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Outdoor Recreation for People With Spinal Cord Injuries: An Educational Video Series

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Outdoor Recreation for People With Spinal Cord Injuries: An Educational Video Series

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Abstract

More than 15 million people globally are living with spinal cord injury (SCI). Only half of people with SCI engage in leisure activities and approximately 71% of the population reports dissatisfaction in their leisure participation. There are numerous intrinsic and extrinsic barriers that lead to these significant declines in leisure exploration and participation, including lack of knowledge and inaccurate accessible online information. In correlation with these barriers, occupational therapy practitioners underutilize leisure participation during the rehabilitation process for people with SCI and this is an underreported topic in the literature. Occupational therapy practitioners and people with SCI lack knowledge of adapted outdoor recreational activities that people with SCI can engage in. The purpose of this project was to create an educational video series to promote participation in adapted outdoor recreational activities among people with SCI. An educational video series containing 18 videos was created through the culmination of literature review, communication with stakeholders, and gathering data during capstone site experience. Topics incorporated in this video series include background of SCI and outdoor recreation, precautions, equipment, transfers, participation expectations for cervical and thoracic level SCI, and opportunities for outdoor recreation participation in Colorado. The outdoor recreational activities that are reviewed in this educational video series include archery, cycling, kayaking, and paddleboarding.

Keywords: spinal cord injury, occupational therapy, outdoor recreation, adapted recreation

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Outdoor Recreation for People With Spinal Cord Injuries: An Educational Video Series

Chapter 1: Needs Assessment

This capstone project addresses the need for educational materials to promote participation in adapted outdoor recreational activities among people with spinal cord injuries (SCI).

Background

Spinal Cord Injuries

SCI affect sensory and motor signal conduction across the lesion site as well as the autonomic nervous system (American Spinal Injury Association [ASIA], 2021). SCI are developed from non-traumatic causes or traumatic injuries and are classified as complete or incomplete (ASIA, 2021; Ding et al., 2022).

The World Health Organization estimates that globally more than 15.4 million people are living with SCI, meaning approximately 721 to 906 out of one million people have experienced an SCI (Ding et al., 2022; World Health Organization, 2024). Furthermore, the incidence of SCI in the United States is 17,900 new cases per year, with males and the elderly demonstrating the highest rates (Ding et al., 2022; Rayes et al., 2022). Among those who were diagnosed with SCI, the average age increased from 28.3 in the 1970s to 37.1 years old in 2008. Worldwide research reports cervical level SCI accounting for over half of all SCI while demonstrating higher rates of morbidity and more debilitating effects.

Spinal Cord Injuries Impact on Function

Changes in functional ability occur after an SCI. The following areas may be impaired: pain and temperature, motor function, proprioception, tactile sensation, vibratory sensation, reflexes, bowel and bladder dysfunction, sexual dysfunction, postural control, respiratory

functioning, and changes in muscular tone (Bennett et al., 2022). Impairment in any or all of these areas has a significant effect on occupations in daily life.

Impact of Spinal Cord Injury on Outdoor Recreation Participation

Among the occupational impacts that are seen in individuals with SCI, significant declines are seen in participation in recreational activities and social participation (Barclay et al., 2015; Boyce & Fleming-Castaldy, 2012; Hwang et al., 2016; Kemeny et al., 2020; Labbe et al., 2019; Sar, 2022; Slater & Meade, 2004; Taylor & McGruder, 1995). Leisure is an area of occupation and is linked to exploration and participation activities (American Occupational Therapy Association [AOTA], 2020). Deficits in leisure exploration and participation lead to occupational isolation in social participation, leisure, and play, thus adversely affecting physical and psychological health (Barclay et al., 2015; Price et al., 2010). The impact of these occupations is one contributing factor to this population's high rates of depression and sedentary lifestyle, resulting in increased reports of mortality and comorbidities (Slater & Meade, 2004; Williams & Murray, 2015). All of these are of concern, as these decrease one's health, well-being, and quality of life.

Effects of Participation in Outdoor Recreation in People With Spinal Cord Injury

However, participation in social and leisure activities has been shown to combat these challenges within the SCI community. Strong correlations between participation in recreation activities and enhanced physical health, psychological health, cognition, quality of life, life satisfaction, psychosocial status, and well-being have been noted for people with SCI (Anneken et al, 2010; Boyce & Fleming- Castaldy, 2012; DelGrande et al., 2020; Dorsch et al., 2016; Hwang et al., 2016; Kemeny et al., 2020; Labbe et al., 2019; Price et al., 2011; Ryan et al., 2023; Schonherr et al., 2005; Slater & Meade, 2004; Smith & Hsieh, 2017; Taylor & McGruder, 1995;

Wickham et al., 2009). Furthermore, these positive outcomes are amplified when recreational activities are completed outdoors (Dorsch et al., 2016). Slater & Meade (2004) and Smith & Hsieh (2017) noted participation in recreation activities have been shown to increase occupational performance and participation in activities of daily living (ADL) and instrumental activities of daily living (IADL) through utilization of Craig's Handicap Assessment and Reporting Technique (CHART). Improvement in these areas support the OT process and its projected outcomes.

Occupational Therapy's Role

Because SCI can be a barrier to participation and a challenge to effective occupational performance, occupational therapy (OT) has an important role to play enabling the participation of people with SCI in recreational activities. OT practitioners (OTPs) facilitate engagement in meaningful occupations, such as outdoor recreational occupations (AOTA, 2020). However, researchers have noted that participation in leisure activities for the SCI population is an underutilized intervention within the scope of OT and underreported in the OT literature (Schonherr et al., 2005; Wickham et al., 2000). OTPs can promote increased performance and participation in leisure activities for people with SCI through the lens of the Person-Environment-Occupation-Performance (PEOP) model and the rehabilitative framework. The PEOP model can be used to assess barriers and accomplishments in occupational performance through using a dynamic lens between personal, environmental, and occupational influences on outdoor recreational activities for people with SCI (Baum et al., 2015; Hwang et al., 2016; Ryan et al., 2023). Once barriers are identified, the OTP can address these through the rehabilitative framework using compensatory strategies and adaptations within the task to achieve improved occupational performance (Cole & Tufano, 2020). Using compensatory strategies and

adaptations, OTPs can build upon the remaining skills people with SCI present to promote participation and enhance occupational performance in outdoor recreational activities.

In addition to outdoor recreation being an underutilized intervention and underreported in the OT literature, people with SCI report either a lack of knowledge or inaccurate accessible information online regarding opportunities in this occupation (Arbour-Nicitopoulos et al., 2009; Ryan et al., 2023). These barriers result in a lack of knowledge regarding outdoor recreation among people with SCI, and thus, decreases occupational participation and performance. Furthermore, these factors have been reported to cause people with SCI to use a trial-and-error approach during participation and resulted in scheduling difficulties (Ryan et al., 2023). These aspects can be unfavorable for people with SCI to initiate participation in adapted outdoor recreational activities. However, when people with SCI have access to a supportive therapeutic team that facilitates opportunities to participate in leisure activities, they report higher life satisfaction than those without leisure activities and increased likelihood to participation (Alve & Bontje, 2019; Barclay, 2015). With an expanse of accurate knowledge available and OTPs' facilitation and advocacy for people with SCI to engage in outdoor recreational activities, client outcomes can be supported through improved overall functional status, self-efficacy, social integration, and psychological health (Alve & Bontje, 2019; Slater & Meade, 2004).

Problem Statement

OTPs and people with SCI lack knowledge of adapted outdoor recreational activities that people with SCI can engage in.

Purpose statement

The purpose of this project was to create an educational video series to promote participation in adapted outdoor recreational activities among people with SCI.

Rationale for Proposed Project

This capstone project was essential to address the multitude of barriers leading to a lack of knowledge among people with SCI and OTPs for adapted outdoor recreational activities. With significant decreases seen in outdoor recreation participation post-SCI and the negative effects reported due to this decrease, an increase in knowledge among people with SCI and OTPs promote increased engagement within this occupation. Furthermore, mitigating the lack of knowledge in precautions, equipment, and participation expectations in adapted outdoor recreation activities facilitate increased safety for people with SCI and promote positive client outcomes.

Significance of Proposed Capstone

The creation of this educational video series informs OTPs of the knowledge necessary to create opportunities for education, advocacy, and empowerment of people with SCI through leisure exploration and participation. Implementation of adapted outdoor recreational activities support people with SCIs' quality of life, mental health, physical health, and life satisfaction. The availability of this resource informs both OTPs and people with SCI, and, in turn, leading to increased quality of life, health, and wellness through participation in outdoor occupation.

Preliminary Capstone Objectives

Learning objectives

- Examine the barriers of participation in adapted outdoor recreational activities for people with SCI.
- Distinguish the various adaptive equipment available for outdoor recreational activities.
- Identify how different levels of SCI participate in outdoor recreational activities.

- Evaluate the effects that participation in physically active leisure activities have for people with SCI.
- Examine established adapted outdoor recreational programs for people with SCI to identify areas of improvement.
- Analyze OTPs' unique role and contributions in accessing outdoor recreation for people with SCI.
- Apply principles of cinematography and adult learning theory to the making of educational videos.

Outcome objectives

An educational video series was created to promote participation in adapted outdoor recreational activities among people with SCI. The video series addressed the following areas:

- precautions for adapted outdoor recreational activities to promote safety with participation
- adaptive equipment needed for engagement in various adapted outdoor recreational activities
- impact of injury levels and current abilities on participation in adapted outdoor recreational activities
- opportunities for outdoor recreational activities in Colorado for people with SCI

Assumptions

An underlying assumption to this project is that people with SCI and OTPs will seek out education on adapted outdoor recreational activities and benefit from the educational video series. Furthermore, it is assumed that these educational videos will inform people with SCI and OTPs on adapted outdoor recreational activities, which will lead to increased participation.

Limitations

Due to the timeframe in which the capstone project was completed, not all adapted outdoor recreational activities were included in the educational video series. Additionally, I lacked experience in videography and video editing. Due to this inexperience, the lack of videography programming and equipment presented difficulties in the creation of the video series. Furthermore, there were limited sources of literature on participation expectations in adapted outdoor recreational activities for people with SCI.

Delimitations

A delimitation to this project is that the educational video series was published online and in English. The selected population and topic were other delimitations as research supports a lack of knowledge and decreased participation in outdoor recreation among people with SCI.

Chapter 2: Literature Review

Spinal Cord Injury Background

The spinal cord works as a channel in which one's body and brain transmits sensory and motor information (ASIA, 2021). Injuries to the spinal cord disrupt this conduit, resulting in motor and sensory deficits below the level of lesion affecting one's ability to participate in daily occupations. A SCI can occur from traumatic or nontraumatic causes and are classified as either complete or incomplete. Approximately 90% of SCIs occur from traumatic mechanisms of injury (Budash, 2021; Ding et al., 2022). Most SCIs are a result of motor vehicle accidents (40%) and falls (30%). There are several incomplete SCI conditions including Brown-Sequard, central cord syndrome, anterior cord syndrome, cauda equina syndrome, and conus medullaris syndrome (ASIA, 2021). Each incomplete SCI condition presents with varying motor and sensory deficits.

Motor and sensory deficits from the various incomplete SCI conditions impact occupational participation and performance in unique ways based on the condition's presentation. People with central cord syndrome present with damage to the middle of the spinal cord resulting in increased weakness in the upper extremities than compared to the lower extremities (ASIA, 2021; Budash, 2021). Brown-Sequard syndrome is caused by an injury to one side of the spinal cord causing same sided loss of proprioception, vibration sensation, and loss of motor control at the site of the injury and below. Additionally, people with Brown-Sequard syndrome experience the absence of pain and temperature sensation contralaterally. Anterior cord syndrome results from damage to the anterior two-thirds of the spinal cord and presents with loss of motor function, pain, and temperature sensation at and below the injury level. Cauda equina syndrome is caused by damage to the lumbosacral nerve roots and result in flaccid paralysis of the lower extremities, which is dependent upon the level of injury, partial or

complete sensory function loss, and areflexic bladder and bowel. Conus medullaris syndrome presents clinically similar to cauda equina syndrome with the addition of damage to the lumbar spinal cord. This additional damage results in a mixed presentation of upper and lower neuron symptoms with the possibility of reflex activity preservation.

Incomplete SCIs are also characterized by sensory and motor sacral sparing of the fourth and fifth sacral (S4/5) spinal cord roots (ASIA, 2021). However, complete SCIs are characterized by complete sensory and motor function loss below the lesion level and no sacral sparing is present. Tetraplegia is a complete SCI condition where all four extremities are affected by a lesion in the cervical spine. Paraplegia is a complete SCI condition where the lower extremities are affected by a lesion to the thoracic, lumbar, or sacral spine. To determine the neurological level of injury (NLI) of an individual's SCI, a clinician should assess the functioning sensory and motor levels referring to the most inferior segment with intact sensation and antigravity motor function. These levels are determined through an evaluation of dermatomes and myotomes using the ASIA assessment. The ASIA assessment reviews 28 dermatomes on both sides of the body, deep anal pressure, and ten myotomes on both sides. Dermatomes test for sensation, are graded on a 3-point scale, and assess sharp-dull discrimination and light touch. Myotomes test for motor function through manual muscle tests (MMT) and are graded on a 6-point scale. From these tests, the ASIA assessment will enable clinicians to score the degree of impairment ranging from complete, sensory incomplete, two levels of motor incomplete, and normal, as well as the NLI. The zone of partial preservation (ZPP) can also be evaluated through the ASIA assessment. ZPP notes any motor or sensory function that remains partially innervated below the NLI (ASIA, 2021). These outcomes inform clinicians of expected functional skills and are important to OTPs in preparation for training using compensatory strategies to engage in occupations.

Higher levels of SCI require increased dependence as they have a greater impact on functional skills (Budash, 2021). Above the sixth cervical vertebrae (C6), limited movement to the head, shoulders, and upper extremities (UE) is seen. A C6 level SCI gains the motion of wrist extension, which can greatly impact the ability to perform occupations more independently with a tenodesis grasp. Thoracic level SCIs allow for full UE movement and more inferior levels provide greater trunk control and strength. Lumbar-level SCIs will show motor movements of the hips and knees as well. Each level of SCI requires different adaptive equipment needs based on functional skills. Respiratory support, such as ventilation, is needed for C1-C3 levels and should be considered when recommending and participating in occupations. Bowel and bladder function is another skill that can greatly impact participation and performance in occupations and is important to be assessed by a clinician. Living with a SCI is a highly individualized experience with varying levels of needs and resources (Budash, 2021). All of these should be taken into consideration when creating functional goals, implementing interventions, and providing recommendations to optimize outcomes and minimize complications throughout the OT process.

Impact of Spinal Cord Injury on Outdoor Recreation Participation

Significant declines in social and leisure-time physical activity (LTPA) participation are seen in people with SCI (Barclay et al., 2015; Boyce & Fleming-Castaldy, 2012; Hwang et al., 2016; Kemeny et al., 2020; Labbe et al., 2019; Sar, 2022; Slater & Meade, 2004; Taylor & McGruder, 1995). LTPA is defined as any voluntary physical activity that one chooses to participate in during their spare time (Hwang et al., 2016). Outdoor recreational activity participation falls within the concept of LTPA (Ryan et al., 2023). Research reports less than 50% of adults with disabilities participate in LTPA and 25% have high levels of sedentary behavior (Kemeny et al., 2020). Furthermore, half of people with SCI report being physically

inactive and spend very little time participating in leisure activities, although they identified themselves as being physically active pre-injury (Hwang et al., 2016; Ryan et al., 2023). This significant decrease in physical exercise and leisure participation among people with SCI has resulted in a 71 percent dissatisfaction rate with their activity levels (Hwang et al., 2016). Dissatisfaction with leisure participation can affect physical and psychosocial well-being.

People who reported unsatisfactory leisure participation levels identified reduced quality of life (QoL) as well (Schonherr et al., 2005). Additionally, people with SCI report less community engagement than those without SCI, supporting other findings that SCI has a significant impact on social participation (Boyce & Fleming- Castaldy, 2012; Labbe et al., 2019). The impact on social participation is so significant that the United Nations named social participation a critical element in the *Convention on the Rights of Persons with Disabilities* (Labbe et al., 2019). Lower rates of social participation can lead to decreased levels of independence, financial income, and increased healthcare costs. Social networks for people with disabilities tend to only include family members and healthcare professionals. Participation in outdoor recreational activities can combat these deficits seen in people with SCI's social and LTPA participation.

Significant losses in social and LTPA occupations can lead to loss of self-identity, decreased psychological health and volition, comorbidities, secondary conditions, high-risk behaviors, and even premature death (Boyce & Fleming-Castaldy, 2012; Kemeny et al., 2020; Taylor & McGruder, 1995). People with disabilities experience unequal access to health prevention activities and health promotions when compared to non-disabled people of the same age (Kemeny et al., 2020). Due to this disadvantage, people with chronic health conditions are three times more likely to experience comorbidities, secondary conditions, and premature death.

These factors are seen in people with SCI with increased rates of pressure ulcers, urinary tract infections (UTI), diabetes mellitus, cardiovascular disease, pain, obesity, mental health conditions, respiratory problems, osteoporosis, and stress (Hwang et al., 2016; Kemeny et al., 2020). The most common causes of death among people with SCI are identified as infections and respiratory complications (Ryan et al., 2023). In addition to these concerns, decreased muscle force, pain, spasticity, fatigue, balance deficits, and decreased endurance present challenges in engaging in LTPA (DelGrande et al., 2020). Decreased engagement in social and leisure occupations can lead to declines in psychological and physical health in conjunction with significant loss of prior meaningful activities (Boyce & Fleming- Castaldy, 2012; Ryan et al., 2023). OTs can combat these concerns through education, advocacy, and implementation of LTPA within the rehabilitation process for people with SCI in preparation for community reintegration.

Effects of Participation in Outdoor Recreational Activities in People with Spinal Cord Injury

Numerous research articles discuss the positive effects seen in people with SCI when increasing participation in recreational activities. Participation in physical and recreational activities has strong correlations to improved physical health, enhanced psychological health, improved cognition, positive psychosocial status, and increased QoL, life satisfaction, and well-being (Anneken et al., 2010; Boyce & Fleming- Castaldy, 2012; DelGrande et al., 2020; Dorsch et al., 2016; Hwang et al., 2016; Kemeny et al., 2020; Labbe et al., 2019; Price et al., 2011; Ryan et al., 2023; Schonherr et al., 2005; Slater & Meade, 2004; Smith & Hsieh, 2017; Taylor & McGruder, 1995; Wickham et al., 2009). Therefore, participation in these occupations is shown to improve overall functional status which translates to increased performance and participation

in ADLs and IADLs (Slater & Meade, 2004). This evidence is further supported by findings that people with SCI who participate in physical and recreational activities scored significantly higher on the CHART in the domains of physical independence, mobility, occupation, and social integration (Slater & Meade, 2004; Smith & Hsieh, 2017). Increases seen within these domains lead to more fulfilled social roles in the community and home, thus improving mental health, social competence, and satisfaction in levels of participation (Smith & Hsieh, 2017). All of which are important factors of occupational engagement and balance for people with SCI.

