2013; Michielsen et al., 2010). It is important to keep in mind that each individual is unique so the emotional healing process is not linear and has no timeline (Conyers & Prigge, 2011).

**Evaluation Considerations:**

- Self-esteem
- Self-confidence
- Depression symptoms
- Social problems
- Negative self-talk
- Self comparison to “normal” kids
- Bullying
- Isolation tendencies
• Location of limb loss
  o More noticeable limb loss like shoulder or hip disarticulation without a prosthetic may cause more psychological distress.

**Intervention Ideas:**

• Discuss bullying and boundaries

• Interventions for self-esteem and self-confidence including:
  o Writing positives about self
  o Gratitude journal
  o Write complements to a partner

• Group activities for increased social participation
Addressing the Psychological Needs of Caregivers (Bing, 2015)
With an acquired limb loss, the shock can be overwhelming. Children are not the only ones who will be adjusting to the sudden change as caregivers are also at risk for psychological distress due to financial obligation, changes in family routines and rituals, not feeling prepared to handle their child's disability, and feeling helpless (Varni & Setoguchi, 1993). It is imperative that the OT promotes open communication between all members of the care team and reminds caregivers that the feelings they are experiencing at this time are normal. OTs are able to offer assistance and resources to help relieve the burdens of the caregiver.

Support

• Providing access to resources is critical so the caregivers can get in touch with others who may be experiencing similar difficulties.
  
  o This could be in the form of: support groups, grief counseling, and finding more information about a child’s diagnosis.

• Always ask for caregiver concerns following therapy or reassessments, and address any additional information needs that could help the caregiver feel more in control of the situation.

• OTs will be an advocate for both child and caregivers. Support the right of the family to make their own decisions about the health care services that are received. This may require the OT to be a strong voice in the multidisciplinary team.

• Recovery is not linear and constantly ongoing. Each phase presents different challenges and requires different coping strategies.

Encouragement

• Encourage caregivers to be positive and strong although it is a difficult situation. Encourage them to seek professional help when dealing with issues of guilt, grief, or depression.
Caregiver attitudes make a large difference to children. Acceptance may take time, but emphasize that although the journey may be difficult, a child can return fully to previous roles and occupations with modifications.

Emotional reactions to medical traumas can vary. Remind caregivers that all limb loss cases are unique and success can be achieved although rehabilitation is not easy.

Empowering caregivers is crucial because they may be experiencing feelings of not being in control leading to a feeling of hopelessness or helplessness. Provide caregivers access to resources including access to support groups, information databases, and opportunities to advocate for their child.
Resources

(Bing, 2015)
Sources of education, support, or advocacy opportunities that can be shared with caregivers and the multidisciplinary team include:

1. **The Amputee Coalition of America**
   - The Amputee Coalition of America’s mission is to connect with those affected by limb loss and provide an array of free resources that can positively impact an individual so that he or she can achieve their desired goals (2009).
   - Specific resources include: being able to contact a specialist for more information, descriptions about the healthcare team and resources for each member of the multidisciplinary team, legislative and advocacy opportunities, the most current research about limb loss, and access to multiple support networks.
   
   [http://www.amputee-coalition.org](http://www.amputee-coalition.org)

2. **The National Limb Loss Resource Center**
   - This resource, developed by the Amputee Coalition of America, provides users with detailed and free access to information that is supported by medical experts who work with limb loss across the lifespan. This site can be a great tool for all members of the multidisciplinary team while providing increased resources and online support for caregivers.
   - Specific resources include: information based on amputation level, resources for caregivers, children, and practitioners, educational publications, tips for pain management, tips for coping with limb loss, access to support groups, and access to an information specialist.
   
3. The American Trauma Society

- The American Trauma Society is dedicated to the prevention of traumatic injury and to provide advocacy for those who have experienced a traumatic injury in health care. It provides information to all people about traumatic injury.

- Specific resources include: information about the different levels of trauma centers and services provided at each, how to locate a local trauma center, member access to the Trauma Information Exchange Program, preventative strategies, and professional development for healthcare practitioners.

   http://www.amtrauma.org

4. The Helping Hands Foundation

- The Helping Hands Foundation was created to support, share similar experiences, and provide information to families and children affected by upper extremity limb loss.

- Specific resources include: a provision of informational books, a list of hospitals and care centers that are specifically dedicated to assisting individuals with upper limb loss, and a collection of support networks.

   http://helpinghandsgroup.org

5. The Limbless Association

- The Limbless Association provides sources that are devoted to help the limb loss community and individuals who have experienced a limb amputation.

- Specific resources include: access to current news and publications, a list of prosthetic fitting centers and disabled service centers, a collection of support links, various bodies and associations designed to address the physical, psychosocial, financial, and advocacy issues surrounding limb loss, and research dedicated to fitness and sports with limb loss.

   http://www.limbless-association.org/index.php/directory/bodies
6. Anxiety and Depression Association of America (ADAA)

- The ADAA is an organization that supplies resources for individuals who experience anxiety or depression that support them to be successful and reduce the effect of anxiety and depression on their daily lives.

