

College Students' Family Relationships and Mental and Physical Well-Being During the COVID-19 Pandemic



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INTRODUCTION

- The COVID-19 pandemic has presented unique challenges to college students.
- The following hypotheses were examined:
 - Higher levels of family conflict will be associated with higher levels of both depressive symptoms and sleep disruptions.
 - Higher levels of depressive symptoms will be related to greater sleep disruption.
 - Higher levels of individuation will be associated with a greater incidence of family conflict.
 - Higher levels of impact and exposure to COVID-19 will be associated with higher levels of sleep disruption, depressive symptoms, and family conflict.

METHODS

- **Participants**
 - 113 College students from Marquette University
- **Measures**
 - **The Pittsburgh Sleep Quality Index** (Buysse et al., 1989)
 - 19-item, self-rated questionnaire assessing sleep quality, sleep disturbance, sleep medication use, and daytime dysfunction
 - **The COVID-19 Exposure and Family Impact Scale** (Kazak et al., 2021)
 - 28 items assessing COVID-related exposures
 - 17 items assessing impacts of COVID-19
 - **The Young Adults' and Parents' Reports of Family Conflict and the Young Adults' Reports of Parent Intrusiveness measure** (Stormshak et al., 2017)
 - 11-item questionnaire assessing young adult perceptions of family conflict and parent intrusiveness
 - **The Patient Health Questionnaire - 9** (Kroenke et al., 2001)
 - 9 items self-reporting on the DSM-IV criteria for depressive disorder diagnosis
 - **The Late Adolescent Individuation Questionnaire** (Baik, 1997)
 - 13 items assessing participant levels of connection and separateness from their parents

Table 1: Percentage of Students in Each Living Situation Before and During COVID-19 Pandemic

	Prior to COVID	Early Months of COVID	Summer Months of COVID	Fall 2020 Semester	Winter Months of COVID	Spring 2020 Semester
On Campus Housing	67.3	9.0	5.5	38.4	12.7	36.6
Off Campus Housing (Not With Family)	18.6	3.6	17.4	42.9	15.5	48.2
At Family Residence	17.7	88.4	77.1	18.8	78.1	15.2

- Family conflict was not significantly associated with depression, but higher family conflict was associated with greater college student sleep disturbance.
- Student reports of more depressive symptoms were associated with poorer sleep quality, more sleep disturbance, more sleep medication use, and greater daytime dysfunction.
- Greater reports of family conflict were associated with lower levels of feeling connected with parents and higher levels of parental control.
- Greater exposure to COVID-related events and impacts were associated with more symptoms of depression and greater daytime dysfunction. More COVID-related exposures, but not impacts, were associated with greater family conflict and more sleep medication use. More COVID-related impacts, but not exposures, were associated with more sleep disturbances and poorer overall sleep quality.

ADDITIONAL RESULTS

- 39.9% of participants had clinically significant levels of depression
- Student Commentary on COVID-19
 - “I feel more anxious, and depressed since not being able to see my friends on a daily basis.”
 - “A loss of focus, especially with school. Also, there were deaths in the family that were not COVID-related, but we could not be there to attend the funeral, care for direct loved ones of those who passed away. Also, I have friends that have huge deterioration of mental health, but because we were all home it was hard to help each other in person. A lot of anxiety and depression on missed opportunities, events, and uncertainty of future.”
 - “It brought my family closer together, but it also made us argue a lot being in close quarters for months.”

DISCUSSION

- Students' experiences during the pandemic were associated with family interaction difficulties.
- Students struggled significantly with depression and sleep over the pandemic, which may have impacted their academic success and personal lives.
- Universities should continue to offer resources and programs for their students as they cope with the pandemic since it has had such a profound impact on their levels of depression, sleep disruptions, and family conflict.

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Jane Layden & Jenya Iuzzini-Seigel, Ph.D., CCC-SLP

Research Questions

- How do physical activity level and participation in active games and sports vary based on motor abilities in children with typical and disordered communication?