Dorsch et al. (2016) reported the positive effects of physical exercise and recreation participation among people with SCI are amplified when these activities are completed outdoors. Furthermore, participation in outdoor recreational activity shows increases in engagement, well-being, and decreased tension when compared to indoor physical activity (Ryan et al., 2023). Accordingly, this indicates the importance of participation in outdoor recreational activities for people with SCI to improve physical and psychosocial health.

Physical improvements seen in people with SCI who participate in LTPA include increased strength, coordination, endurance, flexibility, aerobic power, and immune function (Hwang et al., 2016; Kemeny et al., 2020; Ryan et al., 2023; Taylor & McGruder, 1995). Decreases in secondary comorbidities, such as integumentary complications, infections, weight gain, hypertension, risks for various cancers, cortisol levels, cardiovascular disease, spasticity, respiratory infections, deep vein thrombosis, osteoporosis, mortality, and UTIs, are seen with increases in participation of LTPA (Kemeny et al., 2020; Ryan et al., 2023; Slater & Meade, 2004; Taylor & McGruder, 1995). Lundstrom et al. (2017) report physical activity can also prevent or reduce common orthopedic conditions, such as shoulder pain. These marked physical benefits are also responsible for the findings that people with paraplegia who participate in

physical activity are found to have three times less likelihood of frequent and less expensive hospitalizations (Slater & Meade, 2004). Participation in outdoor recreational activities also target common rehabilitation goals for people with SCI of postural stability, upper extremity range of motion (ROM) and strength, grasp, trunk ROM, balance reactions, and bilateral coordination as well (Taylor & McGruder, 1995). Implementing outdoor recreational activities into SCI rehabilitation is relevant and adheres to the role of OT by addressing social participation and occupational engagement.

Significant correlations between positive psychosocial and mental health are seen with the quantity and quality of participation in LTPA among people with SCI. Recreational activities have been shown to be strongly related to well-being, QoL, and life satisfaction (Boyce & Fleming- Castaldy, 2012; DelGrande et al., 2020; Hwang et al., 2016; Kemeny et al., 2023; Lundstrom et al., 2017; Price et al., 2011; Schonherr et al., 2005; Taylor & McGruder, 1995). The SCI population is reported to have high rates of depression, but in one study the lowest scores of depression and anxiety were seen among people with the highest activity levels (Boyce & Fleming- Castaldy, 2012). There are a multitude of factors that contribute to this finding. On a chemical level, physical activity releases neurotransmitters that are responsible for aiding in balancing emotions, reducing stress, and preventing or alleviating depression (Boyce & Fleming-Castaldy, 2012; Hwang et al., 2016). Incorporating leisure interventions promotes opportunities for people with SCI to optimize personal strengths and abilities, thus leading to meaningful occupational engagement (Zahl et al., 2020). With the increased incidence of depression among people with SCI, it is important for OTs to identify common risk factors and methods to combat these statistics.

Participation in outdoor recreational activities also enhances community reintegration and social support, which lead to more fulfilled roles and are associated with higher levels of QoL and life satisfaction among people with SCI (Dorsch et al., 2016; Price et al., 2011; Ryan et al., 2023; Smith & Hsieh, 2017). Slater & Meade (2004) found recreation among people with disabilities was noted to be the main determinant of life satisfaction. Several qualitative research studies reported that participation in meaningful leisure activities for people with SCI provided improved self-efficacy, sense of belonging, autonomy, empowerment, positive self-image, a renewed sense of identity, and a reconnection to the former self and interests (Anneken et al., 2010; Boyce & Fleming- Castaldy, 2012; Kemeny et al., 2020; Labbe et al., 2019; Ryan et al., 2023; Smith & Hsieh, 2017; Taylor & McGruder, 1995). Participation in leisure activities has also been shown to help people with SCI accept and better adjust to their injury (Dorsch et al., 2016; Hwang et al., 2016; Labbe et al., 2019). Leisure participation can provide occupational balance as well as social participation opportunities, all of which promote QoL and health (Taylor & McGruder, 1995). Promoting leisure participation within the rehabilitation process also promotes holistic care in all occupations and creates goals to address adaptive skills necessary for participating in meaningful activities.

Barriers to Outdoor Recreational Participation in People With Spinal Cord Injury

Intrapersonal Barriers

People with SCI have limited access to leisure activities, particularly outdoor recreational activities (Taylor & McGruder, 1995). Barriers to outdoor recreational participation for people with SCI have been categorized into intrapersonal factors, accessibility, lack of knowledge, societal stigma and attitudes, finances, and scheduling (Dorsch et al., 2016; Hwang et al., 2016; Labbe et al., 2019; Lundstrom et al., 2017; Mtetwa et al., 2016; Price et al., 2011; Ryan et al.,

2023; Sar, 2022; Sousa de Andrade et al., 2019). Intrapersonal factors are highly individualized and vary in intensity of impact on participation in outdoor activities. Common themes identified within this category are decreased self-esteem and confidence, fear and anxiety, pain, lack of motivation, lack of energy, functional skills, and presence of health complications (Dorsch et al., 2016; Hwang et al., 2016; Ryan et al., 2023). An adapted outdoor recreational activities program director identified fear of the unknown to engage in these activities play a large role in why LTPA participation is significantly decreased among people with SCI (R. Sproull, personal communication, January 22, 2024). A study in 2017 (Lundstrom et al., 2017), found fatigue, pain, spasticity, and decreased muscle strength affected participation in exercise and active recreation for 67.7 percent of individuals that were 36-55 years post-injury. People with SCI also express safety concerns, fear, and anxiety prior to participation in outdoor recreational activities (Dorsch et al., 2016; Taylor & McGruder, 1995). Additionally, Cole et al. (2022) found the desire for autonomy and external motivation were barriers to travel participation. This cross-sectional quantitative research study of 250 people with SCI found that travel barriers could also derive from internalized barriers regarding the environment and one's autonomy needs satisfaction level. Despite these personal barriers, successful participation in outdoor recreational activities has been shown to increase one's self-efficacy, esteem, and image (Anneken et al., 2010; Dorsch et al., 2016; Hwang et al., 2016; Smith & Hsieh, 2017). Improvements in these aspects promote role competence, quality of life, and wellness.

Environmental Barriers

There are many environmental barriers causing a lack of accessibility to participation in adapted outdoor recreational activities among people with SCI. Transportation presents a major barrier for people with SCI, as motor and sensory deficits seen with the injury require

adaptations to motor vehicles and rigorous training as well as issues experienced with accessibility for public transportation (Dorsch et al., 2016; Labbe et al., 2019; Mtetwa et al., 2016). The common experience with public transportation for people with SCI includes a significant lack of readily accessible, available, and affordable means of transportation (Mtetwa et al., 2016). Additionally, if the public transportation system provides adequate adaptations for wheelchairs, they are often expensive and inconvenient. Conversely, independent driving acts as a facilitator of meaningful recreational and social participation.

Accessibility of environmental terrains and trails are a concern of participation in adapted outdoor recreation activities as well for people with SCI (Hwang et al., 2016). Common everyday wheelchairs are typically not prepared for experiencing various terrains that the outdoor environment can present. Thus, specialized equipment, such as all-terrain wheelchairs, is required to access trails that are in a more natural, ungroomed state. Additionally, many adapted outdoor programs are geographically distant for many people with SCI limiting access (Dorsch et al., 2016; Labbe et al., 2019; Ryan et al., 2023; Sousa de Andrade et al., 2019). Ryan et al. (2023) found that when using the PEOP model, the environment was the most restricting factor for occupation performance in outdoor recreational activities. Advocacy on a national and local level is needed to aid in the accessibility of adapted outdoor recreational programs to increase participation.

People with SCI have noted that lack of knowledge regarding opportunities and accessibility has led to a trial-and-error approach when participating in outdoor recreational activities (Ryan et al., 2023). The information available online has been reported to be inaccurate and difficult to find, thus making scheduling for participation in outdoor recreational activities cumbersome (Arbour-Nicitopoulos et al., 2009; Ryan et al., 2023). These factors can be

discouraging for people to continue participation in outdoor recreational activities. Improvements in scheduling and easily accessible, accurate information could combat these barriers and increase people with SCI's participation in outdoor recreational activities.

Social Stigma as a Barrier

Many researchers have acknowledged the impact of social stigma and attitudes on participation in leisure activities for people with SCI (Dorsch et al., 2016; Hwang et al., 2016; Price et al., 2011; Kemeny et al., 2020; Sar, 2022; Smith & Hsieh, 2017; Sousa de Andrade et al., 2019). These stigmas and attitudes are not limited to just societal, but familial beliefs as well. Ideas behind this barrier focus on limitations in physical ability leading to the belief that people with disabilities cannot participate in leisure activities. Sar (2022) reported social attitudes towards people with disabilities, membership in community organizations, and physical support systems greatly influence interpersonal relationships and participation in community and leisure occupations.

To contest these negative stigmas and attitudes, occupational therapists can use the social model of disability as a guide to implement change on a societal level that improves accessibility and decreases structural biases for people with disabilities (Harrison et al., 2021). Furthermore, Alve & Bontje (2019) reported positive and supportive mindsets facilitate people with SCI to engage in leisure participation activities. This practice can promote participation in meaningful occupations for all individuals, despite any diagnosis.

Financial Barriers

Financial costs associated with disability and adapted outdoor recreation activities have been identified as another barrier to participation (Dorsch et al., 2016; Hwang et al., 2016, Labbe et al., 2019; Ryan et al., 2023). Average lifetime costs for people with SCI range from 1 to 5

million dollars, not including specialized equipment for adapted outdoor recreational activities (Ryan et al., 2023). Hwang et al. (2016) reported that over half of the 85 participants had only a $40,000 household income, indicating that people with SCI face barriers due to the high costs of equipment, training, program fees, and transportation costs (Ryan et al., 2023). Advocacy for affordable adaptive equipment and programs are needed to increase outdoor recreation participation for people with SCI.

Precautions for Participation in Outdoor Recreational Activities

Due to the nature of the injury of SCI, there are several precautions that individuals, caregivers, OTPs, and program employees should be aware of to promote safety in participation in outdoor recreational activities. Complete SCIs and higher-level lesions experience greater impairments to their thermoregulatory capacity, increasing the risk for heat-related illnesses that can pose serious health risks and even death (Slater & Meade, 2004). This impact is caused by the disruption of the somatic and autonomic nervous systems, resulting in deficits seen in sweating and blood flow affecting thermoregulation below the level of the lesion. Due to these factors, it is recommended that people with SCI avoid temperatures above 21 degrees Celsius and 50% humidity. Additionally, one should ensure they have proper sleep and appropriate loose, lightweight clothing to decrease the risk of hyperthermia.

People with SCI also demonstrate decreased stroke volume, left ventricular volume, and VO2 maxes (Slater & Meade, 2004). Changes in blood flow are caused by lesions at or above the T1 level disrupting the sympathetic feedback system to the heart, resulting in decreased cardiac output and maximum attainable heart rate. People with paraplegia and incomplete SCI present with higher VO2 maxes than people with tetraplegia and complete SCI. This is due to a decrease in active muscle mass accessible for oxygen withdrawal. Additionally, people with tetraplegia

and complete SCI have lower slow oxidative fibers and a higher ratio of fast glycolytic muscle fibers in paralyzed muscle causing an available reduction for oxygen extraction from the muscles. These complications of SCI cause decreases in endurance and those involved in physical and outdoor recreational activities should be aware of this and take precautions when participating in outdoor recreation.

Changes in blood pressure mechanisms post-injury make people with SCI vulnerable to dehydration (Slate & Meade, 2004). Prevention of dehydration includes keeping water readily available during participation and tracking weight to monitor fluids lost. When tracking weight loss, an individual should not lose greater than 4% of body mass weight. Another precaution of participation in outdoor recreational activities are upper extremity (UE) orthopedic injuries. These injuries range from rotator cuff injuries to bicipital tendon injuries, elbow pathologies, entrapment neuropathies, and impingement syndromes. Soft-tissue injuries and shoulder pain are common among people with SCI due to overuse and heavy reliance on UEs for all tasks (Slater & Meade, 2004). Education on using preventative biomechanics and warmup exercises should be practiced to decrease the risk of injury.

Autonomic dysreflexia (AD) is a serious condition caused by a sudden dangerous increase in blood pressure that could be life-threatening in people with SCI lesions at or above T6 (Budash, 2021). AD occurs from a sympathetic response to noxious stimuli and only occurs after spinal shock. Those who participate in adapted outdoor recreational activities should know the common causes, symptoms, and treatment of AD as this condition is considered a medical emergency. Common causes include UTIs, distended bladder, bladder or kidney stone, bowel impaction, decubitus ulcers, ingrown toenails, and pain of any kind. Symptoms of AD present with a pounding headache, sweating, flushing of skin above lesion level, blurred vision, and

"goosebumps", although some cases of AD can be asymptomatic. Treatment of AD includes removing the noxious stimuli once identified, ensuring the individual stays in an upright posture, and seeking medical attention. OTPs should educate and train people with SCI and their caregivers on the precautions to participate in outdoor recreational activities during the rehabilitation process to ensure optimal safety is maintained.

Occupational Therapy's Role and Theory

OTPs play an important role in optimizing independence, autonomy, and participation in meaningful activities while reducing risks for secondary complications (Sousa de Andrade et al., 2019). Barclay (2015) reported having appropriate OT input promoted participation in social and community activities. With OT services, people with SCI who report unsatisfactory levels of QoL and life satisfaction are more likely to regain functional skills to work towards independence, reenter the workforce, support for community reintegration, and increased participation in meaningful leisure activities (Ma et al., 2014; Schonerr et al., 2005; Taylor & McGruder, 1995). Leisure and social participation can promote occupational balance, thus increasing QoL and health, which are desired outcomes identified in the OTPF-4 (AOTA, 2020; Taylor & McGruder, 1995). Using leisure and physical activities as interventions holds historically significant values for OTs as the main categories of occupations are ADLs, IADLs, and play and leisure (Wickham et al., 2009). OTPs can address participation in leisure occupations through intervention implementation, advocacy, training, and education (Harrison et al., 2021; Kemeny et al., 2020; Price et al., 2011; Sousa de Andrade et al., 2019; Taylor & McGruder, 1995; Wickham et al., 2009). With these approaches, occupational engagement in outdoor recreational activities among people with SCI will increase.

Implementation of participation in recreational activities while staying at an inpatient SCI rehabilitation center has reported several positive outcomes when compared to not receiving therapeutic recreation (TR). Gassaway et al. (2019) found people with SCI who received TR scored significantly higher on community participation, social integration, mobility, and occupations at one year and five years post-injury as measured by the CHART. In addition, individuals in the TR group reported fewer rehospitalizations within the first year of injury. However, no changes in rehospitalizations were observed in the five-year post-injury measurements between the two groups. Furthermore, the study reported individuals who received TR during their inpatient rehabilitation stay had higher levels of participation in sports and gardening one year after injury and continued to be more active in recreational activities at the five-year anniversary. This study supports the need for OTPs to implement recreational activities in inpatient rehabilitation centers for people with SCI to improve occupational balance, performance, and engagement.

Conversely, decreased lengths of stay in rehabilitation hospitals are common and may result in people with SCI not gaining the necessary skills for ADL performance, let alone the skills and motivation to participate in social and physical activity (Kemeny et al., 2020). This further proves the importance of continuing OT services through outpatient clinics to address community reintegration, leisure opportunities, skills training, community resources, peer mentoring, and activity adaptations. A specific skill set that has been identified to improve self-efficacy and motivation in preparation of participating in adapted leisure activities is early wheelchair mobility training (Anneken et al., 2010; Smith & Hsieh, 2017). Wheelchair mobility courses can also improve everyday life management skills to perform ADLs and IADLs, thus also improving QoL. Before recommending adapted leisure activities, the OT should evaluate

medical history, past leisure interests, needed modifications, specialized adaptive equipment, and specific community reintegration strategies to promote recreational pursuits on a more independent level (Kemeny et al., 2020). This process may start with the OT conducting an occupational profile to explore the client's interests and concerns.

People with SCI also report needing training on how to better self-advocate and find resources available to increase participation in LTPA within their community. Knowing how to access resources in their community can lead to feelings of empowerment and self-determination (Price et al., 2011; Taylor & McGruder, 1995; Wickham et al., 2009). These interventions are supported and adhere to the intervention types outlined by the AOTA in the OTPF-4 (AOTA, 2020). OTPs should implement these methods and strategies throughout the rehabilitation process for people with SCI to promote comprehensive, holistic care that addresses all meaningful occupations.

Person-Environment-Occupation-Performance Model

Within OT theory, the PEOP model is used in the context of assessing barriers and success in outdoor recreation participation for people with SCI (Hwang et al., 2016; Ryan et al., 2023). The PEOP model focuses on the dynamic relationship between personal, environmental, and occupational factors that lead to barriers or engagement impacting occupational performance. OTPs use this model in a top-down approach, where the focus is on the performance of a task and the client's perspective of the challenges they face during participation (Baum et al., 2015). With this individualized assessment, clinical intervention will focus on addressing these barriers to overcome them, whether personal, environmental, or occupational, to enhance performance in meaningful tasks. Barriers for people with SCI to participate in adapted outdoor recreational activities have been identified in each of these components of PEOP

(Arbour-Nicitopoulos et al., 2009; Cole et al., 2022; Dorsch et al., 2016; Hwang et al., 2016; Kemeny et al., 2020; Labbe et al., 2019; Lundstrom et al., 2017; Mtetwa et al., 2016; Price et al., 2011; R. Sproull, personal communication, January 22, 2024; Ryan et al., 2023; Sar, 2022; Smith & Hsieh, 2017; Sousa de Andrade et al., 2019). Baum et al. (2015) identified these areas being directly correlated to participation, performance, and well-being. This statement is also supported by the literature reporting when these barriers are reduced for people with SCI to engage in adapted outdoor recreational activities, increased participation and performance in ADLs and IADLs as well as enhanced well-being are seen (Anneken et al., 2010; Boyce & Fleming-Castaldy, 2012; DelGrande et al., 2020; Dorsch et al., 2016; Gassaway et al., 2019; Hwang et al., 2016; Kemeny et al., 2020; Labbe et al., 2019; Price et al., 2011; Ryan et al., 2023; Schonherr et al., 2005; Slater & Meade, 2004; Smith & Hsieh, 2017; Taylor & McGruder, 1995; Wickham et al., 2009). The PEOP model will be used to address and minimize these contextual barriers through the educational video series.

