

## Introduction

- Cerebral Palsy (CP) is among the most common developmental disabilities seen in United States. [1]
- CP encapsulates a group of physical disabilities that affect muscle tone and limb function [1] which can lead to decreased opportunities for participation within social/leisure activities. [2]
- Literature suggests that participation in adaptive sports is associated with improvements in self-efficacy, social activity, meaningful relationships and quality of life for individuals with disabilities. [2]
- Backyard sporting (BYS) games such as Cornhole, Kan Jam, Washers, etc. have not been modified to be as accessible to the disability community
- Research regarding adapting backyard sports to be more inclusive could not be found during investigator's literature review.
- To fill this research gap, this pilot study was conducted at Unified Health and Performance in Lancaster, MA, an inclusive strength and conditioning facility.
- The research study was designed to identify and address multiple participation barriers to playing backyard sports for individuals living with CP by answering the question:

### How does adaptive backyard sports impact social and leisure participation for individuals 18 and older living with Cerebral Palsy?

Aim #1	Aim #2	Aim #3
Explore what backyard sporting games individuals with Cerebral Palsy want to participate in	Identify what adaptations will allow them to do so	Understand how one's social and leisure participation opportunities are affected pre/post intervention

## Methods

Obtained IRB approval prior to start of study (IRB designated Human Subject Research Protocol: CR-01-STUDY00001655)

### Recruitment:

- Recruited\* and consented 4 individuals living with CP using a flyer posting
  - Inclusion criteria** –
    - [1] Individual must be 18 or older
    - [2] Individual must have CP
    - [3] Individual must live in the Worcester County area
    - [4] Individual must have interest in participating in backyard sports
    - [5] Individual must be proficient in English
  - Exclusion criteria** –
    - [1] Individuals with literacy below 6<sup>th</sup> grade level and/or with diminished capacity to consent

### Intervention:

- Conducted 45-minute-long semi-structured interviews with each participant to gather information regarding:
  - what 3 backyard sport games they would most want to improve
  - their strengths and challenges in playing backyard sports
  - what each participant hopes to get out of participating in this study
- Each participant played a total of 3-5 backyard sporting games throughout the 9-week intervention. 1-hour weekly trial clinics consisted of:
  - playing a BYS game while the primary investigator conducted activity analysis
  - adapting/modifying the backyard sporting game for participation during the next session.
- Each participant completed a post-intervention Qualtrics survey to gather feedback pertaining to their experiences with the study.
- Qualitative themes from the post-intervention survey were identified by the primary investigator
- Themes were then used in conjunction with activity analysis to create recommendations for future modification to BYS games and game selection based on individual's strengths and challenges

### Outcome Variables:



## Participants and Game Tried

### Four Participants living with Cerebral Palsy in the Worcester County Area:

- 32-year-old with Spastic Diplegia; Manual Wheelchair User -> Tried three backyard games (Cornhole, Kan Jam, Washers)
- 21-year-old with Spastic Hemiplegia; Ankle-Foot Orthotic User -> Tried three backyard games (Ring Toss, Cornhole, Kan Jam)
- 25-year-old with Spastic Diplegia; Walker User -> Tried five backyard games (Spike Ball, Kan Jam, Ring Toss, Ladder Ball and Washers)
- 22-year-old with Spastic Diplegia; Loftstrand Crutch User -> Tried three backyard games (Cornhole, Kan Jam, Ring Toss)

## Qualitative Results

<p><b>Game Modifications</b></p> <p>"I think the adaptations to the outdoor games made me feel more inclusive to the games. Some of the adaptations helped me get better control with my throwing and more power to throw far."</p>	<p><b>Social Participation</b></p> <p>"The real challenge socially is how are you going to show somebody that I can hit that shot."</p>
<p><b>Leisure Participation</b></p> <p>"I think practice is important for these games... and I haven't really played many of these games before so I think once I continue to practice these games I will get better."</p>	<p><b>Self-Efficacy</b></p> <p>"Knowing that I am more able to play backyard sports than I previously thought."</p>

### Objective Observations RE Game Modifications and Activity Analysis:

- Participant #1 generally benefit from positional changes of his wheelchair (i.e. throwing at an angle rather than straight on and having an external support to either hold on to or lean into while throwing).
- Participant #2 did not need any adaptations or modifications to successfully participate in the backyard sporting games that he trialed. However, the participant did improve his performance when using visual cues (i.e. an "X" target to focus on) that helped balance
- Participant #3 enhanced his performance from environmental changes throughout the games he trialed. Specifically, the participant was able to focus more on the objectives of each game when his wheels were locked in place to prevent rolling and his dominant side arm handle was removed to gain range of motion.
- Participant #4 benefited from playing in a seated position rather than tall kneeling or standing. While a seated position did not drastically improve his performance within each game he trialed, the participant was more comfortable for longer periods of time and did not fatigue, thus improving his focus on, and experience of, each game.