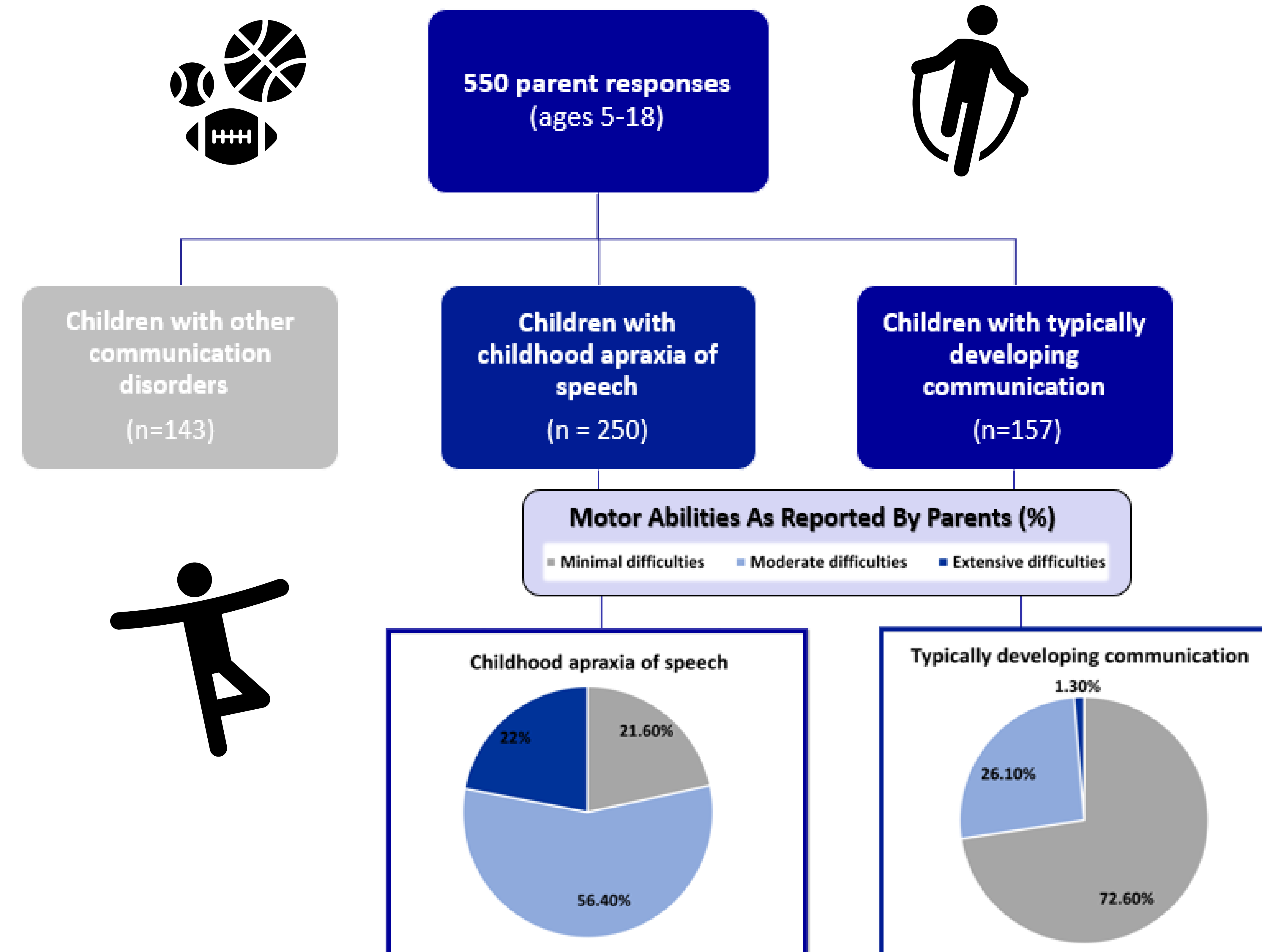
Significance

- Children with poor motor abilities are more likely to have poor physical fitness and less likely to reap the widespread benefits of exercise
- The current research contributes to a “whole-child approach” in caring for children with communication disorders who have a high rate of motor impairments

