

Effects of a Therapeutic Recreation Intervention using Exercise: A Case Study with a Child with Cerebral Palsy

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Exercising regularly at an early age promotes lifelong fitness. As promoting healthy lifestyles for people with disabilities has been identified as a national priority, the benefits of conducting therapeutic interventions to foster healthy lifestyles in children with disabilities also has become increasingly apparent. This case report describes a 6-week therapeutic recreation program using an exercise intervention in a home-based setting to improve the physical functioning of a child with cerebral palsy. Interventions included walking, sit-ups, push-ups, hand grip strengthener, and soccer. Results indicated that the client partially met his goals of increasing muscular strength, muscular endurance, and gross motor skill. Implications for practitioners are presented along with suggestions for the future.

KEY WORDS: *Therapeutic Recreation, Exercise, Cerebral Palsy*

Introduction

As evidenced by the Surgeon General's most recent "Call to Action to Improve the Health and Wellness of Persons with Disabil-

ities" (U.S. Department of Health and Human Services [HHS], 2005), the health of citizens with disabilities has become a national priority. One of the primary actions outlined in this report was a call for "persons with disabilities to promote their own good health by developing and maintaining healthy lifestyles" (HHS, 2005, p. 2). Yet for many individuals with disabilities, access to health care providers who can provide both support and services that encourage healthy lifestyles does not exist. To

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address this issue, health care providers must focus on developing programs that address the skills and knowledge needed by individuals of all ages and disabilities to engage in healthy lifestyles and make wise decisions regarding leisure time use. It seems particularly crucial that children with disabilities improve their physical functioning in order to engage in activities that promote health. Anderson (2004) has identified that individuals who exercise at an early age are more likely to establish a strong athletic identity and engage in physical activity throughout the lifespan. Limited research, however, precludes the establishment of definitive guidelines that identify the type, intensity, or duration of exercise needed to improve the health and physical fitness of children with disabilities. This case study describes the results of a six-week therapeutic recreation (TR) program using an exercise intervention to improve the physical functioning of a child with cerebral palsy. Background information will be presented, as well as a brief review of literature; details regarding assessment, planning, implementation, and evaluation; and implications for TR practice.

Background Information

Theoretical Foundation

This study was based on the World Health Organization's (WHO, 2001) Model of Disablement. The Model of Disablement has been operationalized through the International Classification of Functioning, Disability and Health (ICF). The ICF provides an integrated way to view health through biological, individual and social perspectives (WHO, 2001). The WHO model has been identified as the dominant model for addressing the delivery of health care services because it effectively captures the complexities of health (HHS, 2005; Whiteneck, Fougeyrollas, & Gerhart, 1997). The model characterizes health as an interactive and evolutionary process that involves functioning, activities and participation, and environmental factors (WHO, 2001). *Func-*

tioning is used as an overall term to describe body functions and structures. *Activities and participation* refer to the capacity to perform at a certain level if adaptations are provided which allow the individual to negotiate limitations and restrictions. *Environmental factors* consider the overall context of an individual's life, societal influence over the conditions in which health exists, and their consequences with respect to functioning and disability. The WHO Model of Disablement and ICF can serve as the foundation for assessment and treatment planning aimed at promoting healthy lifestyles and preventing unhealthy conditions (Caldwell, 2001; HHS, 2005).

The WHO model reflects ecological theory which assumes that individuals are interconnected with their surrounding environments (Bronfenbrenner, 1979). This interconnection creates reciprocal relationships in which individuals both directly and indirectly influence various aspects of their environment and visa versa. When ecological theory is applied to service delivery, there are four basic assumptions that will be reflected in a therapist's behavior: a) the relationship between key individuals will be based on mutual respect and reciprocity, b) the needs of the total person (current abilities, limitations, interests, environment) will be considered when the focal point of service is created, c) problems, liabilities, deficits and constraints will be analyzed from multiple perspectives, and d) services will be delivered in the "least restrictive environment" with the focus centered on empowering individuals to achieve optimal interdependence (Devine & O'Brien, 2004; Howe-Murphy & Charboneau, 1987).

Several authors state that therapeutic recreation services guided by ecological theory and delivered within an inclusive setting will provide a rich and supportive environment for clients (Devine & O'Brien, 2004; Devine & Wilhite, 1999; Howe-Murphy & Charboneau, 1987). Delivery of inclusive therapeutic recreation services within a least restrictive environment has numerous benefits including: improved quality of life, provision of appropriate

role models, increased opportunities for social interaction, increased positive attitude toward self and others, increased positive attitude toward individuals with disabilities, and increased independence (Anderson & Kress, 2003). In light of these benefits, therapeutic recreation specialists could use the WHO Model of Disablement and ecological theory to improve service delivery and meet the needs of the clients they serve. To be successful, TR specialists should establish cooperative relationships among individuals with disabilities, family members, community agencies, and other health care providers in an attempt to build lifelong leisure skills that contribute to overall quality of life (Devine & O'Brien, 2004).