Rehabilitative Framework

The rehabilitative framework is most aligned to the focus of participation in outdoor recreation activities for people with SCI. This framework focuses on compensatory strategies and adaptations within tasks and environments to compensate for lost skills and client factors (Cole & Tufano, 2020). Another element of the rehabilitative framework is the focus on remaining skills rather than limitations to promote greater independence. OTPs can utilize this framework using adapted equipment involved in outdoor recreational activities. OTPs should perform a thorough history and evaluation to match the needs of the individual to the tasks and adaptive equipment to optimize occupational performance and participation.

Adaptive Equipment

Archery

Adapted archery is very similar to traditional archery, where the main equipment used is a bow and a target (Passionate People Team, n.d.). However, adaptations for archery are available to accommodate client factors for varying levels of SCI. Firstly, participants should decide between using a recurve or compound bow. A recurve bow is known for being lighter in weight but drawing back the arrow may require more strength (Stott & Krueger, n.d.). Conversely, compound bows are shorter and may be easier to draw back. These factors, in addition, to being able to be utilized with a bow mount may make using the compound bow easier for seated archers.

Adapted equipment available to be used with the bow include mechanical releases, mouth tabs, slings, bow mount, and wheelchair bow slinger (Passionate People Team, n.d.; Stott & Krueger, n.d.). The mechanical releases and mouth tabs assist with the drawing and release of the arrow on the bowstring. Finger tabs or gloves are used for people with full function in their upper extremities but need assistance with gripping when using a recurve bow (Stott & Krueger, n.d.). A caliper release aid with wrist strap is used for people with deficits in fine motor skills recreationally using a recurve bow. The release mechanism can be set through touching the cheek or another body part to the trigger. Strap-on release aids can be strapped to the archer, such as the shoulder, and are set off with a finger or chin. Thumb release aids are utilized with more experienced archers and have a trigger extension that releases the string. The back tension release aid works as a hinge and can be utilized by archers with limited to absent use of hands. With the ease of the release system and difficulty of use, the back tension release aid is also recommended for more experienced archers. Mouth tabs can be used for archers with very

limited or absent function in their upper extremities. The mouth tab is placed between the archer's molar to draw the arrow back, hold, and release. Shoulder mount release aids are custom made and are used by having the bow fitted to the harness on the archer's shoulder. The release is then triggered by the archer's face. An additional accessory known as "quad gloves" are used for people with no function in their hands, which allow them to grip items, such as the bow (Stott & Krueger, n.d.).

The bow mount, wheelchair bow slinger, and slings can facilitate increased stability and support when using the bow (Passionate People Team, n.d.; Stott & Krueger, n.d.). Bow mounts, or bow stands, are used so the bow is stabilized and the archer is only responsible for drawing back the bowstring and releasing (Stott & Krueger, n.d.). There are horizontal and vertical bow mounts available for people with significant client factor deficits due to motor dysfunction, spasticity, or paralysis to promote occupational participation and performance. These mounts are versatile and can be utilized free standing or wheelchair attached. Quiver stands are used so archers with limited mobility do not have to engage in additional movement to retrieve arrows. Some quiver stands can be attached to the archer's wheelchair as well.

To promote trunk stabilization, strapping systems may be used for wheelchair users or for transfers in and out of stools or chairs. Depending on the level and severity of the archer's SCI, their own wheelchair, a stool, or a brace can be used for seating and support. Stott & Krueger (n.d.) state it is intended that adaptations should be made to the archer's client factors rather than the archer adapt to the bow. However, minimal adaptations are recommended so independence and engagement are optimized.

Cycling

There is a multitude of equipment and accessories available for people with SCI to participate in adapted cycling. For people with functional skills maintained in their upper extremities, handcycles can be used by having arm force propelled through a crank system. Different handcycles are used for various terrain (Chowan, n.d.-a). For paved terrain, a recreational handcycle can be used. For more uneven, rugged terrain, an off road handcycle should be used as they provide more durable tires and a wider base of support. To aid in pedaling for off-road surfaces, electric options are available as well. People who present with more limited functional skills, such as decreased ROM, in their upper extremities can utilize e-assist handcycles. The e-assist handcycles can be customized to the user and offer various hand pedals, foot pedals, and adapted hand controls. All handcycles have gears placed in the front of the bike rather than the back of the bike as other types of bikes do. If a person does not desire to complete transfers in and out of a handcycle from their wheelchair, an attachable handcycle is available. The attachable handcycle connects to the front of the wheelchair and can be used through either a crank system with arm propulsion or through a power system controlled through thumb throttles (Chowan, n.d.-a).

Tandem bikes provide space for two people to ride as one on a singular bike (Chowan, n.d.-a). There are several variations of tandem bikes with the option of electrical power to aid in pedaling. Variations include side-by-side, semi-recumbent, and tandem trike bikes. A side-by-side tandem bike allows the users to sit next to one another and offers easy movability. A semi-recumbent tandem bike has a semi-reclined seat with trunk support at the front and a standard seat on the back of the bike. Whereas a tandem trike bike, has two semi-reclined seats with trunk

support where one user is in the front and one is in the back. There are other seating options available for tandem trike bikes based on the user's needs.

Recumbent bikes are identified by their semi-reclined seat positioning and can come in variations of handcycles, tandem, and trikes (Chowan, n.d.-a). Recumbent bikes provide increased balance and comfort of the rider. Most recumbent bikes have the pedals in front of the user and the control handles are on both sides of the seat. The recumbent delta trike is one bike that has two wheels in the back and one wheel in front. The pedals on this recumbent bike are in front of the rider with the brakes on the sides. Unlike other recumbent bikes, the recumbent handcycle bike has a crank system that control the gears using arm force and thumb throttle brake controls. Another type of recumbent bike is the tandem recumbent bike. This bike is for two-person use with the recumbent seat in the front and a standard bike seat in the back. Each seat has its own foot pedals and the thumb throttle brakes are placed on the back of the recumbent seat.

Carrier bikes allow the person in the front to have a seat or platform for their wheelchair with a second seat behind for the user to pedal the bike for both users (Chowan, n.d.-a). A carrier bike with a built-in seat provides trunk support with a neutral positioned seat. Additional features can be added to this carrier bike, such as a headrest, arm rest, and hand protectors for safety of the front user. The brakes are controlled by the second user with a squeezable stroller handlebar attached to the front seat. Another carrier bike available is one with a wheelchair platform. This bike allows a personal wheelchair to be rolled onto a front platform and locked into place using straps. For additional safety, the front rider wears an additional seatbelt. The second user rides on a standard seat in the back with standard handlebars and hand brakes.

Accessories to increase occupational performance and safety for adapted cycling are available as well. A special pedal with calf support is used to secure the users lower leg in a neutral position while cycling (Chowan, n.d.-a). There are two Velcro straps to secure the lower leg and foot to the pedal at the calf and top of foot. For people with hemiparalysis, a one-sided leg support is used to support and secure the paralyzed leg to the pedal while the other leg propels the bike. Foot fixation trays allow the person's feet to be secured in a neutral position with straps while cycling. Steering dampers help reduce energy expenditure and fatigue through increasing control of the handlebars and increasing stability. These benefits are achieved through a ventilation system preventing airflow in the opposite direction. Steering dampers are often used for off-roading, uneven terrain.

Kayaking

Adapted kayaking has three variations that vary on the seating arrangement options to match the user's client factors (Chowan, n.d.-b). Cockpit seating kayaks allow the user to sit inside the vessel, whereas the kayak with the seat on top allows the user to sit above the vessel providing increased ease with transfers. The third seating variation is the tandem kayak with two seats, one in the front and one in the back, that allows two users to use the vessel together. Withing these three kayak options, there is a multitude of additional accessories to promote safety and occupational performance with adapted kayaking for people with SCI.

In addition to the various seating arrangements, there are seating systems available to add onto the kayak to increase comfort and safety of the user (Chowan, n.d.-b). The basic seat has lateral supports to promote trunk stability and balance as well as adjustability in each support point of the chair based on the user's comfort and needs. The padding and fabric within the chair decreases skin irritation and the cushion material can vary based on the user's preference.

Mounting the basic seat on the seat pan of the kayak allows for secure attachment on most kayak types. Furthermore, the basic seat can also be mounted onto a canoe utilizing the clamping system on the seat. Another seating system available is the high back seat with lower back support (Chowan, n.d.-b). This is seat is best utilized for people with increased trunk stability as this seat does not provide lateral supports like the basic seat. With a tall, padded back, additional lumbar support, adjustable side wings, and a gel pad seating cushion, this seat provides increased comfort and stability for the user while decreasing the pressure on the ischial tuberosities. Gel and inflatable seating pads are available to be placed on top of the user's seat to provide pressure relief of the legs. The gel pad consists of nylon and a non-skid material on the bottom so the cushion remains in place during participation and with transfers. The inflatable seat pad is filled with air rather than gel and can easily be adjusted based on user's preference (Chowan, n.d.-b; Outdoor Play, n.d.). Outriggers are used to provide additional stability through adding floats that attach on either side of the kayak (Chowan, n.d.-b). There are a variety of options for outrigger kits but the outcome of providing increased stability remains the same. The outrigger device attaches to the base of the kayak and the floats can be adjusted up or down and closer or farther depending on the amount of stability needed for the user. The further the outrigger floats are from the kayak, the more stable the kayak is.

A variety of kayak paddles are available to match the user's client factors to enhance occupational performance and participation. The mount supported paddle decreases stress placed on the upper extremity joints and back by having most of the paddle's weight being supported by the kayak through the mount attachment (Chowan, n.d.-b). This system also requires less trunk rotation while paddling. The angle of the paddles can be adjusted to be downward or straight, with the downward angled paddles requiring less range of motion to effectively paddle. The

paddle pivot provides one-arm control of the kayak using a universal base that the paddle is supported by (American Canoe Association, n.d.). This paddling system removes the weight of the paddle from the user, reducing the stress on the user's upper extremities. The bent shaft paddle is visually similar to a standard paddle but with the addition of divets to provide easier grasping of the paddle. This paddle allows for decreased stress on the hand and wrist which can prevent overuse injuries if the user kayaks often. Lastly, the lightweight carbon fiber paddle provides decreased weight and increased durability when compared to the standard kayak paddle. With these features, the energy expenditure from strength and endurance required by the user to paddle is decreased.

For people with SCI who present with decreased function of the distal upper extremities, gripping devices are available to support the wrists and hands to promote occupational performance (Chowan, n.d.-b). Paddling mitts allow for increased gripping stability using Velcro to attach the mitts to the paddle. A wrist cuff secures the user's hands and wrists in place while paddling using hook and lock fasteners. The back of hand grip device increases the user's hand support while paddling by sliding the hands underneath the mechanism and securing them in place. This device allows for decreased pressure to be placed on the hands and wrist, so the arms are doing the most work. This grasping device is utilized by people who prefer less external gripping support than the paddling mitts and wrist cuff devices. Paddle grips are put onto the paddles to increase gripping stability and control. There are variations within paddle grips depending on the type of material the user prefers.

Additional supports, such as foam supports, are used to provide further stability and comfort to the user while kayaking (Chowan, n.d.-b). These supports are also utilized to decrease pressure and friction on the skin while kayaking, decreasing the risk of pressure sores and other

preventable injuries. Common sites for foam support to be placed include the lateral aspect of the upper and lower legs, beneath the knees, under the heels, at the buttocks, behind the back, the outside of the hips, and wherever else the user prefers. These foam supports are lightweight and provide increased comfort to the user, thus enhancing the kayaking experience.

Transportation devices are available to decrease transferring challenges in and out of the kayak (Chowan, n.d.-b). A transfer bench is utilized for people who demonstrate increased independence with transfers from the wheelchair to the kayak. The transfer is completed using a slide board that can be removed once the user is in place above the kayak seat (Creating ability, n.d.). The user then lowers themselves into the seat using the handlebars on either side of their body. The kayak cart allows easier transportation of the kayak with the user in it from land to the water (Chowan, n.d.-b). This device also provides a smoother transition of the kayak into the water as the user can be rolled directly into the water. It is important to consider client factors to match the correct kayaking systems and accessories to the user to increase occupational performance, comfort, and safety.

Paddle boarding

There are adapted paddleboards available to enhance a user's experience; however, there are accessories and devices that can be added onto a standard paddleboard to modify them to the user's needs (Chowan, n.d.-c). Adapted paddleboard types include the oar board and the trident paddleboard. The oar board comes as a kit that includes carbon fiber paddles, a rowing unit that is secured at the top of the board, a seat that can be attached onto the board, an air pump, and a bag with wheels for easier transportation. The trident paddleboard can accommodate most manual wheelchairs and various amounts of abilities. Additionally, the trident paddleboard can be used by two people at the same time if desired. The design of this board promotes decreased

energy expenditure by decreasing the effort necessary to paddle fast and tracks straight. Another commercially sold paddleboard that can be used is a megalodon paddleboard. Various sizes of megalodon paddleboards are available and can range up to 18 feet in length and hold 1100 pounds (Bluefin SUP, n.d.). With the size of this paddleboard, a wheelchair can be anchored in the middle with multiple other people on the board as well. Outriggers can also be applied to enhance stability of the paddleboard if needed.

Similar to adapted kayaks, adapted paddleboards have various seating system options (Chowan, n.d.-c). Manual wheelchair accommodations can be utilized on trident paddleboards, removing the requirement to transfer in and out of the wheelchair. The manual wheelchair sits on top of the paddleboard and is secured so user can paddle while remaining seated in the wheelchair. The paddleboard set is another seating system option. This seat promotes trunk support and attaches to the paddleboard by four rigging points placed towards the center handle. This option can be used on any paddleboard with the four rigging points. Bean bag chairs can also be placed on the paddleboard to form around the participant's body to aid in comfort and stabilization. These seating variations allow for increased trunk stability and comfort of the user to optimize their adapted paddleboarding experience.

Outriggers can be utilized to increase the stability of the paddleboard (Chowan, n.d.-c). These outriggers are attached to the paddleboard and can be adjusted to the amount of stability needed by the user. The inflatable outrigger attaches to the kayak through a strap system and is more closely positioned to the paddleboard providing slight additional stability. Whereas the stabilizer float package can be extended up to 20 inches on either side of the paddleboard providing maximal increased stability and the hydrodynamic designs promotes minimal water

drag. The stabilizer float package attaches to the paddleboard through suction cups and straps to secure the device in place.

Rower paddles, bent shaft paddles, and lightweight carbon fiber paddles can be used for adapted kayaking (Chowan, n.d.-c). Rower paddles are utilized for people who prefer to sit on the paddleboard. This device attaches to the top of the paddleboard and the user performs a rowing movement pattern to move the paddles and board forward in the water. The bent shaft and lightweight carbon fiber paddles are the same as the ones used for adapted kayaking, promoting decreased strength and endurance requirements and stress on upper extremity joints.

Like adapted kayaking, adapted paddleboarding has accessories available to increase hand and wrist support while participating (Chowan, n.d.-c). There are many varieties of paddle grips available to reduce pressure and friction of one's hands on the paddle. These accessories attach around the paddle and are secured in place by Velcro. Wrist guards are also available to promote wrist stability and decrease the risk of overuse injuries while paddleboarding. These cuffs are secured on one's wrist with Velcro straps at the proximal and distal ends of the guard.

Transportation of paddleboards can be cumbersome but there are devices available to ease the task of moving the paddleboard from one place to another. A carrying strap has two straps that wrap around the top and back of the paddleboard and are secured with adjustable buckles (Chowan, n.d.-c). A shoulder strap with a cushioned pad is then used to so the paddleboard can be carried on one's shoulder for easier transportation. Another paddleboard transportation option is a transport cart. There are various transport carts on the market that can carry up to two paddleboards on the device at a time. These devices have wheels, reducing the need for carrying the paddleboards on oneself and the energy expended for transportation. Prior to paddleboarding, it is important to consider the user's client factors and comfort level on the

water to provide the optimal seating, paddling, stability system to enhance the user's safety and experience.

Participation Expectations

What participation looks like for adapted outdoor recreational activities will vary for each person dependent on the type of SCI and the level of injury. Specific neuromusculoskeletal and sensory client factors will be utilized for engaging in adapted outdoor recreational activities for each incomplete SCI condition and complete SCI level. These client factors are as follows:

Incomplete SCI Conditions Client Factors

- Central cord syndrome: temperature, pain, proprioception, and vibration sensation; motor function of upper extremities; motor function and strength of lower extremities
- Brown-Sequard syndrome: same side pain and temperature sensation; opposite side motor control, proprioception, and vibration sensation
- Anterior cord syndrome: proprioception and light touch
- Cauda equina syndrome: motor and sensory function of upper extremities; potential partial preservation of sensory functions
- Conus medullaris syndrome: potential preservation of reflexes; motor and sensory function of upper extremities

(ASIA, 2021; Budash, 2021)

Complete SCI Client Factors

- C1-C3: cervical flexion, extension, rotation
- C4: shoulder elevation; inspiration
- C5: shoulder flexion, abduction, and extension; scapular adduction and abduction; elbow flexion and supination

- C6: scapular protraction; shoulder horizontal adduction and abduction; pronation; radial wrist extension
- C7-C8: elbow extension; wrist flexion, ulnar wrist extension; finger flexion and extension; thumb flexion, extension, opposition, and abduction
- T1: abduction of the fifth finger
- T2-T9: increased endurance of intercostal muscles; typical motor function of upper extremities; limited trunk stability
- T10-L1: increased trunk strength and stability
- L2: hip adduction
- L3: hip external rotation
- L4: hip extension, abduction, and internal rotation; knee flexion; ankle inversion and eversion; toe extension
- L5: toe flexion and abduction
- S1: hallux adduction
- S2-S5: partial to full control of lower extremities

(ASIA, 2021; Budash, 2021)

Determining the client factors available to use for adapted outdoor recreational participation will provide increased safety and occupational performance when the task, equipment, and body functions align.

Archery

Adapted archery can be done competitively or recreationally. Competitively, there are four categories the Paralympics recognize: archery standing (ARST), archery wheelchair 1 (ARW1), archery wheelchair 2 (ARW2), and compound bow use (Passionate People Team, n.d.).