Methods

- Qualtrics software was used to develop and administer a parent-survey
- Questions examined motor skills, physical activity levels, parental concerns, and functional and recreational activities
- Current aim: Determine if physical activity involvement differs between children with communication impairments and typical communication, who are grouped by motor ability

Difficulties with Motor Skills



*Motor abilities based on response 7 general motor skills questions:

- My child has difficulty balancing (e.g. standing on one leg)
- My child often stumbles and falls
- My child could be described as a “bull in a china shop” (that is, appears so clumsy that he or she might break fragile things in a small room).
- My child runs as fast / in a similar way to other children of the same gender and age
- My child jumps over obstacles found in their play environment easily
- My child catches a small ball (e.g., tennis ball) thrown from a distance of 6 to 8 feet
- My child throws a ball in a controlled and accurate fashion

Motor Difficulties and Physical Activity

- **22%** of children with CAS (n=250) were reported to have extensive motor difficulties, compared to **1.3%** of children with typical communication (n=157)
- Children with CAS and typical development with **moderate and extensive** motor difficulties reported less frequent vigorous physical activity and participation in sports and games

Conclusion

- A substantially higher rate of moderate and extensive motor difficulties were reported for children with CAS relative to peers with typical communication
 - Both groups of children with moderate and extensive motor difficulties were reported to have similar limitations in activity level and participation
- Limited participation potentially contributes to lower physical fitness and poorer social outcomes

Advancing the Discipline

- Transdisciplinary assessment and treatment is needed for children with multi-systems deficits
- Future research should examine physical and cognitive-linguistic benefits of exercise training for children with communication disorders

Social-Emotional Health and Motor Impairments in Children With and Without Communication Impairments

Emily Olsen & Jenya Iuzzini-Seigel, Ph.D., CCC-SLP

RESEARCH QUESTION

What is the physical and social-emotional experience of children with childhood apraxia of speech (CAS) and/or developmental language disorder (DLD) compared to typically developing peers?

SIGNIFICANCE

- Over 50% of children with CAS and DLD have fine and/or gross motor impairments (Iuzzini-Seigel, 2019), compounding effects of their communication deficits.
- Functional outcomes of these deficits are unknown.
- It is essential that we understand the extent to which bullying, mental health issues, and other social-emotional and physical challenges affect children with CAS and/or DLD relative to typically developing peers.