Review of Literature

Physiological Benefits of Exercise as a Therapeutic Intervention

Exercise is defined as physical activity that has planned, structured and repetitive body movements done to improve or maintain one or more components of physical fitness (Caspersen, Powell, & Christensen, 1985). Exercise is essentially the same for people with and without disabilities; however, when exercise is applied as a therapeutic medium, it uses activities in a systematic manner to achieve treatment goals and objectives (Bullock & Mahon, 1995). Exercise can be used by TR specialists as an appropriate therapeutic medium to improve cardiovascular fitness, muscle strength, muscle endurance, flexibility, and body composition (Miller, 1995). Broach, Dattilo and Loy (2002) summarized the findings from multiple studies that used exercise as a therapeutic medium and concluded that exercise leads to improved health, enhanced physical ability, and reduced risk of chronic disease secondary to disability (i.e., diabetes, cancer and cardiovascular disease). Therefore, these authors concluded that exercise is a beneficial addition to the TR field, and is a viable option for treatment in a variety of settings for people with disabilities. People who exercise and

achieve a greater level of health are also better able to participate in life activities (e.g. school, work and leisure), leading to enhanced feelings of well-being (Broach, Dattilo and Loy, 2000).

Increasing muscular strength, muscular endurance and flexibility have all been shown to be practical therapeutic goals for exercise participation. Exercise for the purpose of improved muscular strength would include activities that use muscle force during a single effort, or repetitively over a short period of time, such as push-ups, arm circles, and leg lifts using weights. It is recommended that these activities be completed three times a week, with a recovery period of at least 48 hours (ACSM, 1995). When planning therapeutic exercise to improve muscular endurance, a Certified Therapeutic Recreation Specialist (CTRS) should consider the type of exercise activity in order to target specific muscle groups; for example, walking can be used to improve muscular endurance for a person's legs (Broach, Dattilo & Loy, 2000). Lastly, flexibility can be improved or maintained by using exercises such as stretching, range of motion, and relaxation multiple times per week.

Exercise as a Therapeutic Intervention for Youth with Cerebral Palsy

United Cerebral Palsy (UCP) defines cerebral palsy (CP) as "a group of chronic conditions affecting body movement and muscle coordination . . . caused by damage to one or more specific areas of the brain, usually occurring during fetal development . . . or during infancy" (UCP, 2005, p. 1). The damage to motor areas in the brain prevents the body from adequately coordinating and integrating basic movement patterns. Although CP itself is not a progressive condition, muscle imbalances with spastic muscle groups overpowering non-spastic muscle groups can increase as an individual ages and bones grow in length (McCubbin & Horvat, 1990). Individuals with

Table 1.
Exercise Guidelines for Individuals with Cerebral Palsy

- 1 Functional skills, such as creeping, walking, running, and throwing should be incorporated into the student's program.
 - 2 Strength development should focus on strengthening the extensor muscles.
 - 3 Handheld weights or flexible tubing can be used to ensure appropriate resistance is applied to a particular body segment or region.
 - 4 Strength-building exercises should be performed at a moderate speed rather than a fast speed in order to lessen the spasticity.
 - 5 Spastic muscles should not be subjected to workloads above 60 percent of maximum.
 - 6 Isokinetic resistance exercises are particularly useful for developing strength as they provide constant tension through the full range of motion and aide in inhibiting jerky movements.
 - 7 Moving limbs in diagonal patterns encourages muscles groups to work in harmony. Such movements include throwing, striking, and kicking.
 - 8 Flexibility exercises and activities should be a regular part of physical education and sport programs to prevent restricted range of motion that leads to contractures.
 - 9 Individuals should be encouraged to perform movements as quickly as possible but to perform them in a controlled, accurate, and purposeful manner. Concentrate on the pattern of movement while gradually increasing the speed of execution.
 - 10 Individuals should be taught to fall in a protective manner.
 - 11 The use of a weighted ball, bat, or other implement will assist in decreasing abnormal flailing or tremor movements.
 - 12 Skills should be broken down into basic component parts and presented sequentially to help develop fundamental motor skills and patterns, such as walking, running, jumping, throwing, and catching.
 - 13 As many children with CP exhibit short attention spans and are easily distracted by objects and persons in the immediate environment, activities need to be conducted in environments as free from distractions as possible.
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Note. Adapted from "Training Guide to Cerebral Palsy Sports," by J. A. Jones, 1988, Champaign, IL: Human Kinetics Books.