ARST are archers with no functional deficits seen in their upper extremities, who can stand, but have weakness in their lower extremities. This category includes people with various SCI syndromes and lower level lumbar and sacral SCI (ASIA, 2021; Budash, 2021). The ARW1 category is for archers with limited function of their upper extremities and significant deficits are present in their lower extremities, who compete from their wheelchair (Passionate People Team, n.d.). The ARW2 category is for people who compete in their wheelchair and present with complete paralysis of their lower extremities. These categories are for people with varying levels of incomplete and complete SCI (ASIA, 2021; Budash, 2021).

Before the archer begins participation, it is important the correct bow is chosen. The size and style of bow will be chosen based on the archer's hand dominance, height, eye dominance, and upper extremity functions (Passionate People Team, n.d.). If the archer is participating in a seated position, it is important to consider the height of the chair, as a smaller bow may be needed, and ensure their feet are stable and balanced on the wheelchair's footrests (Stott & Krueger, n.d.). For people with limited to no use of their hands, such as seen in cervical level SCI, an assistant can place the arrow onto the bowstring, known as nocking (ASIA, 2021; Budash, 2021; Passionate People Team, n.d.; Stott & Krueger, n.d.). Archers with fine motor skills, such as people with thoracic level SCI, can nock the arrow themselves. Next, the archer must hook, or hold the bowstring (Stott & Krueger, n.d.). People with cervical level SCI who have limited to absent use of their hands may need to utilize an appropriately chosen mechanical release aid. Once the bowstring is hooked, the archer must grip the bow handle and raise the bow before drawing the bowstring back. Based on client factors, this step is when a bow mount, "quad gloves", or strapping system may be utilized to stabilize the bow or grip on the bow.

When raising the bow to the correct positioning, if the archer is utilizing a mouth tab or shoulder harness, the bow arm will remain bent to prevent strain on the archer's neck.

For archers who are using their arms to draw the string, they must keep their draw arm as close in alignment with the arrow and level to the ground as possible to prevent safety concerns and shoulder injury (Stott & Krueger, n.d.). Archers with cervical level SCI who are using mouth tabs or mechanical releases with a shoulder harness will engage their triceps of the bow arm to draw the bowstring while resisting the draw weight force. Before participation, the appropriate amount of draw weight should be decided upon for each archer. After the bowstring is drawn, the archer will anchor the bowstring into the correct position, so the sighting mechanism is in front of the aiming eye. Once the archer feels comfortable with their aim, they will complete the release and follow through. Archers that use a mechanical releasing aid will trigger the system as specified by the manufacturing company. Archers who utilize a mouth tab will open their mouth to release the arrow towards the target. Decreasing fatigue and risk of injury will be accomplished through the correct use and application of archery adaptive equipment based on the archer's client factors.

Cycling

The most used adapted bike for people with SCI is the handcycle recumbent bike (Kelly Brush Foundation, n.d.). However, people with incomplete SCIs who retain some function of their lower extremities can utilize foot-pedaled trike, such as the recumbent delta trike and tandem recumbent bike (Chowan, n.d.a.; Kelly Brush Foundation, n.d.). For people who have increased trunk strength and stability, sitting more upright or kneeling is an option to cycle (Kelly Brush Foundation, n.d.). People with cervical level injuries can utilize mechanical brakes and shifts as well as additional accessories to promote increased upper extremity function.

Transfers from a wheelchair to the bike will vary depending on the level of SCI. People with upper thoracic complete SCI, can independently transfer into the bike (Kelly Brush Foundation, n.d.). They will first ensure the brakes on the wheelchair and bike are locked and the wheelchair is flushed next to the seat of the bike. They will move their hips towards the front of the wheelchair and place a leg on either side of the bike. Then, one hand will be placed on the far side of the bike seat and the other placed on the wheelchair. Once the hands are placed, they will slowly slide their hips off the wheelchair seat and lower themselves in bike seat. Once seated in the bike, they will perform trunk flexion and use their upper extremities to place each leg in the foot holder. To transfer into the wheelchair, the user will perform trunk flexion and use their upper extremities to remove their legs from the foot holders. The user will then move to a more upright sitting position and put their knees in a flexed position. The wheelchair will then be at approximately a 90-degree angle to the bike and the user will place one hand on the frame of the wheelchair and the other on the back of the bike seat. Then, the user will use their upper extremity strength to lift their body into the wheelchair seat.

For people with a lower-level thoracic SCI, they will have increased trunk stability and strength. Therefore, more trunk involvement will be utilized in the transfer in and out of the bike, but the steps of the transfer remain the same (Kelly Brush Foundation, n.d.). Dependent on the level of the cervical SCI, the user may need assistance with the transfer or additional equipment for ease of transfer and safety. With each cervical level SCI injury demonstrating various neuromusculoskeletal client factors, the transfer will be modified to adhere to the user's upper extremity capabilities. Each person will complete transfers slightly different based on their preferences and client factors, but these are the general steps a person with SCI will perform to complete transfers in and out of the bike.

Kayaking

The process of transferring into the kayak, launching into the water, paddling, and water safety will be taught to participants in preparation for engaging in adapted kayaking (Adaptive Sports Connection, n.d.). There are a variety of options and equipment available for transferring into and out of the kayak. For people with tetraplegia, a Hoyer type lift on a dock or a lifting system on a truck can be used to transfer into the kayak (Determined2Heal Foundation, 2017). If neither of these lifting systems are available, assistance from two able-bodied people will allow for safety and efficiency transferring in and out of the kayak. People with paraplegia may also require assistance from an able-bodied person to safely transfer in and out of the kayak. Once the kayaker is seated, they should ensure the lumbar spine is in complete contact with the back of the seat, the forefoot is in contact with the foot pedals but a slight bend in the knees is maintained, and the lateral aspects of the knees are in solid contact with both sides of the boat (US Adaptive, n.d.-a). These points of contact allow the kayaker to maintain control and stability throughout the activity. For optimal safety with transfers, it is recommended to transfer into the kayak on land, this could also include a dock, then be transported into the water (Determined2Heal Foundation, 2017). This type of transfer from the same level of a shoreline into the water is known as a zero entry launch (US Adaptive, n.d.-a).

The type of paddle utilized for adapted kayaking will be determined based on the user's needs but more standard paddles will require the use of the kayakers trunk rotation as power to move through the water (US Adaptive, n.d.-a). The paddles will be placed perpendicular to the feet, with one hand moving towards the user's hip until the paddle becomes parallel to the user's feet, and the paddle will then lift out of the water. The same process will be completed on the other side so the paddle will move evenly and deeply through the water creating force to move

through the water. Adaptations, such as gripping accessories, can be included to optimize occupational performance and decrease energy expenditure for the kayaker. A personal flotation device, helmet, quick drying clothing, throw rope, dry bag, and whistle are other items that are necessary for safe kayaking.

Paddle boarding

Adapted paddleboarding can be completed without the need for transferring on and off the paddleboard using the trident or megalodon paddleboard that secures a manual wheelchair onto the board (Chowan, n.d.-c). With this technology the user can paddle the board solo or have an able-bodied person behind them who can assist in paddling if desired. This method of adapted paddleboarding is ideal for people with a cervical or upper level thoracic SCI that has limited upper extremity or trunk range of motion, strength, and stability (ASIA, 2021; Budash, 2021; Chowan, n.d.-c). Another option people with mid-lower thoracic SCI can utilize is an oar board or a standard paddleboard with a seat attached (Chowan, n.d.-c). Information regarding transfers on and off the paddleboard for people with SCI is not available in the literature currently. However, through experience with the capstone sites, Lone Star Paralysis Foundation and the National Sports Center for the Disabled (NSCD), floor transfers or assistance from two able-bodied people are the most common methods for people with SCI to transfer on and off a paddleboard. If a two-person transfer is needed, one person will maintain control of the upper body while the other person assists with leg management.

The standard paddle for paddleboarding has one blade and is used with both upper extremities at the same time for propulsion (Chowan, n.d.-c). However, the oar board allows two single blade paddles to be used on either side at the same time while secured at the top of the paddleboard allowing it to be used as a rowing mechanism. To increase stabilization for all users,

during transfers and paddling, outriggers can be used. A zero-entry launch, where the paddleboarder enters the water from the shoreline or a dock at the same level, is recommended for stability and safe entry into the water. The appropriate equipment and process to increase safety and optimize the paddleboarder's experience will be done by taking their client factors into consideration before getting on the water.

Media Used to Disseminate Information

Educational videos can be utilized as a strong transmitter of knowledge to an individual or a group of people (Kohler & Dietrich, 2021). The YouTube platform provides limited barriers to accessibility, as language can be adapted, subtitles can be added, and viewing of the videos are independent of time and space. Furthermore, educational video series allow the user to manage their learning pace and has been proven to be more effective in learning than any other learning media (Brame, 2016; Kohler & Dietrich, 2021). To reduce cognitive overload, segmenting the educational videos into shorter timeframes of six minutes or less, covering one topic at a time will increase the user's engagement and capacity of learning (Brame, 2016; Cihangir & Coklar, 2021). Research has reported that educational videos that are six minutes or less increases the interaction time of the user with the video up to 100%. Furthermore, to enhance the learning experience, utilization of both visual and audio media will provide a more engaging video allowing for increased long-term learning. These findings support the creation of an educational video series to inform people with SCI and OTPs on the knowledge necessary for people with SCI to participate in adapted outdoor recreational activities.

Conclusion

The literature supports the need for an educational video series regarding adapted outdoor recreation for people with SCI for both OTPs and people with SCI as the intended audience.

Implementation of these videos through the YouTube platform will promote advocacy and education in outdoor recreation activities so OTPs and people with SCI can address barriers to participation. Thus, participation, performance, and well-being can be optimized for people with SCI through engaging in adapted outdoor recreation.

Chapter 3: Project Description

The purpose of this project was to create an educational video series to promote participation in adapted outdoor recreational activities among people with SCI. This capstone project was needed due to the lack of knowledge among OTPs and people with SCI regarding adapted outdoor recreational activities that people with SCI can engage in. Leisure participation is an underutilized therapeutic intervention among OTPs for people with SCI as well as being underreported in the OT literature (Schonherr et al., 2005; Wickham et al., 2000). People with SCI report decreased leisure participation due to a multitude of internal and external barriers, especially the lack of knowledge on adapted outdoor recreational activities and inaccurate online information (Arbour-Nicitopoulos et al., 2009; Dorsch et al., 2016; Hwang et al., 2016; Labbe et al., 2019; Lundstrom et al., 2017; Mtetwa et al., 2016; Price et al., 2011; Ryan et al., 2023; Sar, 2022; Sousa de Andrade et al., 2019). Through the creation of this educational video series, OTPs and people with SCI have access to accurate information regarding adapted outdoor recreation to increase education, advocacy, and empowerment for people with SCI to engage in leisure participation. Thus, participation in outdoor recreation will enhance and support people with SCIs' quality of life, health, life satisfaction, and wellbeing. The educational video series addressed precautions, adaptive equipment, impact of injury levels on participation, and opportunities for outdoor recreation participation among people with SCI in Colorado.

Process

Target Audience

People with SCI and OTPs were the target audience for this project, as both populations lack knowledge on adapted outdoor recreation that people with SCI can engage in. The creation of the educational video series promotes education and advocacy of leisure participation among

people with SCI with accurate, accessible information. Additionally, the educational video series allow OTPs and people with SCI to feel more confident implementing and engaging in outdoor recreation by addressing the internal and external barriers people with SCI face during participation.

Educational Video Series Outline

The educational video series contain visual and audio learning materials and the majority of videos are limited to six minutes per video to optimize effective learning in OTPs and people with SCI (Brame, 2016; Cihangir & Coklar, 2021; Kohler & Dietrich, 2021). The video series reviews an introduction to SCI and adapted outdoor recreation, precautions, equipment, participation expectations for cervical and thoracic SCI, and opportunities for outdoor recreation for people with SCI in Colorado. The outdoor recreational activities that are covered include archery, cycling, kayaking, and paddleboarding. The video series reviews participation expectations for C1 to T9 SCI, as these levels of injury are the most common and present with the greatest impact to occupational performance and participation (ASIA, 2021; Budash, 2021; Ding et al., 2022; Rayes et al., 2022). The educational video series outline can be found in Appendix A.

Development and Implementation Process

The development of this capstone project entailed five phases: organizing research, data gathering, video series development, evaluation/revision, and dissemination.

Organizing research. The first phase of the project included organizing research from the literature review and communications with stakeholders regarding abilities for cervical and thoracic level SCI, precautions, adaptive equipment for the selected activities, and opportunities

for adapted outdoor recreation in Colorado. This took place from March 25th to April 14th. This information was filed into the appropriate video's outline in preparation for script writing.

Data Gathering. The second phase of this project included gathering data on the selected adapted outdoor recreational activities, level of SCI of participant, adaptive equipment, transfer technique, and task analysis**.** This phase was completed with the Lone Star Paralysis Foundation regarding precautions and adapted archery, cycling, kayaking, and paddleboarding. This was completed from March 25th to April 19th. The second part of this phase was completed with the NSCD regarding opportunities for leisure participation among people with SCI in Colorado. This was completed from May 20th to June 9th.

Video Series Development. The third phase of the capstone project was the creation of the educational video series. This phase followed the data gathering phases' two parts. Once the data was gathered in the first timeline with collaboration from the Lone Star Paralysis Foundation, the initial videos reviewing the introduction, precautions, archery, cycling, kayaking, and paddleboarding were sent to the capstone mentor, capstone site supervisor, and capstone coordinator for feedback and approval. In the second timeline with collaboration from NSCD, the initial video reviewing opportunities in outdoor recreation for people with SCI in Colorado were sent to the capstone mentor and coordinator for feedback and approval. The majority of videos created in this series were less than 6 minutes in length and include visual and audio educational material from pictures and videos. The educational video series outline is listed in Appendix A and the video scripts can be found in Appendix B.

Evaluation/Revision. The fourth phase of the capstone project included revisions to the educational video series from the evaluations and feedback from the capstone mentor, capstone site supervisor, and capstone coordinator. The entirety of the educational video series was sent to

the capstone mentor and coordinator the week of August 5th. Once evaluated by the capstone mentor and coordinator, revisions to the educational video series were completed the week of August 12th.

Dissemination. The final phase of the capstone project was the dissemination of the educational video series. The educational video series was uploaded to my YouTube channel the week of August 12th (Walker, n.d.-a). Furthermore, this educational video series was compiled into a centralized playlist for easier viewer access (Walker, n.d.-b). In addition, the videos on introductions, precautions, adapted archery, cycling, kayaking, and paddleboarding were sent to the Lone Star Paralysis Foundation to be linked onto their adapted outdoor recreation program's website.

Conceptual Model and Framework

The PEOP model and rehabilitative framework informed the process of the creation of the educational video series. This was done by identifying and examining the intrinsic and extrinsic factors of the occupation of outdoor recreation and how they affect performance and participation among people with SCI. The rehabilitative framework was utilized in correlation with the PEOP model by addressing performance with the introduction of adaptive equipment within outdoor recreation to support the participants physical abilities, which is a context within intrinsic factors of the PEOP model. By using the PEOP model and rehabilitative framework, the barriers to participation were addressed within the educational video series to promote participation and performance, thus enhancing well-being and quality of life.

Conclusion

With the creation of an educational video series, this capstone intended to promote education and advocacy of adapted outdoor recreational activities to increase participation

among people with SCI (Walker, n.d.-b). The creation of the educational video series required five phases to successfully achieve this goal including organizing research, data gathering, video series development, evaluation/revision, and dissemination. Once the educational video series was completed, videos 2-17 were distributed to Lone Star Paralysis to link onto their adapted outdoor recreation website. The link to my YouTube channel for all the educational videos to NSCD was provided. Additionally, the identified adapted outdoor recreation opportunities in Colorado were contacted to see if they would like the link to my YouTube channel for the educational video series as well.

Chapter 4: OT Practice Magazine

The following article has been written to inform OTPs of the educational video series published in partial fulfillment of this capstone project. This article and resource enables OTPs to better support the SCI population through education and advocacy of participation in outdoor recreational activities. It is intended that this article be published in the *OT Practice* magazine to promote this new resource, resulting in increased knowledge of precautions, equipment, transfers, and participation expectations in archery, cycling, kayaking, and paddleboarding and opportunities for engagement in Colorado among OTPs to increase participation among the SCI population.

Outdoor Recreation for People With Spinal Cord Injury: An Educational Video Series

When a person experiences a SCI, all aspects of their world and life are turn upside down. Suddenly occupational participation and performance in dressing, toileting, house management, intimate relationships, bathing, and all other activities of daily living are impacted. Leisure exploration and participation are no exception.

Figure 1.

Participants Engaging in Adapted Kayaking

Background

In the United States alone, 17,900 new cases of SCI occur each year (Rayes et al., 2022). Changes in functional ability due to impairments in any of the following, pain and temperature, motor function, proprioception, tactile sensation, vibratory sensation, reflexes, bowel and bladder dysfunction, sexual dysfunction, postural control, respiratory functioning, and changes in muscular tone, significantly effect daily occupations (Bennett et al., 2022). Among occupational impacts that are seen in people with SCI, participation in recreational activities and social participation is severely affected (Hwang et al., 2016). Leisure is an area of occupation and is linked to exploration and participation activities (AOTA, 2020). Deficits in leisure exploration and participation lead to occupational isolation in social participation, leisure, and play, thus adversely affecting physical and psychological health (Barclay et al., 2015; Price et al., 2010). The impact of these occupations is one contributing factor to this population's high rates of depression and sedentary lifestyle, resulting in increased reports of mortality and comorbidities (Slater & Meade, 2004; Williams & Murray, 2015). Since all of these factors can adversely impact one's health, well-being, and quality of life, OT has an important role to play in addressing leisure participation and performance in people with SCIs (Ryan et al., 2023).

Participation in leisure pursuits is good for you! Strong correlations between participation in recreation activities, especially when completed outdoors, and enhanced physical and psychological health, cognition, quality of life, life satisfaction, psychosocial status, and well-being have been seen for people with SCI (Dorsch et al., 2016; Kemeny et al., 2020; Labbe et al., 2019). Furthermore, participation in outdoor recreational activities have also been shown to increase occupational performance and participation in ADLs and IADLs through utilization of

the CHART in the domains of physical independence, mobility, occupation, and social integration (Slater & Meade, 2004; Smith & Hsieh, 2017).