- Specific resources include: how to find help specific to a client’s needs, numerous fact sheets detailing specific anxiety disorders and symptoms and signs of depression, how to manage and cope with the symptoms of anxiety and depression, and resource tools for professionals.

  http://www.adaa.org


- The U.S. Department of Health & Human Services: The Child Welfare Information Gateway is designed to assist health care professionals by providing resources that help empower children and their families.

- Specific resources include: access to state and federal resources, a collection of topics related to the health and wellbeing of children and families, behavioral wellness for children and families, and detailed legislation in regards to child welfare

  https://www.childwelfare.gov/survey/
Appendices
### Appendix A

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Notes:
Appendix B

Prosthetic Regimen Checklist:

☐ Clean the residual limb every day with mild soap and water. Avoid soaking as this can cause the skin to be too tender.

☐ Thoroughly dry the area completely before putting on your prosthesis.

☐ If supplied with a shrinker, be sure to wear the shrinker as instructed when not wearing the prosthetic.

☐ The prosthetist may provide a sock or liner to be worn in conjunction with the prosthetic during scheduled wear times.

☐ Before donning the prosthetic, be sure to use a new sock each day to avoid skin irritation.

☐ Use recommended lotions or creams at night. Do not use these items in the morning prior to donning the prosthetic as it may affect the fit.

☐ **Never** use lotion with silicone gel liners.

☐ Examine the residual limb tissue *daily* for signs of redness, irritation, or skin breakdown and alert the prosthetic management team immediately if these conditions persist.

(Cobb Prosthetics & Orthotics, 2011)
Prosthetic Wear Schedule:

Day 1: Wear the prosthetic for a ½ hour.

- It takes time to become accustomed to the feeling of the prosthetic and it is best to get used to it in short time increments.

Week 1: If no persisting redness or skin irritation, increase the wear time to 1 hour a day.

Week 2: If no persisting redness or skin irritation, increase the wear time to 2 hours a day.

Week 3: If no persisting redness or skin irritation, increase the wear time to 3 hours a day.

Week 4: If no persisting redness or skin irritation, the child can shift to a full-time wear schedule and the prosthetic can be put on in the morning and taken off at night.

(Peterson, 2012)

Note: Do not progress to the next week unless the child can meet the demands of the wearing schedule of the previous week.

Be sure to encourage the child to use the prosthetic during functional activities consistently. Remember, practice makes perfect!

Open communication between client, caregivers, and the healthcare team is critical for prosthetic wearing success. A need for adjustments is part of the process. Encouraging open dialogue is crucial for best fit of the prosthetic.
References


Peterson, J. (2012). The prosthetic habilitation of a congenital, transradial limb deficient child: A case study analyzing the functional effectiveness and the benefits of early prosthetic fitting, appropriate prosthetic equipment, and

CHAPTER V
SUMMARY

The purpose of this scholarly project was to define the role of the occupational therapist working with children following traumatic limb loss in the school setting. Through the review of literature, one main problem emerged; the lack of research involving occupational therapy and the reintegration of children in the school setting following traumatic limb loss. The majority of literature that was reviewed focused on specific aspects of limb loss, isolating it to individual topics including physiological, psychological, and emotional changes. However, limited data was found addressing the holistic concerns of a child following traumatic limb loss and the return to his or her natural contexts, including the school environment. The identification of this problem led to the development of the reintegration manual for OTs working in the school setting with children following limb loss.

The manual, designed specifically for OTs working in the school environment, is a unique guide detailing the OT’s role within the healthcare team, specific evaluation considerations within the school setting, tips for modifications and adapting the environment to promote occupational performance, and helpful resources that can be provided to all members of the multidisciplinary team and caregivers to address concerns or find further information. The layout of the manual is easy to read and well organized.
which allows for the OT to find needed information quickly in order to spend more time focused on the application of the outlined interventions. The PEO Model was used as the foundation for the environmental adaptations and interventions while guiding the OT to utilize this model during the evaluation process in order to make the therapeutic process truly holistic and client-centered. Examining the relationships between each element of person, environment, and occupation was imperative in determining the needed interventions and environmental adaptations created to find the best fit to promote occupational performance and engagement. Each section detailing the environmental modifications specific to each setting within the school institution is described in detail so that a skilled OT reading it for the first time will be able to implement the modifications that would best suit his or her client with ease. The multiple elements that are addressed throughout the manual have been described with the ability of variability in mind, meaning that each intervention or evaluation consideration could be completed differently based on the unique ability of the client, supplies available to the therapist, and type of school institution being assessed.

When creating a resource for the occupational therapy profession in an area of research that is particularly lacking, limitations and barriers must be addressed. The limitation of the product includes the SP has not yet been implemented so there is a lack of evidence-based literature specific to OT for children after a limb loss and the reintegration process into the school setting. Another limitation is that the authors have not provided therapy to children after a traumatic limb loss.

Overall, this manual is the beginning to addressing the lack of evidence in the area of childhood traumatic limb loss and occupational therapy in the school setting.
Additional research is recommended to expand the scope of occupational therapy services for children with limb loss. In the future, with more research and support, the manual could be adapted to include other natural environments and occupations that children engage in. The benefits of adapting these environments through occupational therapy services may promote an improved quality of life and increased physiological, psychological, and emotional wellbeing for children with limb loss.
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118


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Impact of prostheses on function and quality of life for children with unilateral