CP typically exhibit reduced muscle strength, flexibility, balance and cardiovascular endurance levels, which may affect the ability of an individual to complete activities of daily living or participate in recreation and leisure activities (Adams-Mushett, Wyeth, & Richter, 1995).

Previous research on exercise and therapy for people with CP cautioned of the potential detrimental effects of increased muscle strength on muscle spasticity, thereby reducing range of motion and functional ability (Holland & Steadward, 1990; McCubbin & Horvat, 1990; McCubbin & Shasby, 1985).

McCubbin and Shasby (1985) conducted the first study on the effects of isokinetic exercise on speed of movement and time rate of torque in individuals with CP. Although the authors initially warned of the potential detrimental effects of strength training for people with CP, their results showed that study participants made gains similar to individuals without disabilities. Similarly, Holland and Steadward (1990) found that a ten-week circuit training strength program helped athletes with cerebral palsy improve their strength and range of motion, with six of the seven athletes also making

received speech, physical, and occupational therapies each week.

The treatment team met with Christopher and his mother at their home to complete a leisure interest inventory. The inventory was developed by a treatment team member to: a) identify recreation activities that Christopher knew how to play, b) identify and measure his level of knowledge regarding each activity, c) assess his knowledge of community resources, and d) identify if he was interested in learning new recreation activities. Mrs. Spellman interpreted the assessment for Christopher using ASL and helped to complete parts of the inventory.

Results indicated that Christopher knew how to and was interested in continuing to participate in bowling, weight lifting, basketball, soccer, football, baseball, Frisbee, yoga, bicycling, and rock climbing. His current leisure activity schedule included swimming and stretching with his Physical Therapist once a week, bowling three times a month, rock climbing twice a month, and occasionally lifting weights and doing yoga with his father. Despite the number of activities in which he was participating, he lacked the fundamental skills and knowledge of many of the activities in which he currently participated. Christopher could not explain the rules of the activities, the equipment needed, nor the locations where such activities were played. For example, Christopher indicated that he liked swimming, but could not express that he needed a swimsuit and swimming pool in order to participate. The client indicated that he was not interested in learning or increasing his current level of participation in tennis, golf, karate, fishing, volleyball, badminton, swimming or jogging.

Physical Assessment

According to the Cerebral Palsy International Sport and Recreation Association (CP-ISRA), Christopher would be classified at the C5 level. Individuals with C5 CP have “moderate diplegia or triplegia and may require the use of assistive devices in walking but not

necessarily when standing or throwing and may experience problems with dynamic balance” (Winnick & Short, 1999, p. 7). Based on this classification, Christopher completed four physical fitness assessments appropriate to individuals with C5 CP. The physical fitness assessments were selected according to the guidelines identified by the Brockport Physical Fitness Test (BPFT) (Winnick, & Short, 1999). The BPFT is considered to be an effective way to conduct personal fitness assessments for individuals with disabilities including CP (Rimmer, 2004). The BPFT is one of the only criterion referenced tests suitable for assessing the health status of children with disabilities between 10 to 17 years old.

After reviewing the various options of the BPFT, the following tests were selected for use in this case study: a) Target Aerobic Movement Test (TAMT), b) Body Composition, and c) Musculoskeletal Function including dominant grip strength and the Modified Apley Test. The skinfold test is also recommended but after reviewing the clients’ body mass index (BMI) it was determined that body composition was not an issue for this client.

Aerobic Capacity. The TAMT measures the aerobic ability of youth to exercise at or above one’s target heart rate for 15 minutes (Winnick & Short, 1999). To complete the test the administrator checks the participant’s heart rate at least once every 60 seconds while exercising. The participant’s target heart rate is based on his or her minimum predicated heart rate intensity. Minimal levels are identified as Level 1: Moderate = 140–180 bpm, Level 2: Low-level vigorous = 150–180 bpm, Level 3: Vigorous = 160–180 bpm. Results of the TAMT indicated that Christopher sustained a moderate intensity of physical activity (as measured by sustained heart rate (HR) between 140–180 beats per minute for 15 minutes without rest). Range of his HR during the 60 minute test was 119 bpm to 196 bpm.

Body composition. The BMI is calculated based on the client’s weight (48 lbs) and height (46 inches). Results indicated Christopher’s BMI was 15.6. According to national

guidelines this score identifies him as being underweight (below 18.5) for his height.