Currently, there is a lack of knowledge and underutilized intervention implementation among OTPs regarding precautions, equipment, and participation expectations in adapted outdoor recreational activities for people with SCI needed to facilitate increased safety, performance, and participation to promote positive client outcomes and experiences (Schonherr et al., 2005; Wickham et al., 2000). The creation of this educational video series informs OTPs of the knowledge necessary to create opportunities for education, advocacy, and empowerment of people with SCI through leisure exploration and participation (Walker, n.d.-b). This resource reviews background information on SCI and outdoor recreation, precautions to be aware of prior to participation as well as equipment, transfers, and participation expectations for C1-T9 SCI in adapted archery, cycling, kayaking, and paddleboarding. Implementation of adapted outdoor recreational activities support people with SCIs' quality of life, mental health, physical health, and life satisfaction. Through this educational video series, OTPs can make informed recommendations on adaptive equipment, implement education on precautions, and practice transfers and skills that will prepare the participant for a safe, successful outdoor recreation experience. With an expanse of accurate knowledge available through this educational video series and OTPs' facilitation and advocacy for people with SCI to engage in outdoor recreational activities, client outcomes can be supported through improved overall functional status, self-efficacy, social integration, and psychological health (Alve & Bontje, 2019; Slater & Meade, 2004).

Figure 2.

Participants Engaging in Adapted Archery

Case Example

In 2020, Cody experienced an incomplete, SCI caused by an autoimmune disorder. During the worst of his neurological damage, he was classified as an incomplete C7 level SCI but as of 2023 he is classified as a T7/T8 level SCI. He immediately started OT services to gain independence in ADLs. However, it was not until he began outpatient OT that he was encouraged and prepped to participate in adapted kayaking. Since his initial outpatient OT visit, his OTP quickly began preparing him for adapted kayaking through drilling the importance of pressure relief, practicing floor and slide board transfers, increasing trunk stabilization and correction, finding balance points he could easily identify while in a kayak, increasing cardiorespiratory and muscular endurance, and discussing precautions to be mindful of prior to participation. In May 2021, nine months after his injury, Cody successfully and safely participated in adapted kayaking for the first time.

Since his first adapted outdoor recreation experience with kayaking, Cody has begun participating in archery, cycling, and rock climbing as well. With the support of his OTP and the outdoor recreational manager at the Lone Star Paralysis Foundation, Cody now feels confident and comfortable enough to go cycling and kayaking with just his family present. Cody stated that without the encouragement and preparation of his OTP, he would not have participated in adapted outdoor recreational activities due to the lack of knowledge, concern of safety and accessibility, and decreased self-efficacy. These barriers to participation in outdoor recreational activities are consistent with current literature that identify a multitude of intrinsic and extrinsic challenges people with SCI face when engaging in leisure activities. Intrapersonal factors that have been identified as barriers for people with SCI include decreased self-esteem and confidence, fear and anxiety, lack of motivation, and functional skills (Dorsch et al., 2016;

Hwang et al., 2016; Ryan et al., 2023). Cody expressed he experienced these intrinsic challenges prior to his first kayaking trip but as soon as he got on the water these concerns melted away. Extrinsic barriers, including accessibility, transportation, and lack of knowledge, are other challenges Cody has faced that is consistent with the literature (Dorsch et al., 2016; Hwang et al., 2016; Ryan et al., 2023). Despite these barriers, Cody's OTP addressed these during treatment sessions to combat challenges while promoting participation, self-efficacy, and independence.

Participation in outdoor recreation has provided Cody with mental, psychosocial, and physical benefits as well. Physically, he displays increased sitting balance, endurance, strength, and transfer demonstration. Mentally, he states he feels happier, more confident, displays a more positive mindset, and feels at peace when participating in outdoor recreational activities. Psychosocially, he now has a community outside of his family that he is able to share common experiences with that have helped in his healing process. In addition to these benefits, Cody stated that outdoor recreation has provided him a safe space to practice more difficult skills that transfer into daily life, therapy, and recovery. Through participation in outdoor recreation, he stated he is more independent in leisure activities, ADLs, and IADLs as well. Without the expertise, preparation, and encouragement from his OTP, Cody does not believe that he would have participated in and achieved the milestones in both outdoor recreation and ADLs that he has today. Cody's story demonstrates the importance of functional, holistic intervention by implementing leisure exploration and participation in rehabilitation for people with SCI to optimize client outcomes.

Figure 3.

Participant Engaging in Adapted Rock Climbing

Conclusion

OT plays a critical role in enabling participation and optimizing performance in meaningful activities. With significant decreases seen in outdoor recreation participation post-SCI and the negative effects reported due to this decrease, an increase in knowledge among people with SCI and OTPs promote increased engagement within this occupation. Furthermore, mitigating the lack of knowledge in precautions, equipment, and participation expectations in adapted outdoor recreation activities facilitate increased safety for people with SCI and promote positive client outcomes. With this educational video series, OTPs are better informed to address this gap within the literature, barriers people with SCI face when participating in outdoor recreation, and appropriately prepare participants (Walker, n.d.-b). Scan the QR code below to access this newly available resource.

Education Video Series QR Code:

Chapter 5: Discussion

The purpose of this capstone project was to create an educational video series to promote participation in adapted outdoor recreational activities among people with SCI (Walker, n.d.-b). People with SCI experience significant declines in recreational and social participation (Barclay et al., 2015; Boyce & Fleming-Castaldy, 2012; Hwang et al., 2016; Kemeny et al., 2020; Labbe et al., 2019; Sar, 2022; Slater & Meade, 2004; Taylor & McGruder, 1995). Deficits in these occupations lead to occupational isolation and adversely affect physical and psychological health (Barclay et al., 2015; Price et al., 2010). However, numerous studies have shown strong correlations between recreational participation and enhanced physical health, psychological health, cognition, quality of life, life satisfaction, psychosocial status, and well-being for people with SCI (Anneken et al, 2010; Boyce & Fleming- Castaldy, 2012; DelGrande et al., 2020; Dorsch et al., 2016; Hwang et al., 2016; Kemeny et al., 2020; Labbe et al., 2019; Price et al., 2011; Ryan et al., 2023; Schonherr et al., 2005; Slater & Meade, 2004; Smith & Hsieh, 2017; Taylor & McGruder, 1995; Wickham et al., 2009). Moreover, found that these benefits were amplified when leisure activities were completed outdoors (Dorsch et al., 2016).

Despite the multitude of positive outcomes that people with SCI experience when engaging in outdoor recreation activities, there are many intrinsic and extrinsic barriers that lead to decreased participation. A lack of knowledge regarding outdoor recreation among people with SCI and OTPs, inaccurate accessible information online, and leisure being an underutilized intervention throughout the rehabilitation process by OTPs, are major contributors to the decline of outdoor recreation participation in people with SCI (Arbour-Nicitopoulos et al., 2009; Ryan et al., 2023; Schonherr et al., 2005; Wickham et al., 2000). The gap in knowledge on outdoor

recreation for people with SCI was addressed through the creation of an accessible, accurate online educational video series.

Summary

The educational video series mitigates the lack of knowledge among people with SCI and OTPs in precautions, equipment, participation expectations, and opportunities in outdoor recreation to facilitate increased safety and participation for people with SCI (Walker, n.d.-b). This resource currently includes these four aspects of outdoor recreation in archery, cycling, kayaking, and paddleboarding. Furthermore, the educational video series is divided into equipment, transfers, and participation expectations for varying levels of SCI, including C1-C5, C6-T1, and T2-T9. These SCI levels were chosen as they are the most common and experience the greatest impact in occupational performance and participation due to the injury's presentation (ASIA, 2021; Budash, 2021; Ding et al., 2022; Rayes et al., 2022). This educational video series was completed in collaboration with the Lone Star Paralysis Foundation and will be linked on their website to promote increased participation and knowledge among people with SCI (Lone Star Paralysis Foundation, n.d.).

Implications for People With SCI

The lack of knowledge and inaccurate accessible online information, which are identified barriers regarding participation in outdoor recreation for people with SCI, is alleviated by this educational video series (Arbour-Nicitopoulos et al., 2009; Ryan et al., 2023). With only 50% of people with SCI engaging in leisure activities and 71% of people with SCI being dissatisfied with their activity levels, more people with SCI will be able to access accurate information in outdoor recreation, thus increasing the current participation percentage (Hwang et al., 2016). Additionally, with increased participation, more people with SCI will be able to experience the

multitude of physical, psychological, psychosocial, and cognitive benefits that outdoor recreation has been proven to enhance (Anneken et al, 2010; Boyce & Fleming- Castaldy, 2012; DelGrande et al., 2020; Dorsch et al., 2016; Hwang et al., 2016; Kemeny et al., 2020; Labbe et al., 2019; Price et al., 2011; Ryan et al., 2023; Schonherr et al., 2005; Slater & Meade, 2004; Smith & Hsieh, 2017; Taylor & McGruder, 1995; Wickham et al., 2009). Participation in outdoor recreation has also been shown to increase overall functional status in physical independence, mobility, occupation, and social integration through utilization of the CHART (Slater & Meade, 2004; Smith & Hsieh, 2017). This finding demonstrates the transferability of skills from outdoor recreation participation to occupational performance and participation in ADLs and IADLs. Furthermore, this educational video series aids in breaking down a few of the numerous intrinsic and extrinsic barriers that people with SCI face when participating in outdoor recreation. People with SCI now have access to accurate information regarding precautions, equipment, transfers, participation expectations, and opportunities for various levels of SCI, ultimately enhancing their participation and performance in outdoor recreation.

Implications for Occupational Therapy

Utilizing leisure exploration and participation during rehabilitation holds historically significant values to the field of OT (Wickham et al., 2009). Incorporating leisure interventions during rehabilitation supports engagement in meaningful occupations and can facilitate opportunities to optimize personal strengths and abilities (Zahl et al., 2020). Through the utilization of leisure intervention implementation, all client outcomes listed in the OTPF-4, including occupational performance, improvement, enhancement, prevention, health and wellness, quality of life, participation, role competence, well-being, and occupational justice, can be addressed and attained (AOTA, 2020). Moreover, OTPs can help address intrinsic and

extrinsic barriers that can be unfavorable for people with SCI to initiate participation in adapted outdoor recreational activities. Research also states that 82% of adults with a disability are more likely to increase leisure participation if recommended by a health care provider (Centers for Disease Control, 2024). Therefore, OTPs can increase outdoor recreation participation in people with SCI through leisure recommendations during the rehabilitation process. Leisure exploration and participation promote occupational balance as well (Taylor & McGruder, 1995). OTPs are vital to the safety and experience of people with SCI in outdoor recreation and can better prepare this population for participation through intervention implementation, advocacy, training, and education (Harrison et al., 2021; Kemeny et al., 2020; Price et al., 2011; Sousa de Andrade et al., 2019; Taylor & McGruder, 1995; Wickham et al., 2009). OTPs play a central role in educating people with SCI on precautions, making adaptive equipment recommendations based on the participant's client factors, and providing leisure reintegration strategies for optimal outdoor recreational experiences (Kemeny et al., 2020). With an expanse of accurate knowledge available through this educational video series along with OTPs' facilitation and advocacy for people with SCI to engage in outdoor recreational activities, client outcomes can be supported through improved overall functional status, self-efficacy, social integration, empowerment, and psychological health (Alve & Bontje, 2019; Price et al., 2011; Slater & Meade, 2004; Taylor & McGruder, 1995; Wickham et al., 2009).

Strengths and Limitations

Strengths

Strengths of this educational video series include accessibility of playlist through a widely used media platform, centralized availability of all videos, numerous topics of outdoor recreation for people with SCI being addressed within the video series, and short, easy to follow

videos allow for increased user engagement and capacity for learning (Brame, 2016; Cihangir & Coklar, 2021). Accessibility features, such as adaptable language and added subtitles, are also offered on the YouTube platform (YouTube, n.d.). Additionally, the educational video series allow the user to manage their learning pace and receive educational material through visual and audio media to optimize long-term learning (Brame, 2016; Cihangir & Coklar, 2021; Kohler & Dietrich, 2021).

Limitations

Due to time restraints, this resource does not include all outdoor recreational activities and contains educational material on archery, cycling, kayaking, and paddleboarding. Limited resources regarding equipment, transfers, and participation expectations for people with SCI previously existed in the literature and were not in accessible, centralized locations.

Conclusion

The lack of knowledge among OTPs and people with SCI creates a barrier to participation in outdoor recreational activities among people with SCI. The purpose of this project was to create an educational video series to promote participation in adapted outdoor recreational activities among people with SCI. The creation of this educational video series will aid in mitigating the lack of knowledge in adapted outdoor recreation for people with SCI. This educational video series facilitates precaution safety, choosing the appropriate adaptive equipment, learning about applicable transfers, reviewing participation expectations for various levels of SCI, and knowledge regarding opportunities in Colorado. Through this educational resource providing an expansion in the literature, OTPs can better guide people with SCI in outdoor recreation safety, performance, and participation. For people with SCI, this educational

resource provides knowledge, empowerment, and advocacy that can increase outdoor recreation participation and thus promote optimized physical and psychosocial health and well-being.

Envisioned next steps include presenting my project at a state or national OT conference, connecting with OTPs to spread awareness within the field, further expansion with additional outdoor recreational activities being addressed within the educational video series, and publication of an article in *OT Practice* magazine (AOTA, n.d.). The Lone Star Paralysis Foundation will also link the educational video series onto their website in hopes of increasing participants and optimizing their experiences (Lone Star Paralysis Foundation, n.d.). Additionally, the links to this educational video series was provided to the NSCD and other outdoor recreation programs in Colorado to reach more people with SCI, increase knowledge, and promote advocacy in adapted outdoor recreation.

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Appendix A

Educational Video Series Outline

1. Welcome to My Educational Video Series: Outdoor Recreation for People With Spinal Cord Injury (SCI) (Walker, 2024r)
    a. About me
    b. Purpose of capstone project
2. All About Outdoor Recreation for People With Spinal Cord Injury (SCI) (Walker, 2024n)
    a. What is SCI?
    b. Adapted outdoor recreation activities description
3. Precautions for People With Spinal Cord Injury (SCI) While Participating in Outdoor Recreation (Walker, 2024q)
    a. Thermoregulation
        i. Heat-related illnesses
        ii. Prevention
    b. Decreased endurance, cardiac output, and maximum heart rate
    c. Vulnerability to dehydration
    d. Upper extremity orthopedic injuries
    e. Autonomic dysreflexia
4. Archery
    a. Adapted Archery Equipment for People With Spinal Cord Injury (SCI) (Walker, 2024a)
        i. Bows
        ii. Mechanical Release Aids

iii. Bow Mounts

iv. Strapping systems

v. Quiver stands

vi. “Quad Gloves”

b. Draw Length and Weight Setup in Adapted Archery for People With Spinal Cord Injury (SCI) (Walker, 2024o)

i. Measurements

ii. Check points for correct fitting

c. Adapted Archery: Equipment, Transfers, and Participation Expectations for People with C1-C5 SCI (Walker, 2024b)

i. Equipment used

ii. Transfers

iii. What participation looks like

d. Adapted Archery: Equipment, Transfers, and Participation Expectations for People With C6-T1 SCI (Walker, 2024c)

i. Equipment used

ii. Transfers

iii. What participation looks like

e. Adapted Archery: Equipment, Transfers, and Participation Expectations for People With T2-T9 SCI (Walker, 2024d)

i. Equipment used

ii. Transfers

iii. What participation looks like

5. Cycling
    a. Adapted Cycling Equipment for People With Spinal Cord Injury (SCI) (Walker, 2024e)
        i. Handcycles
        ii. Tandem bikes
        iii. Recumbent bikes
        iv. Carrier bikes
        v. Accessories
    b. Adapted Cycling: Equipment, Transfers, and Participation Expectations for People With C1-C5 SCI (Walker, 2024f)
        i. Equipment used
        ii. Transfers
        iii. What participation looks like
    c. Adapted Cycling: Equipment, Transfers, and Participation Expectations for People With C6-T1 SCI (Walker, 2024g)
        i. Equipment used
        ii. Transfers
        iii. What participation looks like
    d. Adapted Cycling: Equipment, Transfers, and Participation Expectations for People With T2-T9 SCI (Walker, 2024h)
        i. Equipment used
        ii. Transfers
        iii. What participation looks like

6. Kayaking
    a. Adapted Kayaking Equipment for People With Spinal Cord Injury (SCI) (Walker, 2024i)
        i. Kayaks
        ii. Seating systems
        iii. Outriggers
        iv. Paddles
        v. Accessories
        vi. Transportation
    b. Adapted Kayaking: Equipment, Transfers, and Participation Expectations for People With C1-C5 SCI (Walker, 2024j)
        i. Equipment used
        ii. Transfers
        iii. What participation looks like
    c. Adapted Kayaking: Equipment, Transfers, and Participation Expectations for People With C6-T1 SCI (Walker, 2024k)
        i. Equipment used
        ii. Transfers
        iii. What participation looks like
    d. Adapted Kayaking: Equipment, Transfers, and Participation Expectations for People With T2-T9 SCI (Walker, 2024l)
        i. Equipment used
        ii. Transfers

iii. What participation looks like

7. Paddleboarding
    a. Adapted Paddleboarding: Equipment and Transfers for People With Spinal Cord Injury (SCI) (Walker, 2024m)
        i. Paddleboards
        ii. Seating systems
        iii. Outriggers
        iv. Paddles
        v. Accessories
        vi. Transportation
        vii. Transfers for tetraplegia
        viii. Transfers for paraplegia
8. Opportunities for People with SCI to Participate in Adapted Outdoor Recreational Activities in Colorado (CO) (Walker, 2024p)

Appendix B

Educational Video Series Content

Welcome to My Educational Video Series: Outdoor Recreation for People With Spinal Cord Injury (SCI) [Video 1]

Thumbnail

URL

https://youtu.be/zEXsNj0x4jQ

Video Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St. Augustine for Health Sciences. In this video, I introduce myself, review the intended purpose of this educational video series, and what to expect from the series.

Script

Hello everyone, my name is Siarra Walker, and I am a doctor of occupational therapy student at the University of St. Augustine for Health Sciences the Austin, Texas campus. This educational video series is created in correlation to my capstone project on outdoor recreation for people with spinal cord injury. It is my aim through this educational video series to promote education and advocacy in outdoor recreation participation for people with SCI. This video series can help inform the SCI population, occupational therapists, caregivers, and others on

equipment, transfers, participation expectations, and opportunities in outdoor recreation. Thank you for watching and I am eager to hear your feedback.

All About Outdoor Recreation for People With Spinal Cord Injury (SCI) [Video 2]

Thumbnail

URL

https://youtu.be/u0fsBBzBz18

Video Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St. Augustine for Health Sciences. In this video, I review background information about spinal cord injuries and their classifications. Additionally, I speak on the effects of SCI on adapted outdoor recreation participation, the benefits seen with participation, and established adapted outdoor recreational activities.

