

Children's Mercy Kansas City

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**Improvement on the Slopes: How children with disabilities progress in alpine skiing in skill level, and cognitive, social, emotional, physical and independence scores.**

Stephanie Green

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## Research Abstract Title

**Submitting/Presenting Author (must be a trainee):** Stephanie Green, DO

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**Medical Student**

**Resident/Psychology Intern ( $\leq$  1 month of dedicated research time)**

**Resident/Ph.D/post graduate ( $>$  1 month of dedicated research time)**

**Fellow**

**Primary Mentor (one name only):** Dr. Mark Fisher

**Other authors/contributors involved in project:** Dr. Matthew McLaughlin

**IRB Number:** STUDY00002087

### **Describe role of Submitting/Presenting Trainee in this project (limit 150 words):**

Dr. Stephanie Green (myself) was the primary author and researcher on this project. She did all the data collection, and worked with the attendings to run the statistics. She developed the outcomes graphs. She completed the poster, and completed an in-person presentation at a National Conference this past fall.

### **Background, Objectives/Goal, Methods/Design, Results, Conclusions limited to 500 words**

**Title:** Improvement on the slopes: the impact of an adaptive snow sports program on children and young adults with disabilities

**Authors:** Green, S.M., Fisher, M.T., Eichner, J., McLaughlin, M.J.

**Institutions:** Children's Mercy-Kansas City and Midwest Adaptive Sports

#### **Background:**

Adaptive downhill skiing has been described as a fun, safe, engaging recreational activity for those with disabilities (Sterba, 2006). There are numerous ways the alpine skiing can be modified to meet these athletes' needs. For instance, athletes can use tethered skis, horizontal poles held by their instructors, or modified walkers. For those that have poor standing balance, or are non-ambulatory, sit-skis are an option, with or without outriggers to add additional support and balance for athletes with poor trunk stability or core strength. These options provide equal and accessible alternatives for those with disabilities to get out and enjoy the winter slopes. However, is there more to adaptive winter sports than just the fun in the snow?

While adaptive skiing has been around for a long time, the literature of its benefits remains minimal. Nasuti and Temple (2010) demonstrated that there is scarce literature about individuals with disabilities and the empirical benefits of skiing or snowboarding; however, the available research has repeat themes, which demonstrate that athletes involved in adaptive sports gain significant improvements in quality of life, physical well-being, strength, endurance, cardiovascular health, psychological well-being, mood, social interaction and perception of health.

**Objectives:** The primary aim of this project was to determine the progress of participants in an adaptive snow sports program for children and young adults with disabilities. The secondary goal of this study was to determine the common characteristics of participants in this program.

**Design:** Retrospective Cohort Study

**Setting (Do not list formal institution name):** Winter ski resort

**Participants:** 113 participants, who participated in at least 2 ski or snowboard sessions  
**Interventions:** At least two adaptive ski and snowboard sessions, with trained adaptive instructors.  
**Main Outcome Measures:** Professional Ski Instructors of America and American Association of Snowboard Instructors skill levels (from 1-novice to 9-expert); Cognitive, emotional, social, physical, and independence scores, as rated by trained instructors on a scale from 1-5, with 5 being the highest.

**Results:** There were a total of 113 participants included. The median number of sessions per participant were 4 with a range from 2-65 sessions. The median duration of participation was 2 years (range 2-10 years). A Wilcoxon-rank sum test demonstrated an improvement in final skill level compared to baseline ( $p < 0.0001$ ), with an average increase of 1.2 skill levels per participant with an average increase of 0.48 skill levels per year of involvement. There were also improvements from the initial session to the final session in all secondary outcomes: cognitive ( $p = 0.07$ ), social ( $p = 0.002$ ), emotional ( $p = 0.018$ ), physical ( $p < 0.0001$ ), and independence ( $p < 0.0001$ ) scores. The most common diagnoses of participants were visual impairment, blindness, autism, and spina bifida/spinal cord injury.

**Conclusions:** This study showed improvements in all measured domains during participation in an adaptive snow sports program. Evaluating the effectiveness of adaptive sports programs provides important information to set participants' expectations, determines goals of the program for trainers, and shows the benefit of this program to outside entities.

**Level of Evidence:** III

## Improvement on the slopes: the impact of an adaptive snow sports program on children and young adults with disabilities

Green, S.M., Fisher, M.T., Eichner, J., McLaughlin, M.J.

Children's Mercy - Kansas City; Midwest Adaptive Sports

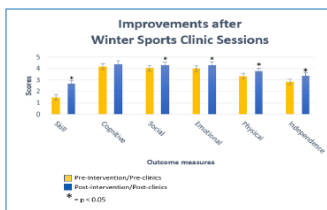
### Background & Objectives

- Adaptive skiing is well-established as a therapeutic activity, yet the literature of its benefits remains minimal.
- Repeat themes include improvements of strength, endurance, cardiovascular health, autonomy, self-esteem, social and conversation skills, attention, health perception and quality of life.
- This study aims to determine the progress of participants in an adaptive snow sports program for children and young adults.

### Design & Outcome Measures

- Retrospective cohort study in an adaptive ski/snowboard program
- Primary Outcome = Professional Ski Instructors of America and American Association of Snowboard Instructors skill levels (from 1-novice to 9-expert)
- Secondary Outcome = cognitive, emotional, social, physical and independence scores, as rated by trained instructors on a scale from 1-5
- Statistical Analysis: Descriptive statistics, Wilcoxon-rank sum test to demonstrate change from initial to final evaluation

### Results



- 113 participants
- Median #sessions/participant = 4, (2-65)
- Median years of participation = 2 (2-10)
- Primary outcomes - improvement in final skill level from initial ( $p < 0.0001$ ), with an average increase of 1.2 skill levels per participant & 0.48 skill levels per years of involvement.
- Secondary outcomes - improvements from initial scores: cognitive ( $p = 0.07$ ), social ( $p = 0.002$ ), emotional ( $p = 0.018$ ), physical ( $p < 0.0001$ ), and independence ( $p < 0.0001$ ) scores.
- The most common diagnoses were visual impairment, autism, spina bifida, and spinal cord injury.

### Discussion

- Showed improvements in all measured domains during participation.
- Limitations: lack of consistency in the number of sessions, instructors' teaching, and subjective instructors' scores.
- Evaluating the effectiveness of adaptive sports programs provides important info to set participants' expectations, determines goals of the program for trainers, and shows the benefit of this program to outside entities.
- Level of Evidence: III
- References available upon request