Strength. Given that dominant grip strength is correlated with overall musculoskeletal strength it was selected as a measure in this study (Heyward, 2002). A hydraulic hand dynamometer (Jamar®) was used to measure dominant grip strength. Results indicated that Christopher applied 3.5 kilograms (kg) of force indicating that he was well below average for his age and gender (Avg. = 21kg), and well below the average score for individuals with cognitive disabilities (Avg. = 14kg).

Flexibility and range of motion. Flexibility and range of motion were measured using the Modified Apley Test. This test requires participants to reach back and touch with one hand the superior medial angle of the opposite scapula. Individuals are scored according to their ability to complete this stretch. A score of 3 indicates the ability to touch the opposite scapula, 2 indicates ability to touch the top of the head, 1 is touch the mouth and 0 is failure to touch the mouth. Christopher scored a 2 for both the left and right arms indicating that he was within the standard for his age and classification.

Planning

Although many individuals with CP typically exhibit reduced flexibility and cardiovascular endurance levels, the assessment results indicated that Christopher's flexibility and cardiovascular endurance levels were within the normal range for his age and classification. The assessment results also indicated that his body mass and muscular strength were well below average for his age and gender. Therefore, the treatment team concluded that Christopher would benefit from activities that strengthened his core muscles and increased his endurance, thereby increasing his BMI to within normal levels by adding muscle mass. As stated previously by the ACSM (1995), exercise with a therapeutic goal of muscular strength should include activities such as sit-ups and push-ups; muscular endurance in an

individual's legs can be improved through activities such as walking, playing soccer, or lifting weights (Broach, Dattilo & Loy, 2000). The ACSM (1995) recommends that a recovery period of at least 48 hours be implemented with activities that exert muscle force during a single effort or repetition over a short period of time.

The treatment team developed an individual treatment plan (ITP) based on the assessment results, past research findings, Christopher's recreational interests, and Mrs. Spellman's input. The treatment plan goals and objectives are found in Table 2. The team identified that the most suitable and inclusive setting to conduct treatment would be at the local recreation center or at the client's home. Sessions were planned that included walking, sit-ups, push-ups, and fundamental throwing, kicking, and catching skills. To foster carry over and long term commitment to being active, Christopher was also encouraged to engage in physical activity with a caregiver for thirty minutes, three times a week.

Intervention

The two therapeutic recreation graduate students met with Christopher for one hour, twice a week, for six weeks. Two sessions were cancelled over the course of the program due to holidays resulting in a total of ten contact sessions. The hour-long sessions took place at Christopher's residence located in a suburban neighborhood, with the exception of the first session which occurred at the local parks and recreation department. The focus on the home environment was necessary when the client's caregiver resigned and the family was no longer able to provide transportation to community venues. Each session began with a half-mile warm-up walk in a cul-de-sac in Christopher's neighborhood. A part-time aide was available during some of the sessions to speak in sign language and assist with communication. At times this assistance was crucial to the comprehension and completion of activities. Next, Christopher would complete

Table 2.
Goals and Objectives

| Goals | Objectives |
|--|---|
| 1) Increase aerobic activity and endurance | 1.1 By the end of the 6-week treatment session, Christopher will complete a 5 minute warm-up walk/jog with the treatment team twice a week for 6 weeks. 1.2 By the end of the 6-week treatment session, Christopher will participate in assigned recreation activities with the treatment team for 30 minutes, twice a week, for 6 weeks. 1.3 By the end of the 6-week treatment session, Christopher will complete a 5 minute cool down walk/jog with the treatment team twice a week for 6 weeks. 1.4 By the end of the 6-week treatment session, Christopher will complete 30 minutes of physical activity, 3 times a week with a caregiver, for 6 weeks. |
| 2) Increase strength | 2.1 By the end of the 6-week treatment session, Christopher will be able to complete 1 pull-up without assistance. 2.2 By the end of the 6-week treatment session, Christopher will be able to complete 1 push-up without assistance. 2.3 By the end of the 6-week treatment session, Christopher will be able to complete 10 sit-ups without assistance. 2.4 By the end of the 6-week treatment session, Christopher will have increased his score on the grip dynamometer by 25%. |
| 3) Increase gross motor skills | 3.1 By the end of the 6-week treatment session, Christopher will be able to catch an 8" foam ball 3 out of 5 times thrown from a distance of 8 feet. 3.2 By the end of the 6-week treatment session, Christopher will be able to kick a soccer goal 3 out of 5 times from a distance of 36 feet. |

sit-ups, push-ups, and a kicking activity with a soccer ball. Periodically, other activities and devices, such as throwing or hand strengtheners, were used to keep him interested in participating. The sessions ended with a half-mile cool down walk back to Christopher's house. To facilitate participation and provide Christopher with a sense of independence and autonomy, he was occasionally asked to choose the sequence of activities during the session. To encourage full participation in each activity, positive reinforcement was used by all of the team members. Christopher responded best to rewards such as promises to be able to eat

spaghetti after the session and looking at parked cars during the session.