Script

Hello everyone. In this video we will be briefly reviewing spinal cord injuries and adapted outdoor recreation. A spinal cord injury or SCI affects sensory and motor signal conduction across the lesion site. The autonomic nervous system, which controls heart rate, blood pressure, respiration, digestion, and sexual arousal, is affected as well. There are different mechanisms and classifications of spinal cord injury. 90% of SCI's are due to traumatic causes, such as motor vehicle accidents or falls. Other mechanisms of injury are due to nontraumatic causes such as

lack of blood supply or other diseases or conditions. SCIs are further classified into incomplete and complete. There are several incomplete SCI syndromes and each syndrome presents with specific motor and sensory deficits in the body. On the other hand, complete SCIs are characterized by complete motor and sensory function loss below the lesion level and no sacral sparing is present. Complete SCIs are further identified into paraplegia and tetraplegia. Paraplegia occurs when the lower extremities present with motor and sensory loss. Whereas tetraplegia affects all four extremities. Higher levels of SCI require increased dependence as more client factors are affected than people with lower-level SCI. The client factors that may become impaired due to SCI include pain and temperature, motor function, proprioception, tactile sensation, vibratory sensation, reflexes, bowel and bladder dysfunction, sexual dysfunction, postural control, respiratory functioning, and changes in muscular tone. As you can imagine these impacts of client factors experienced by people with SCI significantly affect performance and participation in all daily activities. Physical and leisure activities are among the daily activities that are significantly impacted for people with SCI. Research reports less than 50% of people with disabilities participate in leisure activities resulting in 71% of people with SCI being dissatisfied with their activity levels. However, when people with SCI increase their participation in leisure activities numerous positive psychological, social, and physical benefits are seen. Research also reports these benefits are amplified when leisure activities are performed outdoors. There are a multitude of outdoor recreational activities that people with SCI can participate in including but not limited to archery, cycling, hiking, kayaking, canoeing, paddleboarding, horseback riding, rock climbing, camping, whitewater rafting, fishing, skiing, and hunting. This video series is going to focus on what participation looks like for cervical and

thoracic level SCI in adapted archery, cycling, kayaking, and paddleboarding. Can't wait for you to follow along with me"

Precautions for People With Spinal Cord Injury (SCI) While Participating in Outdoor Recreation [Video 3]

Thumbnail

URL

https://youtu.be/LgKvhafIB5U

Video Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St. Augustine for Health Sciences. In this video, I review precautions for people with SCI when participating in outdoor recreation. Precautions that are reviewed include thermoregulation, decreased endurance, cardiac output, and maximum heart rate, dehydration, upper extremity orthopedic injuries, and autonomic dysreflexia (AD).

Script

Hello everyone. In this video we will going over precautions for people with SCI in outdoor recreation. There are several precautions that people with SCI, caregivers, OT practitioners, volunteers and program employees should be aware of to prevent injury and promote safety during participation of outdoor recreational activities. Complete and higher-level SCIs experience greater impairments in their ability to regulate their body temperature. This poses

risks for heat-related illnesses, such as heat exhaustion and heat stroke. These conditions can be life-threatening. It is recommended that people with SCI should limit or avoid time in weather greater than 70* F and 50% humidity. Participants can also decrease heat-related risks by wearing loose, lightweight clothing, having proper sleep, staying hydrated, and bringing a water-mister to stay cool. Decreases in endurance are also seen so maintaining a steady heart and breathing rate is important for cardiorespiratory safety. To ensure dehydration is not occurring, you can track your weight to ensure you do not lose greater than 4% of your body mass weight after activity. Upper extremity orthopedic injuries are common among people with SCI due to the high demands of upper body use in everyday activities. Participants should work with their therapist to establish a warm-up stretching routine and establish good biomechanics and posture to prevent injuries. Autonomic dysreflexia or AD is a serious condition that could be life-threatening and is seen in SCI lesions T6 and above. When AD occurs, your blood pressure suddenly increases due to painful stimuli. Common causes of AD include UTIs, distended bladder, bladder or kidney stone, bowel impaction, pressure ulcers, ingrown toenails, and pain of any other kind. Symptoms of AD can vary from person to person but a pounding headache, sweating, flushing of skin at or above the lesion level, blurred vision, and goosebumps are commonly experienced. It is crucial that the correct treatment of AD take place as soon as possible. First, you should identify the cause of AD and remove that trigger If possible. This could include cathing or removing tight clothing. Make sure the person stays in an upright posture and does not lay down. Medical attention should be sought out immediately to decrease the risk of life-threatening issues. Anyone who participants with these activities should be aware of these precautions and take the appropriate measures to promote optimal safety. Thank you for

watching. Subscribe for more information on outdoor recreation for people with SCI. See you next time.

Adapted Archery Equipment for People With Spinal Cord Injury (SCI) [Video 4]

Thumbnail

URL

https://youtu.be/3gA_PczqYoE

Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St. Augustine for Health Sciences. In this video, I review bows, mechanical release aids, bow mounts, strapping systems, quiver stands, and "quad gloves".

Script

Hello everyone. In this video, I will be reviewing adaptive archery equipment for people with SCI. Adapted archery is very similar to traditional archery. However, adaptations for archery are available to accommodate client factors for varying levels of SCI. Firstly, participants should decide between using a recurve or compound bow. A recurve bow is known for being lighter in weight but drawing back the arrow may require more strength. Conversely, compound bows are shorter and may be easier to draw back. These factors, in addition, to being able to be utilized with a bow mount may make using the compound bow easier for seated archers. Other adaptive equipment that participants may use with the bow include mechanical

release aids, mouth tabs, bow mounts, strapping systems, quiver stands, and quad gloves. Mechanical releases and mouth tabs assist with the drawing and release of the arrow on the bowstring. Finger tabs or gloves are used for people with full function in their upper extremities but need assistance with gripping. A caliper release aid with wrist strap is used for people with deficits in fine motor skills. The release mechanism can be set through touching the cheek or another body part to the trigger. Thumb release aids are utilized with more experienced archers and have a trigger extension that releases the string. The back tension release aid works as a hinge and can be utilized by archers with limited to absent use of hands. With the ease of the release system and difficulty of use, the back tension release aid is also recommended for more experienced archers. Strap-on release aids can be strapped to the archer, such as the shoulder, and are set off with a finger or chin. Shoulder mount release aids are custom made and are used by having the bow fitted to the harness on the archer's shoulder. The release is then triggered by the archer's face. Mouth tabs can be used for archers with very limited or absent function in their upper extremities. The mouth tab is placed between the archer's molar to draw the arrow back, hold, and release. An additional accessory known as "quad gloves" are used for people with no function in their hands, which allow them to grip items, such as the bow. The bow mount, wheelchair bow slinger, and slings can facilitate increased stability and support when using the bow. Bow mounts, or bow stands, are used so the bow is stabilized and the archer is only responsible for drawing back the bowstring and releasing (Stott & Krueger, n.d.). There are horizontal and vertical bow mounts available for people with significant client factor deficits due to motor dysfunction, spasticity, or paralysis to promote occupational participation and performance. These mounts are versatile and can be utilized free standing or wheelchair attached. Quiver stands are used so archers with limited mobility do not have to engage in

additional movement to retrieve arrows. Some quiver stands can be attached to the archer's wheelchair as well. To promote trunk stabilization, strapping systems may be used for wheelchair users. It is intended that adaptations should be made to the archer's client factors rather than the archer adapt to the bow. However, minimal adaptations are recommended so independence and engagement are optimized. Thank you for watching. Subscribe for more information on outdoor recreation for people with SCI. See you next time.

Draw Length and Weight Setup in Adapted Archery for People With Spinal Cord Injury (SCI) [Video 5]

Thumbnail

URL

https://youtu.be/ZrhMnQtVksQ

Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St. Augustine for Health Sciences. In this video, an outdoor recreation director reviews how to accurately measure and assess draw length and weight for adapted archery for people with SCI.

Script

Hello everyone for this video we will be going over how to determine draw length and draw weight for archery. When we want to check the draw length there's several anchor points that we have to hit for a bow to be specific to the shooter. So for me I like to get my index knuckle right behind my earlobe and I like to get the tip of the string or the string on the tip of

my nose rather. So for mine I think it's at 29 inches. So my draw first thing is knuckle behind my ear and then my nose to my string and everything should match up just like that. Then I can look down my peep. I can see my sights and when I match the sight to the distance then we shoot. As far as draw weight is concerned we want to match the weight of the draw with the shooter. So that's going to be if they're a higher level. A heavy draw weight is probably not important at the beginning especially when they're just getting started in archery. So you also want to come out and be able to shoot you know as many arrows as you can whenever you have range time. So if you have heavy poundage you're just going to gas yourself out early. So low poundage, we got to match the arrow spine with the poundage. Also with the draw length so that is very important. There's a spine chart out there that you can check out to make sure the arrow matches the bow and the shooter. As far as positioning goes for our like midlevel thoracic or higher thoracic we try to get a little posterior pelvic tilt. So we'll scoot our rear end forward in the cushion that way we can put all of our weight into the back rest so we're super supported and not top heavy whenever we're holding the weight of the bow. Plus, the weight of the string we want to make sure that we're nice and concrete in our chairs whenever we release. Some of our higher level shooters will wear an abdominal strap that goes around their belly and around the back rest. That just is another insurance policy to make sure that they're tucked into their chair nicely so there's no flailing arrows going down rage whenever we're out here. For shooting, all right, so we've got it at 28 right now which should be pretty close but let's go ahead and lengthen that by one. You can't release so that way it's not as intimidating. Yeah we're just going to practice the draw and see if we're at the right length. Okay now try to get your knuckle up like behind your earlobe if you can. Yeah right in there. Then can you get your nose on the string at all. Man I'm going to go a little bit longer because you're left, let it down nice and easy, beautiful. We're going to go a

little bit longer because I want your left arm to be bent but you were like right here. I want just a little bit and we're going to try to get more of a bend from like our positioning with our hand and kind of rotate our arm out than like that. Right so let me make it another inch and that should make a difference for us. But I want to get like I said with your knuckle back here and then nose on the string. Doesn't matter where but you just want to put it in the same spot every time. Yeah and then you want to get your sight picture through your peep and these knuckles. Right yeah I try to put like my index knuckle right there right because I know it just that's just my first step. All right let's try again. Push and pull. There you go. Can you get your nose down at all? There you go just to where it's touching. Yeah that looks okay. Come down with it. Why don't we try one or two like that and if it just doesn't feel like you can get comfortable and easy then we maybe even go a little bit longer. You still had a pretty good bend but I think like level wise we're going to scoot your butt forward when you shoot so you can sink into your back rest and you'll have a little bit more support so you're not only trying to fight all this, plus your trunk. Yeah it's a lot going on all right and we'll get over there and get a few out see how you feel. Thanks for watching. Subscribe for more information on outdoor recreation for people with SCI. See you next time.

Adapted Archery: Equipment, Transfers, and Participation Expectations for People With C1-C5 SCI [Video 6]

Thumbnail

URL

https://youtu.be/tiQCjSD847s

Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St. Augustine for Health Sciences. In this video, I review the equipment recommended, positioning, checkpoints, and what participation looks like for people with C1-C5 SCI.

Script

Hello everyone. For this video, I will be reviewing what participation in archery looks like for someone with a C1-C5 SCI. First, let's review what motor function each complete cervical SCI level will be able to utilize during archery. C1-C3 SCI will have neck flexion, extension, and rotation. C4 will have shoulder elevation and inspiration for breathing. C5 will have shoulder flexion, abduction, and extension; scapular adduction and abduction; elbow flexion and supination. Before the archer begins participation, it is important the correct bow is chosen. The size and style of bow will be chosen based on the archer's hand dominance, height, eye dominance, and upper extremity functions. With the archer in a seated position, it is important to consider the height of the chair, as a smaller bow may be needed, and ensure their feet are stable and balanced on the wheelchair's footrests. For these SCI levels, an assistant can place the arrow onto the bowstring, known as nocking the arrow. Once the arrow is nocked, it is imperative that the correct mechanical release aid is chosen for the archer. Choices for this adapted equipment include caliper release aid, mouth tabs, strap-on release aids, and shoulder mount release aids. Quad gloves can also be utilized for gripping purposes. Bow mounts would also be beneficial for stabilizing the bow before releasing the arrow. When raising the bow to the correct positioning, if the archer is utilizing a mouth tab or shoulder harness, the bow arm will

remain bent to prevent strain on the archer's neck. Straps for trunk stabilization is also recommended for archers with C1-C5 SCI. Before participation, the appropriate amount of draw weight should be decided upon for each archer. After the bowstring is drawn, the archer will anchor the bowstring into the correct position, so the sighting mechanism is in front of the aiming eye. Once the archer feels comfortable with their aim, they will complete the release and follow through. Archers that use a mechanical releasing aid will trigger the system as specified by the manufacturing company. Archers who utilize a mouth tab will open their mouth to release the arrow towards the target. Decreasing fatigue and risk of injury will be accomplished through the correct use and application of archery adaptive equipment based on the archer's client factors. Thank you for watching. Subscribe for more information on outdoor recreation for people with SCI. See you next time.

Adapted Archery: Equipment, Transfers, and Participation Expectations for People With C6-T1 SCI [Video 7]

Thumbnail

URL

https://youtu.be/a1TBf79fKNw

Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St.

Augustine for Health Sciences. In this video, I review the equipment recommended, positioning, checkpoints, and what participation looks like for people with C6-T1 SCI.

Script

Hello everyone. For this video, I will be reviewing what participation in archery looks like for someone with a C6-T1 SCI. First, let's review what motor function each SCI level will be able to utilize during archery. C6 SCI will have shoulder protraction, scapular protraction; shoulder horizontal adduction and abduction; pronation; radial wrist extension. C7-7-T1 SCI will have elbow extension; wrist flexion, ulnar wrist extension; finger flexion and extension; thumb flexion, extension, opposition, abduction, and abduction of the 5th finger. Before the archer begins participation, it is important the correct bow is chosen. The size and style of bow will be chosen based on the archer's hand dominance, height, eye dominance, and upper extremity functions. If the archer is participating in a seated position, it is important to consider the height of the chair, as a smaller bow may be needed, and ensure their feet are stable and balanced on the wheelchair's footrests. The appropriate amount of draw weight should be decided upon for each archer before participation. Adapted equipment that could promote performance within these levels of SCI includes mechanical release aids, such as the caliper release aid and back tension release aids, finger tabs or gloves, quad gloves, bow mount if desired, and potentially strapping systems for trunk stabilization. The archer will nock the arrow ono the bowstring and then draw the bowstring back. After the bowstring is drawn, the archer will anchor the bowstring into the correct position, so the sighting mechanism is in front of the aiming eye. Once the archer feels comfortable with their aim, they will complete the release and follow through. Archers that use a mechanical releasing aid will trigger the system as specified by the manufacturing company. It is always important to strive for as little adaptations as possible so trial and error may be needed

but safety of the archer and everyone at the range remains the utmost importance. Thank you for watching, Subscribe for more information on outdoor recreation for people with SCI. See you next time.

Adapted Archery: Equipment, Transfers, and Participation Expectations for People With T2-T9 SCI [Video 8]

Thumbnail

URL

https://youtu.be/jsBuhf3dJ6w

Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St. Augustine for Health Sciences. In this video, I review the equipment recommended, positioning, checkpoints, and what participation looks like for people with T2-T9 SCI.

Script

Hello everyone. For this video, I will be reviewing what participation in archery looks like for someone with a T2-T9 SCI. First, let's review what motor function people with these SCI levels will be able to utilize during archery. T2-T9 SCI levels will present with increased endurance of intercostal muscles; typical motor function of upper extremities; and limited trunk stability. Before the archer begins participation, it is important the correct bow is chosen. The size and style of bow will be chosen based on the archer's hand dominance, height, eye dominance, and upper extremity functions. If the archer is participating in a seated position, it is

important to consider the height of the chair, as a smaller bow may be needed, and ensure their feet are stable and balanced on the wheelchair's footrests. The appropriate amount of draw weight should be decided upon for each archer before participation. Mechanical release aids can also be used with archers of these SCI levels if desired. Most archers prefer to use a caliper release aid when shooting. Archers will nock the arrow themselves, then hook or hold the bowstring. Once the bowstring is hooked, the archer must grip the bow handle and raise the bow before drawing the bowstring back. For archers who are using their arms to draw the string, they must keep their draw arm as close in alignment with the arrow and level to the ground as possible to prevent safety concerns and shoulder injury. After the bowstring is drawn, the archer will anchor the bowstring into the correct position, so the sighting mechanism is in front of the aiming eye. Once the archer feels comfortable with their aim, they will complete the release and follow through. Decreasing fatigue and risk of injury will be accomplished through the correct use and application of archery adaptive equipment based on the archer's client factors. This might be a trial-and-error process but safety of the archer and everyone at the range remains the utmost importance. Thank you for watching, Subscribe for more information on outdoor recreation for people with SCI. See you next time.

Adapted Cycling Equipment for People With Spinal Cord Injury (SCI) [Video 9]

Thumbnail

URL

https://youtu.be/E1TBF6ZCGIc

Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St. Augustine for Health Sciences. In this video, I review various types of handcycles, tandem bikes, recumbent bikes, carrier bikes, and adapted cycling accessories.