### Qualitative Themes from Participant Feedback:

<p><b>Practice:</b></p> <p>Most common answer when asked "What do you believe would help improve your performance in this game?"</p> <p>Improvements seen each week</p>	<p><b>Self-Efficacy:</b></p> <p>"Never have been asked [to participate]"</p> <p>"I believe that [participating] will make me more confident to play"</p> <p>"I have more confidence now but....I don't know about expressing that confidence outside of a controlled setting."</p>
<p><b>Participation:</b></p> <p>Many of the games trialed were games that participants either never heard of, never had played, or had very little experience playing</p>	<p><b>Knowledge &amp; Skills:</b></p> <p>Participation improved understanding about games trialed, skills involved and own ability</p>
	<p><b>Lack of opportunity / inaccessibility:</b></p> <p>Will the modifications that helped me participate be accessible when I play?</p> <p>Challenging to find opportunities to play</p>

## Discussion

Participant Satisfaction relating to BYS		Have adaptations improved your ability to participate in BYS games?	
Great	3 people	Yes	3 people
Alright	1 person	No	1 person

\* Answered on 3-point Likert scale ranging : Bad, Alright, Great

### Backyard sporting games can be adapted to enhance an individual's enjoyment of the game and perception of ability to participate.

- Trial and error when modifying BYS games is essential to taking a client-centered approach that emphasizes each client's skills and ability
- Environmental set-up (i.e. chair/walker positioning and angle, external hand supports for balance, visual cues) plays a major role in modifying BYS games to promote an individual's participation and improve performance
- Occupational Therapists have a unique skillset to analyze an individual's movement strengths and areas of challenge in order to suggest the most appropriate BYS games to play, but the ultimate decision of game choice should be made by the participant to increase motivation and enjoyment
- Stationary games that only require throwing (i.e. Ring Toss, Cornhole, Ladder Ball and Washers) are generally easier to play, and require less modifications when applicable, than dynamic games that involve throwing, hitting, hand-eye coordination and movement (Spike Ball, Kan Jam)

### Limitations:

- Small Sample Size: 4 Participants
- Possible lack of diversity based on geographical location of project implementation site (generalizability may be hindered).
- Unclear whether improvements in performance were from adaptations or from practice playing the game
- Risk of investigator/confirmation bias in evaluating performance

### Future Research Considerations:

- Audio/video recording entirety of trial sessions
- Larger sample size/broader geographic location to sample from
- More team members to collaborate on ideas and evaluate performance

## Implications for Occupational Therapy

As individuals that may experience decreased social and leisure activities [2], advocating for increased opportunities for individuals with cerebral palsy to participate in backyard sporting games can provide meaningful physical activity

Occupational Therapists can play a vital role in promoting meaningful physical activity through BYS to:

- Create social and leisure participation opportunities for individuals with cerebral palsy
- Adapt an individual's environment to improve their occupational performance in BYS games
- Connect individuals to community-based programming
- Advocate for individuals with CP to participate in BYS to the BYS sporting community

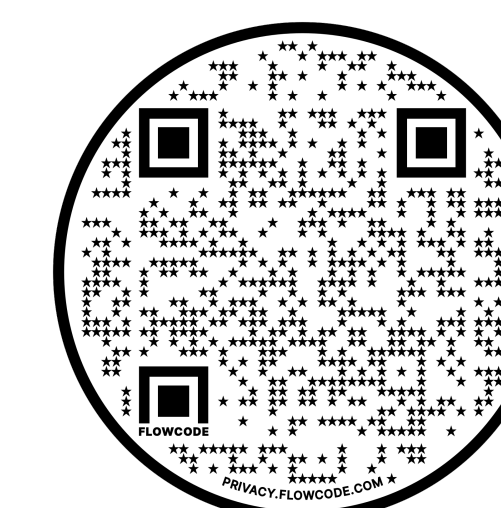
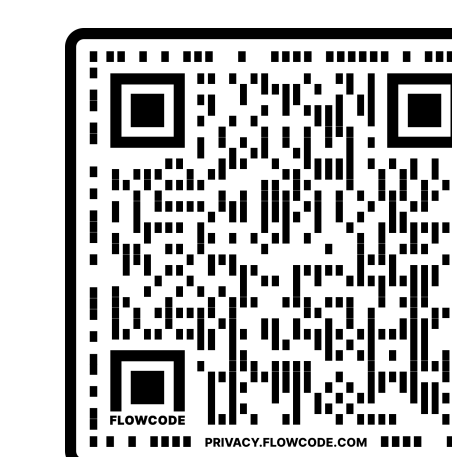
## Conclusion

-Adapting common backyard sporting games such as Cornhole, Kan Jam, Washers, etc., may have a positive impact on social and leisure participation opportunities for individuals with cerebral palsy.

- Occupational Therapists have the skill set to analyze an individual's activity/movement, create innovative solutions to areas of challenge they may present with and promote one's participation through opportunity and advocacy

-Creating social and leisure participation through adapting backyard sports for individuals with cerebral palsy and/or other disabilities is a field of research that requires further exploration in the future.

## Game Recommendations



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