Outcomes

Warm-up techniques. To warm-up, Christopher walked a half-mile with the treatment team. The purpose of the warm up was to provide a consistent beginning to each session, to increase his heart rate and to stretch his muscles in preparation for more intense activity. The level of assistance Christopher required during the warm-up was determined according to the Functional Independence

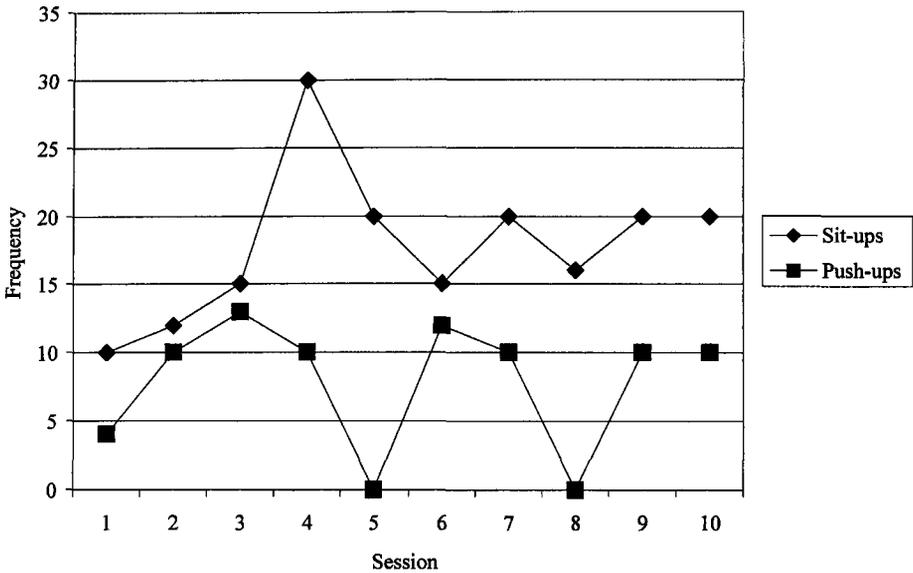


FIGURE 1

Measure (FIM) (Uniform Data System for Medical Rehabilitation, 1996). The FIM is an assessment instrument that allows therapists to rate their clients' functional performance in 18 motor, cognitive, and self-care domains. The instrument uses a 7 point likert rating scale that ranges from complete independence to complete dependence. Christopher was consistently able to walk with modified independence (FIM = 6) on smooth surfaces and moderate assistance (FIM = 3) on hills, stairs, or thick grass during the 1/2 mile warm-up. Christopher's performance is typical of an individual with C5 CP and of an individual who uses ankle braces to assist with walking.

Christopher's functional performance in completing the warm-up remained consistent throughout the intervention. Over the six-week period, however, Christopher required less verbal prompting to complete this task. He also showed an increased sense of pride at being able to reach his goal of touching the red mailbox, which indicated the end of the warm-up.

Sit-up techniques. After completing the warm-up, Christopher and the treatment team went to a grassy area located near his house to complete the remaining interventions. Generally, the first activity completed was sit-ups. The sit-ups were performed to increase his core abdominal muscle strength. The correct form required Christopher to lie flat on his back with bent knees, feet flat and about 8 inches from the buttocks, and with his hands touching the side of his head. Christopher was asked to flex his abdominal muscles to pull himself from the start position to the final position with his chest resting against his bent knees. The sit-ups required various types of assistance including modeling, physical assistance and verbal prompting (FIM = 5).

Christopher partially met his goal of completing 10 sit-ups without assistance. As seen in Figure 1, Christopher was able to physically complete 10 sit-ups each session; however he required verbal prompting and had to have his feet held throughout the intervention. Christo-

pher did not require modeling of the behavior after session five.

Push-up techniques. The purpose of having Christopher complete push-ups was to improve his upper body strength and endurance. The correct push-up form started with Christopher lying face down on the ground with his hands under his shoulders; fingers stretched; legs straight, parallel, and slightly apart; and toes tucked under his feet. At the start command Christopher was instructed to push up with his arms until they were straight. Christopher lowered his body using his arms until his chest touched the ground, and then he repeated the action until he accomplished his goal for that session or to exhaustion.