Script

Hello everyone, in this video I will be reviewing the equipment available for adapted cycling for people with SCI. There is a multitude of equipment and accessories available for people with SCI to participate in adapted cycling. For people with functional skills maintained in their upper extremities, handcycles can be used by having arm force propelled through a crank system. Different handcycles are used for various terrain. For paved terrain, a recreational handcycle, such as an upright bike on the left or recumbent bike on the right, can be used. For more uneven, rugged terrain, an off road handcycle should be used as they provide more durable tires and a wider base of support. To aid in pedaling for off-road surfaces, electric options are available as well. People who present with more limited functional skills, such as decreased ROM, in their upper extremities can utilize e-assist handcycles. The e-assist handcycles can be customized to the user and offer various hand pedals, foot pedals, and adapted hand controls. All handcycles have gears placed in the front of the bike rather than the back of the bike as other types of bikes do. If a person does not desire to complete transfers in and out of a handcycle from their wheelchair, an attachable handcycle is available. The attachable handcycle connects to the front of the wheelchair and can be used through either a crank system with arm propulsion or through a power system controlled through thumb throttles. Tandem bikes provide space for two people to ride as one on a singular bike. There are several variations of tandem bikes with the option of electrical power to aid in pedaling. Variations include side-by-side, semi-recumbent,

and tandem trike bikes. A side-by-side tandem bike allows the users to sit next to one another and offers easy movability. A semi-recumbent tandem bike has a semi-reclined seat with trunk support at the front and a standard seat on the back of the bike. Whereas a tandem trike bike, has two semi-reclined seats with trunk support where one user is in the front and one is in the back. There are other seating options available for tandem trike bikes based on the user's needs. Recumbent bikes are identified by their semi-reclined seat positioning and can come in variations of handcycles, tandem, and trikes. Recumbent bikes provide increased balance and comfort of the rider. Most recumbent bikes have the pedals in front of the user and the control handles are on both sides of the seat. The recumbent delta trike is one bike that has two wheels in the back and one wheel in front. The pedals on this recumbent bike are in front of the rider with the brakes on the sides. Unlike other recumbent bikes, the recumbent handcycle bike has a crank system that control the gears using arm force and thumb throttle brake controls. The tandem recumbent bike is for two-person use with the recumbent seat in the front and a standard bike seat in the back. Each seat has its own foot pedals and the thumb throttle brakes are placed on the back of the recumbent seat. Carrier bikes allow the person in the front to have a seat or platform for their wheelchair with a second seat behind for the user to pedal the bike for both users. A carrier bike with a built-in seat provides trunk support with a neutral positioned seat. Additional features can be added to this carrier bike, such as a headrest, arm rest, and hand protectors for safety of the front user. The brakes are controlled by the second user with a squeezable stroller handlebar attached to the front seat. Another carrier bike available is one with a wheelchair platform. This bike allows a personal wheelchair to be rolled onto a front platform and locked into place using straps. For additional safety, the front rider wears an additional seatbelt. The second user rides on a standard seat in the back with standard handlebars and hand brakes.

Accessories to increase occupational performance and safety for adapted cycling are available as well. A special pedal with calf support is used to secure the users lower leg in a neutral position while cycling. There are two Velcro straps to secure the lower leg and foot to the pedal at the calf and top of foot. For people with hemiparalysis, a one-sided leg support is used to support and secure the paralyzed leg to the pedal while the other leg propels the bike. Foot fixation trays allow the person's feet to be secured in a neutral position with straps while cycling. Steering dampers help reduce energy expenditure and fatigue through increasing control of the handlebars and increasing stability. These benefits are achieved through a ventilation system preventing airflow in the opposite direction. Steering dampers are often used for off-roading, uneven terrain. It is intended that adaptations should be made to the cyclist's client factors rather than the cyclist adapt to the bike. However, minimal adaptations are recommended so independence and engagement are optimized. Thank you for watching, Subscribe for more information on outdoor recreation for people with SCI. See you next time.

Adapted Cycling: Equipment, Transfers, and Participation Expectations for People With C1-C5 SCI [Video 10]

Thumbnail

URL

https://youtu.be/1SR2-AGkjJA

Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St. Augustine for Health Sciences. In this video, I review the equipment recommended, transfers, checkpoints, positioning, and what participation looks like for people with C1-C5 SCI.

Script

Hello everyone, in this video I will be reviewing what participation in cycling looks like for people with C1-C5 SCI. First, let's review what motor function each cervical SCI level will be able to utilize during cycling. C1-C3 SCI will have neck flexion, extension, and rotation. C4 will have shoulder elevation and inspiration for breathing. C5 will have shoulder flexion, abduction, and extension; scapular adduction and abduction; elbow flexion and supination. People with higher level cervical injuries with absent or limited upper extremity function can also participate in cycling using tandem and carrier bikes, such as those pictured on this slide. As you can see there are many options available based on the user's needs. People within these cervical SCI levels who have some upper extremity function can also utilize handcycles as well. Dependent on the level of the cervical SCI, the user may need assistance with the transfer or additional equipment for ease of transfer and safety. With each cervical level SCI injury demonstrating various neuromusculoskeletal client factors, the transfer will be modified to adhere to the user's upper extremity capabilities. Each person will complete transfers slightly different based on their preferences and client factors, but these are the general steps a person with SCI will perform to complete transfers in and out of the bike. People with cervical level injuries can utilize mechanical brakes and shifts as well as additional accessories to promote increased upper extremity function. This is my personal hand cycle that I have here. It is a little bit of an older model but it's definitely lasted me this long so I keep on using it. So I am C5/C7

incomplete quad. So one thing especially if you're a quad, not the greatest transfers. I've gotten pretty good over the years but having a little bit higher bike does make transfers very easy because as you can see it's almost level with my wheelchair a little bit higher but not too bad. So with this one, down here I have a lever so I can scoot the seat forward and back. Then down here you got Velcro straps so before I get in I always make sure that I have the straps undone. Go on each side just make sure that my Velcro straps are not tight underneath. Otherwise it can be kind of hard to reach them. Especially when you only got like one good hand. Alright and then I do use a cushion on top of this because you know pressure sores is always something that you need to be very aware of. So I use a purple cushion. It's just something you can buy at Walmart or a lot of other places. Very comfortable, very good for bike rides. So the way that I do my transfers is I get at an angle like this, I scoot to the corner, and then I put one hand here another hand on my wheelchair cushion and then I lean forward because you want to use momentum. So get it in front of your hips and then you just pick up and get to the corner like that. Then I'll just pick up my leg bring it over like so and make sure cushion it's not all messed up there. Then I'll get my feet positioned like so. I do here this can be a little tricky sometimes but this is why it's important to make sure that before you get in that you get the straps in the right place. So hold with my bad hand then use my good hand to get this. So it's all learning about adaptation. So you may not have the perfect hands but if you can use them in any way you just have to learn how to utilize them to your strengths. Then make sure that you got enough clearance so you don't want your arms to be like completely straight when they're like this. You want to make sure that there is a little bit of a bend. So I will bring it forward just a little bit. So that seems to be pretty good right there all right. Then um if you come over to this side. So because my right hand is not that great I make sure that I have my gear shifter on the left side since this is my good hand. So this is really

easy. Just push down to shift up and then like that shift down. So it's pretty simple and I do have a brake here but I don't use that too much. The brake that I do use when you're going forward if you just go the opposite direction there's a brake like that so you just pedal the opposite direction. So pretty simple. All right and then depending on how much trunk control you have, sometimes, like if you don't like have any or very little, you might want to strap your chest to keep you. I've been doing this for a while I've got enough you know trunk control where I can control myself so I don't use a strap. But if you are a quad I would recommend using one unless you got good trunk control. Thank you for watching. Subscribe for more information on outdoor recreation for people with SCI. See you next time.

Adapted Cycling: Equipment, Transfers, and Participation Expectations for People With C6-T1 SCI [Video 11]

Thumbnail

URL

https://youtu.be/VW2j0my9HYs

Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St. Augustine for Health Sciences. In this video, I review the equipment recommended, transfers, checkpoints, positioning, and what participation looks like for people with C6-T1 SCI.

Script

Hello everyone. For this video, I will be reviewing what participation in cycling looks like for someone with a C6-T1 SCI. First, let's review what motor function each SCI level will be able to utilize during cycling. C6 SCI will have shoulder protraction, scapular protraction; shoulder horizontal adduction and abduction; pronation; radial wrist extension. C7-T1 SCI will have elbow extension; wrist flexion, ulnar wrist extension; finger flexion and extension; thumb flexion, extension, opposition, abduction, and abduction of the 5th finger. Before the cyclist begins participation, it is important the correct handcycle is chosen. The cyclist should consider what terrain they will be riding on to determine if a road or all-terrain handcycle is appropriate. Next, an upright or recumbent bike should be considered. Upright bikes provide a more traditional cycling posture. For individuals with decreased trunk stability a strap can be used to assist with trunk stabilization. A recumbent bike provides increased balance and comfort of the rider. E-assist bikes are also available to assist with pedaling of the hand cranks. Accessories can also be utilized to aid in lower extremity management and safety, such as a special pedal with calf support and foot fixation trays. Transfers from a wheelchair to the bike will vary depending on the level of SCI. With a C6-T1, it is likely the participant can transfer independently. However, support may be needed until the rider becomes comfortable with independent transfers. This video is one example of transferring in and out of an upright bike. Once the cyclist is settled into the bike, we want to ensure that they will able to maintain good posture and skin integrity. A cushion should be placed in the seat of the bike to decrease the risk of pressure ulcers. Additionally, the cyclist should pedal a few times before hitting the trail to determine if any adjustments will need to be made. Check points include making sure the cyclist isn't leaning too far forward, back or to one side, they maintain a slight bend in the elbows when pedaling, their legs will not get pinched or caught in any equipment when turning, and the pedals are not

hitting their legs or hips when completing a full pedaling rotation. Thank you for watching, Subscribe for more information on outdoor recreation for people with SCI. See you next time.

Adapted Cycling: Equipment, Transfers, and Participation Expectations for People With T2-T9 SCI [Video 12]

Thumbnail

URL

https://youtu.be/CATlZVDTmL4

Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St. Augustine for Health Sciences. In this video, I review the equipment recommended, transfers, checkpoints, positioning, and what participation looks like for people with T2-T9 SCI.

Script

Hello everyone. For this video, I will be reviewing what participation in cycling looks like for someone with a T2-T9 SCI. First, let’s review what motor function people with these SCI levels will be able to utilize during cycling. T2-T9 SCI levels will present with increased endurance of intercostal muscles; typical motor function of upper extremities; and limited trunk stability. Hi my name is Ryan with Lone Star paralysis Foundation. We're going to walk through a little bit of the ins and outs of a hand cycle. So this is a top end Force 3. It's a couple years old but even the newest updated ones are very similar. So we're going to go through kind of the

equipment portion of it. Then we'll do the transfer portion of it and the positioning portion of it. So as far as the equipment goes, the main thing is what we call the rear gear set which is just three gears. We have the front gear set, which on this particular bike is nine gears, so we'll have 27 total. Here on our right pedal per se is our brake, which runs a cable down here to this disc so it's disc brakes. You don't have the typical like pads that are on the wheel, so these are a little bit more dependable. For our gear shifters, so the positioning where you hold the pedal is important. This one is for going uphill and this one you pull to go downhill. So this one relieves the tension, this one adds more tension to it. This is all adjustable for the rider's hand and comfort level. We want to be able to make sure that they can hit both of those comfortably without it being in the way. As you are going through your rotation, the back rest here is fully adjustable so this can drop back down to be more of like a laying down position or a prone position. It also will come up a little bit further. We remove the cushion there's also some tubing in here that you can slide this forward for people that have a little bit smaller stature. The stirrups up here are very important for comfort and positioning. So there's two little set screws these can go forward and back. Also these stirrups here can be tightened and loosened depending on you know foot positioning and how we kind of want the rider to sit on the seat. Let's see. We've also got our parking brake here and our derailer for the rear gears is right here. So you can move through these three and then like I said earlier this one gets you through the front nine. All right as for transferring in and out of these, especially these lower hand cycles, there's a couple things to remember. We want to make sure that we don't use our gear setup as an anchor point. Just because it’s got a lot of movement to it and this dampener down here keeps this front wheel kind of in a neutral position even with the bike. So we would try not to use that if possible but there's plenty of other anchor points that we can use to make it easy for our rider. So I try to get my

chair as close to the frame as we can and add a little bit of an angle and that way we're not trying to fight over the frame of our chair or fight over the tire. So once I'm here I can use the back rest as a as an anchor point and I'll try to get my inside foot if not all the way on the other side of the bike as far over as we can that way when we come down we're not putting any kind of torque or weird bend into our knee. We don't want to have any injuries before we actually set sail. So I'll get my foot over there as far as I can. I like to put my outside hand somewhere on my frame and then my left hand in this instance as far down as I can that way I just have a lower center of gravity and I can get my rear end down onto the seat. For some of our beginner riders we can do the same thing with our inside hand but if we can get our rear end somewhere on the back rest then we can get there and slide down comfortably, it makes it a little bit easier. So got my hand on my frame got my other hand down here on the bike little push and we'll slide down and we'll try to make sure that these parking brakes are nice and locked in so the bike doesn't move in the middle of our transfe. Once we've got settled into the bike, we're going to get our feet up into these stirrups like we talked about earlier. So they're adjustable, this one's already set. We're going to get our heel over this strap and we want that strap resting on our achilles so we'll get both feet in. Ideally we want to have just a little bit of bend in both of these knees so we're there. That way we got a little bit of a bend when I'm all the way back. That way when I turn our knees will give a little bit and again we don't put any unwanted torque or put our knees in a compromised position. So I got a strap here that I put across my thighs to keep my hips from rotating outward and I found this is beneficial just from a comfort level. We want our legs and feet nice and straight with the bike. So once I'm settled then when I turn whichever way I turn my knees are bending properly and again not to cause any injury. So once we're in, we want to line up our pedals at like full extension with our arms we want our pedals to be about right here.

A little bend in our elbow. We don't want to have to reach for it, especially with people that don't have any core. They're not going to be able to pull themselves forward to get all the way at full extension and at the same time when we're all the way back in our pedal we don't want to be hitting our chest or our trunk or our thighs. Again prevent injury, we don't want any friction points between our ankles in the bike or between our knees in the bike so it's something to pay attention for before you become mobile on these things. Alright upon dismounting out of our hand cycles we first want to make sure that our parking brake is nice and tight. We'll get our straps off here and we'll get our feet out of our stirrups. Essentially I want to get my chair in a point to where like when we get in we don't want to have to fight the frame and we don't want to have to go over the wheels. So I have an open hand and I have a no obstructions in between my seat and this seat. So again we don't want to use our pedals as an anchor point so I'm going to get the way that I'm transferring that arm that hand my right hand and my left hand is going to go back here, so I get my opposite foot of where I'm transferring to make sure that's in a spot where it's going to stay. Then I get my left hand up as high as I can and we're going to do it in one foul swoop. One, two, and try to get our rear end up as high as we can. There's a one cheek rule. If you can get one cheek on, then you're good to go. Thanks for watching. Subscribe for more information on outdoor recreation for people with SCI. See you next time.

Adapted Kayaking Equipment for People With Spinal Cord Injury (SCI) [Video 13]

Thumbnail

URL

https://youtu.be/goJDmBAsznU

Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St. Augustine for Health Sciences. In this video, I review various types of kayaks, seating systems, outriggers, paddles, accessories, and transportation options for adapted kayaking.

Script

Hello everyone, for this video I will be reviewing the equipment available for adapted kayaking for people with SCI. There are several types of kayaks that can be chosen. First, cockpit seating kayaks allow the user to sit inside the vessel, whereas the kayak with the sit-on top allows the user to sit above the vessel providing increased ease with transfers. The third seating variation is the tandem kayak with two seats, one in the front and one in the back, that allows two users to use the vessel together. Within these three kayak options, there is a multitude of additional accessories to promote safety and performance with adapted kayaking for people with SCI. In addition to the various seating arrangements, there are seating systems available to add onto the kayak to increase comfort and safety of the user. The basic seat has lateral supports to promote trunk stability and balance as well as adjustability in each support point of the chair based on the user's comfort and needs. The padding and fabric within the chair decreases skin irritation and the cushion material can vary based on the user's preference. Mounting the basic seat on the seat pan of the kayak allows for secure attachment on most kayak types. Furthermore, the basic seat can also be mounted onto a canoe utilizing the clamping system on the seat. Another seating system available is the high back seat with lower back support. This is seat is best utilized for people with increased trunk stability as this seat does not provide lateral supports

like the basic seat. With a tall, padded back, additional lumbar support, adjustable side wings, and a gel pad seating cushion, this seat provides increased comfort and stability for the user while decreasing pressure on the butt bones. Gel and inflatable seating pads are available to be placed on top of the user's seat to provide pressure relief of the butt and legs. The gel pad consists of nylon and a non-skid material on the bottom so the cushion remains in place during participation and with transfers. The inflatable seat pad is filled with air rather than gel and can easily be adjusted based on user's preference. Outriggers are used to provide additional stability through adding floats that attach on either side of the kayak. There are a variety of options for outrigger kits but the outcome of providing increased stability remains the same. The outrigger device attaches to the base of the kayak and the floats can be adjusted up or down and closer or farther depending on the amount of stability needed for the user. The further the outrigger floats are from the kayak, the more stable the kayak is. A variety of kayak paddles are available to match the user's abilities. The mount supported paddle decreases stress placed on the upper extremity joints and back by having most of the paddle's weight being supported by the kayak through the mount attachment. This system also requires less trunk rotation while paddling. The angle of the paddles can be adjusted to be downward or straight, with the downward angled paddles requiring less range of motion to effectively paddle. The paddle pivot provides one-arm control of the kayak using a universal base that the paddle is supported by. This paddling system removes the weight of the paddle from the user, reducing the stress on the user's upper extremities. The bent shaft paddle is visually similar to a standard paddle but with the addition of divets to provide easier grasping of the paddle. This paddle allows for decreased stress on the hand and wrist which can prevent overuse injuries if the user kayaks often. Lastly, the lightweight carbon fiber paddle provides decreased weight and increased durability when

compared to the standard kayak paddle. With these features, the energy expenditure from strength and endurance required by the user to paddle is decreased. For people with SCI who present with decreased function of the distal upper extremities, gripping devices are available to support the wrists and hands to promote performance. Paddling mitts allow for increased gripping stability using Velcro to attach the mitts to the paddle. A wrist cuff secures the user's hands and wrists in place while paddling using hook and lock fasteners. The back of hand grip device increases the user's hand support while paddling by sliding the hands underneath the mechanism and securing them in place. This device allows for decreased pressure to be placed on the hands and wrist, so the arms are doing the most work. This grasping device is utilized by people who prefer less external gripping support than the paddling mitts and wrist cuff devices. Paddle grips are put onto the paddles to increase gripping stability and control. There are variations within paddle grips depending on the type of material the user prefers. Additional supports, such as foam supports, are used to provide further stability and comfort to the user while kayaking. These supports are also utilized to decrease pressure and friction on the skin while kayaking, decreasing the risk of pressure sores and other preventable injuries. Common sites for foam support to be placed include the lateral aspect of the upper and lower legs, beneath the knees, under the heels, at the buttocks, behind the back, the outside of the hips, and wherever else the user prefers. These foam supports are lightweight and provide increased comfort to the user, thus enhancing the kayaking experience. Transportation devices are available to decrease transferring challenges in and out of the kayak. A transfer bench, such as the one shown in this video, is utilized for people who demonstrate increased independence with transfers from the wheelchair to the kayak. The transfer is completed using a slide board that can be removed once the user is in place above the kayak seat. The user then lowers themselves into the seat using the

handlebars on either side of their body. The kayak cart allows easier transportation of the kayak with the user in it from land to the water. This device also provides a smoother transition of the kayak into the water as the user can be rolled directly into the water. It is important to consider client factors to match the correct kayaking systems and accessories to the user to increase performance, comfort, and safety. Thanks for watching. Subscribe for more information on outdoor recreation for people with SCI. See you next time.