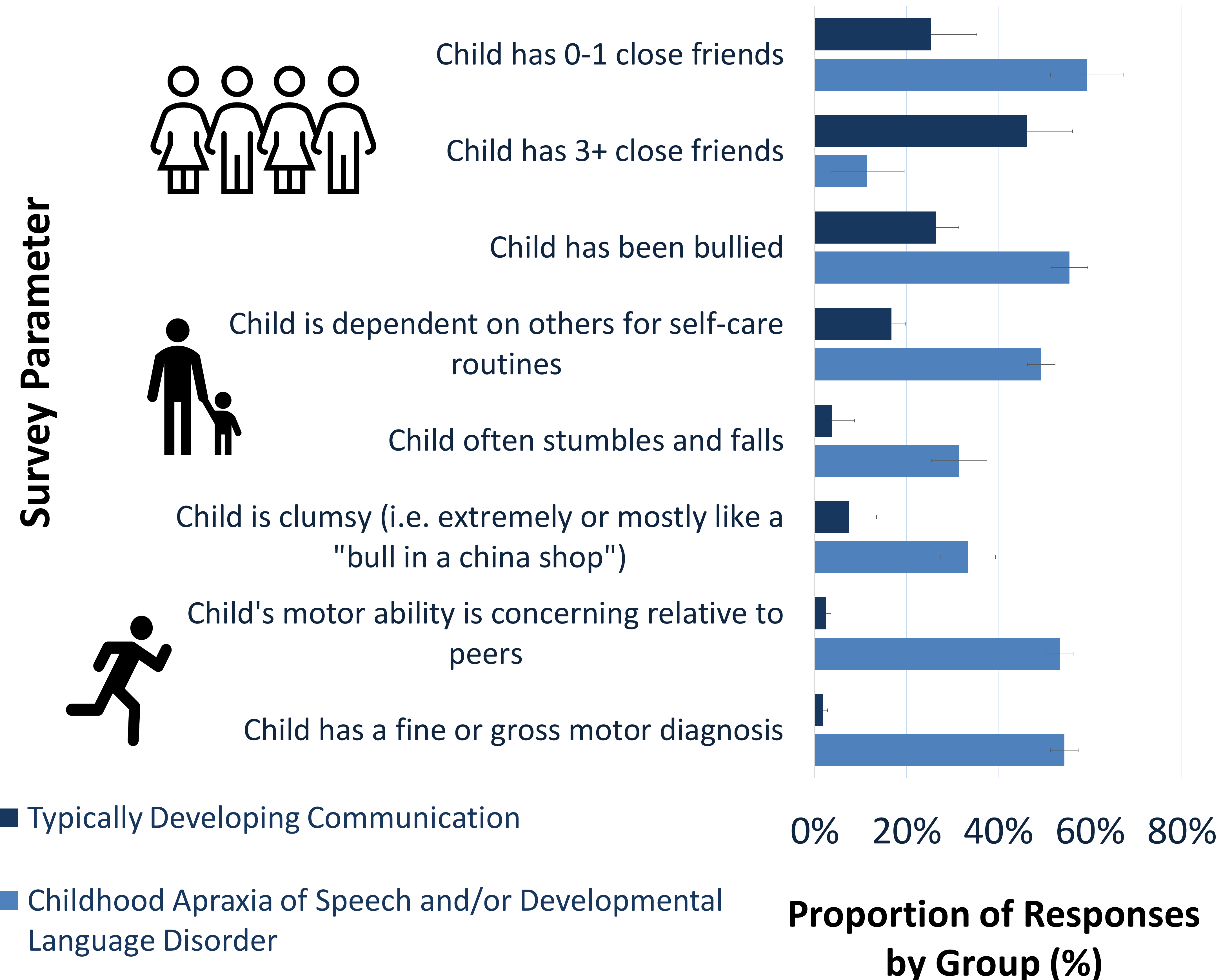
INNOVATION

- Comprehensive parent-survey series used to gather multifaceted data about physical (n = 1113) and social-emotional (n = 541) health in children with communication disorders.
- Extant research is largely limited to communication and academic outcomes in these populations– the current research breaks out of the siloed approach and considers the whole child.



RESULTS

Parent-Reported Data about their Child



CONCLUSIONS

1. Children with CAS and DLD are reported to have fewer friends and experience bullying at twice the rate of typically developing peers.
2. Children in these populations are also reported to demonstrate functional physical limitations consistent with developmental coordination disorder, a lifelong condition in which motor deficits and coordination challenges persist.

ADVANCING THE DISCIPLINE

Data inform the necessity for transdisciplinary assessment and treatment of children with CAS and DLD.

Foundation for Future Studies

- Experimental study of fitness levels and physical health in children with CAS and DLD.
- Treatment studies incorporating exercise to promote physical and social-emotional benefits in these vulnerable populations.

Validation of the dot blot technique to test for protein markers of skeletal muscle denervation



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BACKGROUND

- Human aging is accompanied by a progressive loss in mobility and physical function leading to a decreased quality of life for older adults.
- Important to the age-related loss in function is the loss of muscle mass and strength that is thought to occur, at least in part, from the denervation of skeletal muscle fibers (Sonjak *et al.* 2019) (Fig. 1).
- Denervated skeletal muscle may start to express specific protein markers, such as embryonic (MHC_e) and neonatal myosin heavy chain (MHC_n) or neural cell adhesion molecule (NCAM) (Soendenbroe *et al.* 2019).