Christopher required moderate physical assistance trying to keep his back straight (FIM = 3). To discourage Christopher from arching his back, the treatment team would hold his belt and gently lift his belly off the ground. The treatment team also modeled the behavior and employed maximal verbal prompting to encourage Christopher to complete the activity. Christopher partially met his goal of completing one push-up without assistance. By session 10, Christopher completed 10 push-ups using the correct form but needed physical assistance to remind him to hold his back straight and maximal verbal prompting.

Soccer Skills. The final activity completed during the sessions was kicking a soccer ball. During the initial assessment Christopher identified that he enjoyed playing soccer but he did not possess the fundamental skills needed to fully participate in this activity. The treatment team focused on kicking because it allowed Christopher to improve a fundamental gross motor skill and enhance his leisure skills in an activity that he could perform with his sisters and other individuals with disabilities in Special Olympics.

Christopher was required to develop skills in several areas before being able to perform the proper kicking technique. The primary purpose of kicking was to improve Christopher's ability to independently move his kicking leg, strike the ball, maintain balance, keep

his eyes on the ball, and aim his kick at a target. Generally a soccer ball was used during this activity; however, the treatment team did experiment with using an inflated, textured rubber ball. Although the textured ball helped maintain Christopher's interest and helped him to visually track the ball, he frequently tripped over it due to its lighter weight.

Christopher required moderate physical and maximal verbal assistance to perform kicking techniques (FIM = 3). Christopher had an unsteady gait and frequently requested that treatment team members hold his hand while he kicked. It was easier for Christopher to kick the ball while moving forward as opposed to when he was standing still. This may have been due to the fact that Christopher was unable to complete an independent kicking motion but rather stepped toward the ball and would incidentally make contact. Christopher did not seem fully aware of the ball as the object of activity and was not cognizant of its position as it rolled even if a treatment team member placed it in front of him.

By session six Christopher was more consistent in watching the ball and understood that the ball was the object of the activity. Although he did demonstrate a more concerted effort to make purposeful contact with the ball, Christopher made minimal progress in developing independent kicking skills. The treatment team noted that when Christopher missed the kick he would make a loop to meet up with the ball again, instead of stopping and turning around. This action may have been a learned behavior as result of using a walker for many years. The team also noted that he asked for assistance more when he was on grass than when he was kicking on a hard surface.

For the remaining sessions the team used various kicking games and techniques to isolate and improve Christopher's leg movement. One game required Christopher to kick the ball to a treatment team member. This was effective in helping him develop the ability to independently kick the ball while maintaining his balance. Other times Christopher would aim for cones that were set up as a goal. This

game helped Christopher develop the ability to independently kick the ball, and improve the aim and distance of each kick.

Finally, while returning home from the cul-de-sac, the treatment team would run beside the curb with Christopher allowing him to use the curb to control the ball. Christopher responded well to the game-like nature of this activity. During this time he was very active and accurate, and he paid the greatest attention to the ball. By session 10, Christopher had improved to the point where he could independently position himself facing the ball and kick with minimal verbal prompting. Despite Christopher's improved performance he did not meet the goal of being able to kick a soccer goal three out of five times from a distance of 36 feet. Rather, Christopher was able to kick the ball through a six-foot goal three out of five times from a distance of only 10 feet (FIM = 5).

Other Therapeutic Techniques. Throughout the course of the six week intervention, the team introduced Christopher to a variety of other techniques to improve his upper body strength, hand strength and hand-eye coordination. The team utilized the rock climbing wall and the pull-up bar at the local Parks and Recreation Department during the first treatment session. Given that Christopher already participated in a parks and recreation department climbing program on a bi-weekly basis, he responded positively to that activity. Christopher required maximal verbal prompting and moderate physical assistance to complete two pull-ups (FIM = 3). The therapists were unable to evaluate the extent that rock climbing or pull-ups developed his upper body strength because the team could no longer use the climbing wall and pull-up bar after the first session. This limitation was due to the fact that transportation problems arose as a result of a change in Christopher's caregiver.

To isolate and work on Christopher's hand strength two different techniques were employed. During the 5th session, the treatment team taught Christopher how to use a digital hand strengthener typically used by rock

climbers and other athletes requiring hand and finger strength. To promote continued use of the hand strengthener, Christopher's caregiver was taught how to use the device and Christopher was allowed to keep the hand strengthener at his home. Christopher appeared to enjoy handling the device and was able to squeeze the device with his whole hand; however, he lacked the strength required to manipulate each of the push buttons independently with a single finger. As an alternative to using the hand strengthener, the team thought that Play Dough® would be a novel way for Christopher to develop his hand strength. However, this technique was not as well received by Christopher and he preferred to use the hand strengthener.