Adapted Kayaking: Equipment, Transfers, and Participation Expectations for People With C1-C5 SCI [Video 14]

Thumbnail

URL

https://youtu.be/MAyMOMSIorQ

Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St. Augustine for Health Sciences. In this video, I review the equipment recommended, transfers, checkpoints, positioning, and what participation looks like for people with C1-C5 SCI in adapted kayaking.

Script

Hello everyone. For this video, I will be reviewing what participation in kayaking looks like for someone with a C1-C5 SCI. First, let’s review what motor function each complete

cervical SCI level will be able to utilize during kayaking. C1-C3 SCI will have neck flexion, extension, and rotation. C4 will have shoulder elevation and inspiration for breathing. C5 will have shoulder flexion, abduction, and extension; scapular adduction and abduction; elbow flexion and supination. It is important the correct kayak and equipment are chosen. If the kayaker prefers or has increased difficulty paddling, a tandem kayak may be utilized so the person in the back can assist in providing power and control. If not, a single kayak, cockpit or sit-on top style, can be used. The process of transferring into the kayak, launching into the water, paddling, and water safety will be taught to participants in preparation for engaging in adapted kayaking. There are a variety of options and equipment available for transferring into and out of the kayak. For people with tetraplegia, a Hoyer type lift on a dock or a lifting system on a truck can be used to transfer into the kayak. If these lifting systems are not available, assistance from two able-bodied people can also occur and allow for safety and efficiency transferring in and out of the kayak such as shown in this video. Once the kayaker is seated, they should ensure the lumbar spine is in complete contact with the back of the seat, the ball of the foot is in contact with the foot pedals, a slight bend of the knees are maintained, and the lateral aspects of the knees are in solid contact with both sides of the boat. These points of contact allow the kayaker to maintain control and stability throughout the activity. For optimal safety with transfers, it is recommended to transfer into the kayak on land, this could also include a dock, then be transported into the water. This type of transfer from the same level of a shoreline into the water is known as a zero entry launch. Depending on the kayakers comfort level and trunk stability, several seat options can be utilized. A basic seat that provides lateral supports at the shoulder and hips provide the most stabilization. A high back seat with lower back support can also be utilized for increased trunk stability. These seating mechanisms can be adjusted to the user’s fit and preferences. A seat pad or cushion

should be placed in the kayak seat to prevent any skin integrity issues. Outriggers can be attached to the kayak to increase stability while kayaking if desired. These attach to the base of the kayak and the distance on each side can be adjusted based on how much stability the kayaker needs. The closer the outriggers the less stability and the further the outriggers the more stability that is provided. There are several paddle options for these levels of SCI to use for efficient paddling. A mount supported paddle decreases stress on the upper extremities. A paddle pivot removes the weight of the paddle on the kayaker. A bent shaft paddle has divets where the hands are placed to decrease stress on the wrists and allow easier gripping. A lightweight carbon fiber paddle provides decrease strength and endurance needs with its lightweight feature. This video is an example of a fully outfitted kayak that may be utilized by people with C1-C5 SCI to provide increased safety, stability, and comfort while allowing maximum independence. Adaptations, such as gripping accessories, can also be included to optimize performance and decrease energy expenditure for the kayaker. These accessories include paddling mitts, wrist cuff, back of hand grip, and paddle grips. Increased stability, skin integrity and comfort can also be provided by placing foam supports around the kayaker's body. A personal flotation device, helmet, quick drying clothing, throw rope, dry bag, and whistle are other items that are necessary for safe kayaking. Thanks for watching. Subscribe for more information on outdoor recreation for people with SCI. See you next time.

Adapted Kayaking: Equipment, Transfers, and Participation Expectations for People With C6-T1 SCI [Video 15]

Thumbnail

URL

https://youtu.be/eINdeH3dszs

Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St. Augustine for Health Sciences. In this video, I review the equipment recommended, transfers, checkpoints, positioning, and what participation looks like for people with C6-T1 SCI in adapted kayaking.

Script

Hello everyone. For this video, I will be reviewing what participation in kayaking looks like for someone with a C6-T1 SCI. First, let's review what motor function each SCI level will be able to utilize during kayaking. C6 SCI will have shoulder protraction, scapular protraction; shoulder horizontal adduction and abduction; pronation; radial wrist extension. C7-7-T1 SCI will have elbow extension; wrist flexion, ulnar wrist extension; finger flexion and extension; thumb flexion, extension, opposition, abduction, and abduction of the 5th finger. It is important the correct kayak and equipment are chosen. If the kayaker prefers or has increased difficulty paddling, a tandem kayak may be utilized so the person in the back can assist in providing power and control. However, a single kayak will help promote independence. The process of transferring into the kayak, launching into the water, paddling, and water safety will be taught to participants in preparation for engaging in adapted kayaking. There are a variety of options and

equipment available for transferring into and out of the kayak. A transfer bench can be used to ease the transfer from the wheelchair to the kayak seat. Once the kayaker is above the kayak seat and their legs are in place, they will slowly lower themselves down into the kayak seat. Assistance from two able-bodied people can also occur and allow for safety and efficiency transferring in and out of the kayak if needed. A floor transfer can also be used for the transfer. These videos are examples of ways the kayaker can transfer in and out of the kayak. Once the kayaker is seated, they should ensure the lumbar spine is in complete contact with the back of the seat, the ball of the foot is in contact with the foot pedals, a slight bend of the knees are maintained, and the lateral aspects of the knees are in solid contact with both sides of the boat. These points of contact allow the kayaker to maintain control and stability throughout the activity. For optimal safety with transfers, it is recommended to transfer into the kayak on land, this could also include a dock, then be transported into the water. This type of transfer from the same level of a shoreline into the water is known as a zero-entry launch. Depending on the kayaker's comfort level and trunk stability, several seat options can be utilized. A basic seat that provides lateral supports at the shoulder and hips provide the most stabilization. A high back seat with lower back support can also be utilized for increased trunk stability. Or a traditional kayak seat can be used. These seating mechanisms can be adjusted to the user's fit and preferences. A seat pad or cushion should be placed in the kayak seat to prevent any skin integrity issues. Outriggers may not be needed for these SCI levels but can be attached to the kayak to increase stability while kayaking if desired. These attach to the base of the kayak and the distance on each side can be adjusted based on how much stability the kayaker needs. The closer the outriggers the less stability and the further the outriggers the more stability that is provided. There are several paddle options for these levels of SCI to use for efficient paddling. A mount supported

paddle decreases stress on the upper extremities. A bent shaft paddle has divets where the hands are placed to decrease stress on the wrists and allow easier gripping. A lightweight carbon fiber paddle provides decrease strength and endurance needs with its lightweight feature. Or a traditional kayak paddle can be used. Adaptations, such as gripping accessories, can also be included to optimize performance and decrease energy expenditure for the kayaker. These accessories include paddling mitts, wrist cuff, back of hand grip, and paddle grips. Increased stability, skin integrity and comfort can also be provided by placing foam supports around the kayaker's body. A personal flotation device, helmet, quick drying clothing, throw rope, dry bag, and whistle are other items that are necessary for safe kayaking. Thanks for watching. Subscribe for more information on outdoor recreation for people with SCI. See you next time.

Adapted Kayaking: Equipment, Transfers, and Participation Expectations for People With T2-T9 SCI [Video 16]

Thumbnail

URL

https://youtu.be/i96f3yn-nMw

Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St. Augustine for Health Sciences. In this video, I review the equipment recommended, transfers,

checkpoints, positioning, and what participation looks like for people with T2-T9 SCI in adapted kayaking.

Script

Hello everyone. For this video, I will be reviewing what participation in kayaking looks like for someone with a T2-T9 SCI. First, let's review what motor function people with these SCI levels will be able to utilize during kayaking. T2-T9 SCI levels will present with increased endurance of intercostal muscles; typical motor function of upper extremities; and limited trunk stability. It is important the correct kayak and equipment are chosen. The kayaker can choose from the cockpit or sit-in kayak, sit-on top kayak, or tandem kayak. The process of transferring into the kayak, launching into the water, paddling, and water safety will be taught to participants in preparation for engaging in adapted kayaking. A transfer bench can be used to ease the transfer from the wheelchair to the kayak seat. Once the kayaker is above the kayak seat and their legs are in place, they will slowly lower themselves down into the kayak seat. A floor transfer can also be used for the transfer. These videos are one example of how the kayaker can transfer into and out of the kayak. Once the kayaker is seated, they should ensure the lumbar spine is in complete contact with the back of the seat, the ball of the foot is in contact with the foot pedals, a slight bend of the knees are maintained, and the lateral aspects of the knees are in solid contact with both sides of the boat. These points of contact allow the kayaker to maintain control and stability throughout the activity. For optimal safety with transfers, it is recommended to transfer into the kayak on land, this could also include a dock, then be transported into the water. This type of transfer from the same level of a shoreline into the water is known as a zero-entry launch. For seating options, a high back seat with lower back support can be utilized for increased trunk stability or a traditional kayak seat can be used. These seating mechanisms can

be adjusted to the user's fit and preferences. A seat pad or cushion should be placed in the kayak seat to prevent any skin integrity issues. Outriggers may not be needed for these SCI levels but can be attached to the kayak to increase stability while kayaking if desired. These attach to the base of the kayak and the distance on each side can be adjusted based on how much stability the kayaker needs. The closer the outriggers the less stability and the further the outriggers the more stability that is provided. There are several paddle options for these levels of SCI to use for efficient paddling. A bent shaft paddle has divets where the hands are placed to decrease stress on the wrists and allow easier gripping. A lightweight carbon fiber paddle provides decrease strength and endurance needs with its lightweight feature. Or a traditional kayak paddle can be used. Increased stability, skin integrity and comfort can also be provided by placing foam supports around the kayaker's body. A personal flotation device, helmet, quick drying clothing, throw rope, dry bag, and whistle are other items that are necessary for safe kayaking. Thanks for watching. Subscribe for more information on outdoor recreation for people with SCI. See you next time.

Adapted Paddleboarding: Equipment and Transfers for People With Spinal Cord Injury (SCI) [Video 17]

Thumbnail

URL

https://youtu.be/9CCQzmWSNXQ

Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St. Augustine for Health Sciences. In this video, I review various types of paddleboards, seating systems, outriggers, paddles, accessories, and transportation options for adapted paddleboarding as well as transfers for people with tetraplegia and paraplegia.

Script

Hello everyone, for this video I will be reviewing the equipment and transfers for adapted paddleboarding for people with SCI. There are several types of paddleboards that can be chosen based on the user's needs. Adapted paddleboard types include the oar board and the trident paddleboard. The oar board comes as a kit that includes carbon fiber paddles, a rowing unit that is secured at the top of the board, a seat that can be attached onto the board, an air pump, and a bag with wheels for easier transportation. The trident paddleboard can accommodate most manual wheelchairs and various amounts of abilities. Additionally, the trident paddleboard can be used by two people at the same time if desired. The design of this board promotes decreased energy expenditure by decreasing the effort necessary to paddle fast and tracks straight. Another commercially sold paddleboard that can be used is a megalodon paddleboard. Various sizes of megalodon paddleboards are available and can range up to 18 feet in length and hold 1100 pounds. With the size of this paddleboard, a wheelchair can be anchored in the middle with multiple other people on the board as well. A traditional size paddleboard can also be used. Adapted paddleboards have various seating system options. Manual wheelchair accommodations can be utilized on trident and megalodon paddleboards, removing the requirement to transfer in and out of the wheelchair. The manual wheelchair sits on top of the paddleboard and is secured so user can paddle while remaining seated in the wheelchair. The paddleboard set is another

seating system option. This seat promotes trunk support and attaches to the paddleboard by four rigging points placed towards the center handle. This option can be used on any paddleboard with the four rigging points. Bean bag chairs can also be placed on the paddleboard to form around the participant's body to aid in comfort and stabilization. Outriggers can be utilized to increase the stability of the paddleboard. These outriggers are attached to the paddleboard and can be adjusted to the amount of stability needed by the user. The inflatable outrigger attaches to the kayak through a strap system and is more closely positioned to the paddleboard providing slight additional stability. Whereas the stabilizer float package can be extended up to 20 inches on either side of the paddleboard providing maximal increased stability and the hydrodynamic designs promotes minimal water drag. The stabilizer float package attaches to the paddleboard through suction cups and straps to secure the device in place. Rower paddles, bent shaft paddles, and lightweight carbon fiber paddles can be used for adapted paddleboarding. Rower paddles are utilized for people who prefer to sit on the paddleboard. This device attaches to the top of the paddleboard and the user performs a rowing movement pattern to move the paddles and board forward in the water. The bent shaft and lightweight carbon fiber paddles are the same as the ones used for adapted kayaking, promoting decreased strength and endurance requirements and stress on upper extremity joints. Adapted paddleboarding has accessories available to increase hand and wrist support while participating. There are many varieties of paddle grips available to reduce pressure and friction of one's hands on the paddle. These accessories attach around the paddle and are secured in place by Velcro. Wrist guards are also available to promote wrist stability and decrease the risk of overuse injuries while paddleboarding. These cuffs are secured on one's wrist with Velcro straps at the proximal and distal ends of the guard. Transportation of paddleboards can be cumbersome but there are devices available to ease the task of moving the

paddleboard from one place to another. A carrying strap has two straps that wrap around the top and back of the paddleboard and are secured with adjustable buckles. A shoulder strap with a cushioned pad is then used to so the paddleboard can be carried on one's shoulder for easier transportation. Another paddleboard transportation option is a transport cart. There are various transport carts on the market that can carry up to two paddleboards on the device at a time. These devices have wheels, reducing the need for carrying the paddleboards on oneself and the energy expended for transportation. For transfers, people with cervical or upper-level thoracic SCI that have difficulties with limited upper extremity or trunk range of motion, strength, and stability have the option of transferring onto the trident or megalodon paddleboard while staying in their wheelchair. The manual wheelchair is secured onto the board through a strapping system. For individuals who prefer to sit on the paddleboard without their wheelchair, a floor transfer can be utilized for getting on and off the paddleboard. Here is a demonstration of one way to complete this transfer. However, for optimal safety with transfers, it is recommended to transfer onto the paddleboard on land, this could also include a dock, then be transported into the water. This type of transfer from the same level of a shoreline into the water is known as a zero-entry launch. Prior to paddleboarding, it is important to consider the user's abilities and comfort level on the water to provide the optimal seating, paddling, and stability system to enhance the user's safety and experience. Thanks for watching. Subscribe for more information regarding outdoor recreation for people with SCI. See you next time!

Opportunities for People with SCI to Participate in Adapted Outdoor Recreational Activities in Colorado (CO) [Video 18]

Thumbnail

URL

https://youtu.be/MC_14J8pmw4

Description

This educational video series was created in partial fulfillment to the requirements of my doctoral capstone project through the department of occupational therapy at The University of St. Augustine for Health Sciences. In this video, I review the multitude of adaptive programs and accessible opportunities throughout Colorado and what outdoor activities are offered for summer and winter programs.

Script

Hello everyone. For this video, I will be reviewing adapted outdoor recreation opportunities in Colorado for people with SCI. First we will review the adapted outdoor recreation programs. The National Sports Center for the Disabled has two office locations in Winter Park and Golden. In the winter, they offer an adaptive skiing and snowboarding as well as competition programs for alpine and nordic skiing. In the summer they have camping, mountain biking, river rafting, rock climbing, sailing, therapeutic horseback riding, air rifle, archery, canoeing, kayaking, and paddleboarding programs. Breckinridge Outdoor Education Center offers adaptive skiing and snowboarding programs in the winter and rock climbing, wilderness camping, rafting, canoeing, paddleboarding, adaptive cycling, and ropes courses in the summer. The Adaptive Sports Center program in Crested Butte offer adaptive skiing, snowboarding, Nordic skiing, and snowshoeing for the winter programs. For summer programs they offer cycling, canoeing, rafting, paddleboarding, kayaking, challenge course, hiking, and

rock climbing. Telluride Adaptive Sports Program offer the following winter programs, adaptive skiing and snowboarding, snowshoeing, Nordic skiing, ice climbing, backcountry snowmobiling, and heli-skiing. For summer programming, TASP offers hiking, cycling, rock climbing, horseback riding, tennis/racquet sports, fishing, river rafting and kayaking, and 4x4 Jeep tours. Challenge Aspen offers ice skating, adaptive skiing and snowboarding, sledding, Nordic skiing, snowshoeing, and tubing for winter programming. During the summer, they offer archery, cycling, paddleboarding, fishing, hiking, horseback riding, Jeep tours, rafting, and swimming. Adaptive Sports Association in Durango offer adaptive ski and snowboarding programs in the winter. Summer programs include overnight camping, cycling, canoeing, kayaking, rafting, and indoor rock climbing. Steamboat Adaptive Recreational Sports in Steamboat Springs have adaptive skiing, snowboarding, snowshoeing, and Nordic skiing for winter programming. In the summer, STARS offers horseback riding, cycling, hiking, disc golf, kayaking, paddleboarding, fishing, and racquet sports. Adaptive Adventures in Lakewood offer skiing and snowboarding, cycling, dragon boat racing, kayaking, paddleboarding, rock climbing, water skiing, wakeboarding, and whitewater rafting. Other accessible outdoor recreation opportunities are as follows. Check out Boulder's Accessible Trails website for more information on accessible trails to explore. Videos reviewing what these trails entail are also linked on the website. Colorado Therapeutic Riding Center in Longmont offers equine-assisted therapy. The University of Colorado at Boulder offers adaptive indoor rock climbing. In Colorado Springs, Paradox Sports provides local and national adaptive rock and ice climbing trips/programs. Colorado trail explorer is an app and website that provides information on accessible trails throughout Colorado. Accessibility information for all national parks and monuments in Colorado can be found on the National Park Service website. The Columbine Pass that can be purchased from

Colorado Parks & Wildlife provides reduced state park entrance fees to residents of Colorado with different abilities. Accessibility accommodations are also available for fishing and hunting. Action Trackchairs can be reserved on the weekends at Staunton State Park, Ridgway State Park, and Barr Lake State Park. Additionally, Ridgway State park has floating wheelchairs for summer dips at their swim beach. Colorado.com has great resources and information on adaptive and accessible opportunities throughout Colorado. See you out there! Thanks for watching. Subscribe for more information on outdoor recreation for people with SCI.