Finally, a soft foam ball with an elastic cord attached to it was used to develop Christopher's eye-hand coordination. The soft foam ball was approximately 2 inches in diameter and the elastic string was approximately 18 inches long. The string had a Velcro® fastener that was used to attach the ball and string to Christopher's finger. The object of the activity was to attach the string to your hand, throw the ball and then catch it as it returned back. This activity proved to be too difficult for Christopher but he did enjoy having the string attached to his hand and wildly flailing the ball around in all directions. The activity was modified as a way to work on Christopher's throwing and catching skills. The periodic use of this technique was helpful in that it was a good rainy day, in-door activity, and reduced the need to chase after errant throws.

Evaluation

Progress notes and re-assessment of the hand dynamometer were used to evaluate Christopher's progress toward his goals and objectives. Christopher partially met the goal of increasing aerobic activity and endurance. The treatment team was successful in working with Christopher twice a week for six weeks and during each session completing a warm-up, aerobic activity, and a cool down. Objec-

tive 1.4 was only partially met because Christopher's primary aide, employed to work with him from 2–8 p.m. each day, resigned after the first week of the TR program. His family hired a number of part-time aides while they were interviewing for a permanent replacement. Due to the lack of a consistent care-provider it was difficult to monitor and encourage Christopher's exercise outside of the treatment sessions.

Christopher partially met his goal of increasing his strength. Christopher demonstrated improved strength by being able to complete more sit-ups and push-ups over the course of the intervention. The hydraulic hand dynamometer was the best indicator that Christopher's strength improved. Christopher's median score changed from 3.5 kg of grip force at the initial assessment to 10 kg at the final assessment. The results indicated an increase of 186%, well above the 25% target improvement. Christopher was unable to meet objective 2.1 because the team lost access to the pull-up bar after the first session. Objective 2.2 was also not met because Christopher lacked the core body strength to perform a push-up using the correct form.

Finally, the goal of increasing gross motor skills was partially met. While Christopher was able to kick a soccer goal 3 out of 5 times, he was only able to do so from a distance of 10 feet, not the 36 feet stated in the objective. Christopher was unable to meet objective 3.1 because catching a ball ceased to be a focus of the treatment sessions after determining that this action was an unrealistic expectation given the duration of the treatment period.

Authors' Comments

The results of this 6-week intervention using exercise demonstrated that therapeutic recreation can have a positive effect on the strength of participants with cerebral palsy. Replication of similar therapeutic interventions in home based settings is encouraged. Nonetheless, the delivery of service could have been improved. The recommendations

provided below shed some light on the obstacles that the treatment team faced and lessons learned from reflecting upon the delivery of services.

One critical component of effective treatment is the constant and consistent involvement of family members and other care providers (WHO, 2001). Throughout this intervention Christopher's family was constantly and consistently involved; however, the care provider who had been working with Christopher for many years resigned after the initial assessment. This change in care required the family to undergo scheduling hardships and transportation issues. Christopher was unable to follow a daily workout schedule or keep a daily journal because of the care-provider change. What minimal progress was made toward engaging in exercise at home during the week was the result of the efforts of his parents. Therefore, helping family members establish and maintain consistent care providers may be beneficial for all involved.

The treatment team initially wanted to deliver the intervention at a community-based recreation or university facility. The lack of reliable transportation necessitated that the treatment team conduct the intervention at Christopher's house. The change of location affected the team's ability to meet some of the established goals because the new location did not have the necessary equipment (e.g., pull-up bar). As recognized by the WHO (2001), environmental factors often contribute to the overall functioning and health of clients and therefore the treatment provided. It is advised that practitioners and researchers establish a consistent location for service delivery. In the event that a change in location or care providers is inevitable, the new environment should be assessed for its ability to provide all the resources necessary to achieve the established goals. If changes that affect treatment occur, the team should re-evaluate the treatment goals and make sure they are still appropriate for the new environment.

During the intervention, the treatment team also experienced difficulties with meeting pre-

determined goals due to treatment team administration errors. Christopher did not meet his goal of catching “an 8-inch foam ball three out of five times from a distance of eight feet.” These results do not accurately represent Christopher’s potential to meet his goal of catching a foam ball; rather it reflects the treatment team’s failure to modify his goals over the course of treatment. As Christopher showed delayed progress with kicking skills, it became difficult to focus on his catching skills as well. Christopher also did not fully achieve his kicking goal. As noted in the WHO Model of Disablement (2001), one’s capacity to perform is not always immediately apparent after completion of the initial assessment. As was the case with Christopher, the initial kicking distance was unrealistic and beyond his functional capacity. To improve performance in the future it is vital to plan and conduct team conferences throughout the intervention. Doing so would have allowed all parties to assess the relevance and accuracy of the original goals and modify them accordingly. Another goal that proved difficult to accomplish was “complete one push-up without assistance.” By the end of the six week intervention Christopher could complete six push-ups, but not “without assistance.” It would have been more appropriate in this case if the treatment team had written the original goal to include “with verbal prompting,” rather than “without assistance.”

In accordance with their original verbal agreement, the authors asked Mrs. Spellman to review this case report and provide feedback. Mrs. Spellman eloquently pointed out the necessity of establishing treatment goals that are empowering to the client and family members. Many of the goals that were originally established were focused on Christopher achieving independent functioning. As discussed above, these goals were unrealistic. In striving to meet goals set to attain the highest level of skill or “independent functioning,” we had the effect of decreasing opportunities for Christopher and his family to experience success. Over time, if we as professionals continually push to

meet unrealistic goals, we will diminish feelings of success and decrease the motivation of clients and family to become involved in new activities. This important reflection serves as a critical reminder of two important principles in TR planning: that we must ask clients and family members for feedback regarding goals and objectives throughout service delivery, as well as re-evaluate our goals at regular, pre-designated intervals during the course of treatment.

Finally, the treatment team may have biased the results of the initial and final strength assessment by not using the same handgrip dynamometer at both administrations. Although the same model was used both times, not using the exact same dynamometer could have led to inaccurate results. It is recommended that the same measuring instrument be used for all testing.

In addition to reflecting on what could have been improved, the treatment team also recognized several successful strategies that could be replicated in future practice. The Brockport Physical Fitness Test represents a reliable and valid assessment tool for practitioners to use to assess the physical health of children with physical and mental disabilities. This assessment can easily be obtained from the publisher and includes a test kit, administration video, and training guide for additional resources. The application of the Functional Independence Measure (FIM) scores as a way to assess and record Christopher’s functionality was also helpful in generating consistent and measurable performance indicators. Practitioners are encouraged to continue the use of this readily available assessment tool as well.

The treatment team found that sit-ups and push-ups were particularly challenging activities to facilitate given communication issues encountered while trying to give more complex directions. Although the treatment team was familiar with the signs for words such as ball, kick, and throw; more complex directions for “keep your back straight” and “get your tummy off the ground” were challenging. It was not until session 10 that Christopher’s

part-time aide, who was fluent in sign language, was able to thoroughly translate the directions of the treatment team. When possible, when working with an individual who communicates in a language different from the service providers, interpreters should be present at all sessions. Given that funding for interpreters is often an issue, therapeutic recreation students and practitioners should challenge themselves to stay current in various languages so that they can communicate with all clients.

The application of the WHO's Model of Disablement and the ICF were instrumental in identifying and resolving solutions to problems encountered. As recommended in the model the treatment team found that it was imperative to have the full and consistent cooperation of family members. Clearly, failure to capture this support will dramatically reduce opportunities to accomplish goals and provide treatment.

Over the course of the intervention the treatment team found that Christopher was excited at their arrival and appeared happy to start each session. Although non-verbal, he smiled frequently and seemed to enjoy the accomplishment of reaching his goals (e.g. touching the mailbox or kicking the ball). Although there were a few sessions when he needed additional motivation to complete the sit-ups and push-ups, he responded well to the personal attention he received from the treatment team. Although it is somewhat unrealistic that a 2:1 therapist to client ratio would exist in the "real world," where fees would be charged for services, it did appear that this attention was appreciated by Christopher. To offset this unrealistic cost, TR specialists could utilize the help of college students or high school students seeking volunteer hours. If there is a consistent caregiver she or he may also be trained to help with an intervention. These volunteers could assist with the more elementary actions that helped Christopher excel in an activity, such as holding his hand while playing soccer or holding his belt while doing push-ups.

This case illustrates that a TR exercise intervention can contribute to improvements in physical functioning. Implementing this program in the natural environment of Christopher's neighborhood helped maximize his participation in a normalized, more playful setting that motivated and sustained his interest and efforts. A recent special issue of the *Therapeutic Recreation Journal* (2005), as well as *Trends in Therapeutic Recreation: Ideas, Concepts and Application* (2004), reported that the delivery of TR services in home and community settings represents a vital future for the TR profession. While the current program was unusual in current TR practice, with a ratio of two or even three staff at times, to one client, it points to increasing interest in the provision of individualized, private TR services. The profession might benefit from future research that explores the impacts of providing individual rather than group services to clients in community settings.

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