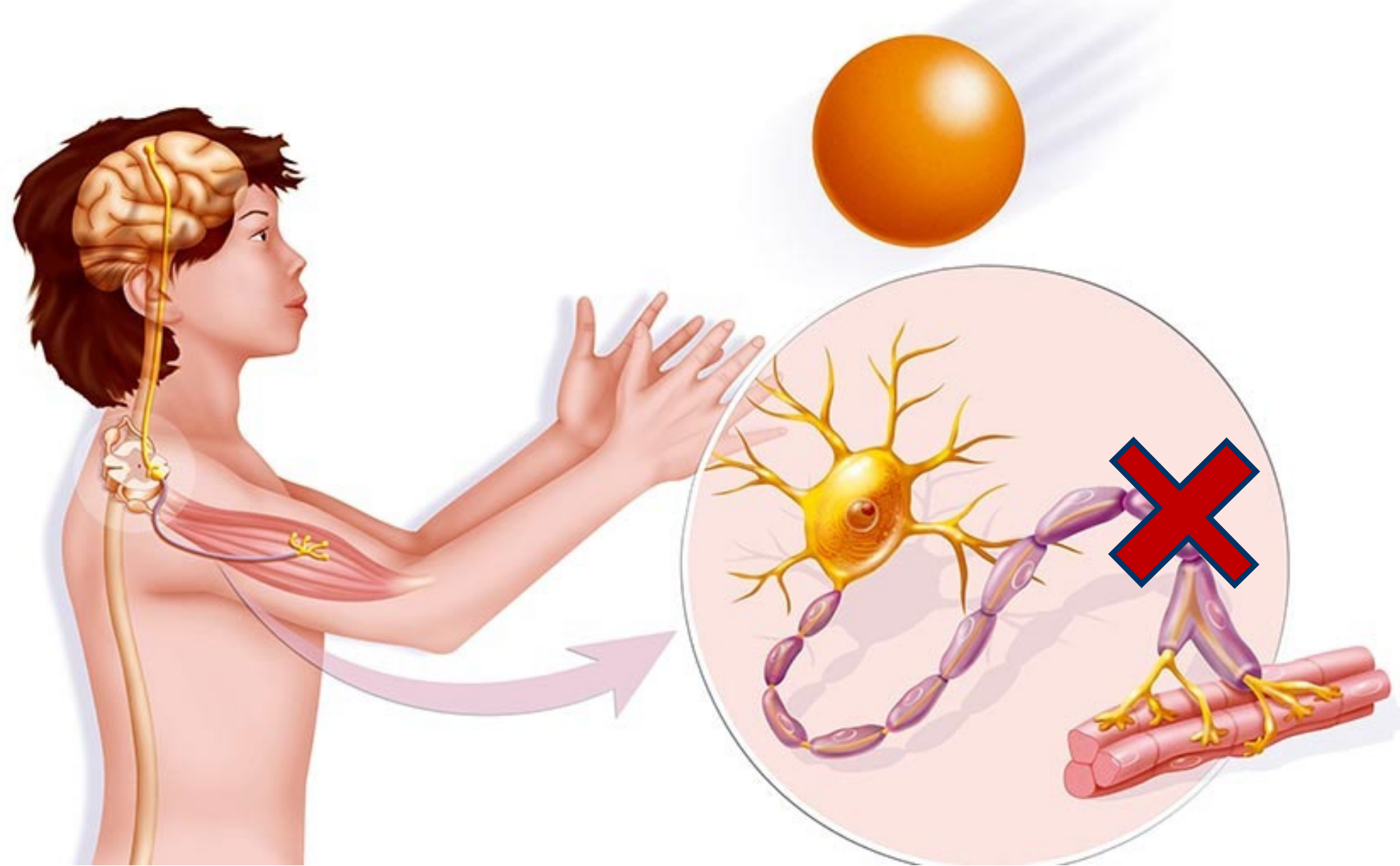


Figure 1: Schematic of hypothetical denervation occurring in human skeletal muscle fibers (healthdirect.gov.au).

KNOWLEDGE GAP & OBJECTIVE

- Knowledge Gap:** Although skeletal muscle denervation is thought to increase with age, a method to test the innervation status of single isolated skeletal muscle fibers is not available.
- Objective:** To identify a simple, cost-effective method to test for protein markers of denervation of isolated human skeletal muscle fibers.

RESEARCH QUESTION

Is the dot blot technique a valid method to test for protein markers of skeletal muscle denervation?

METHODS & RESULTS

- Single muscle fibers were pulled from both human muscle biopsy samples and rodent skeletal muscle samples to perform the dot blot technique (Fig. 2).

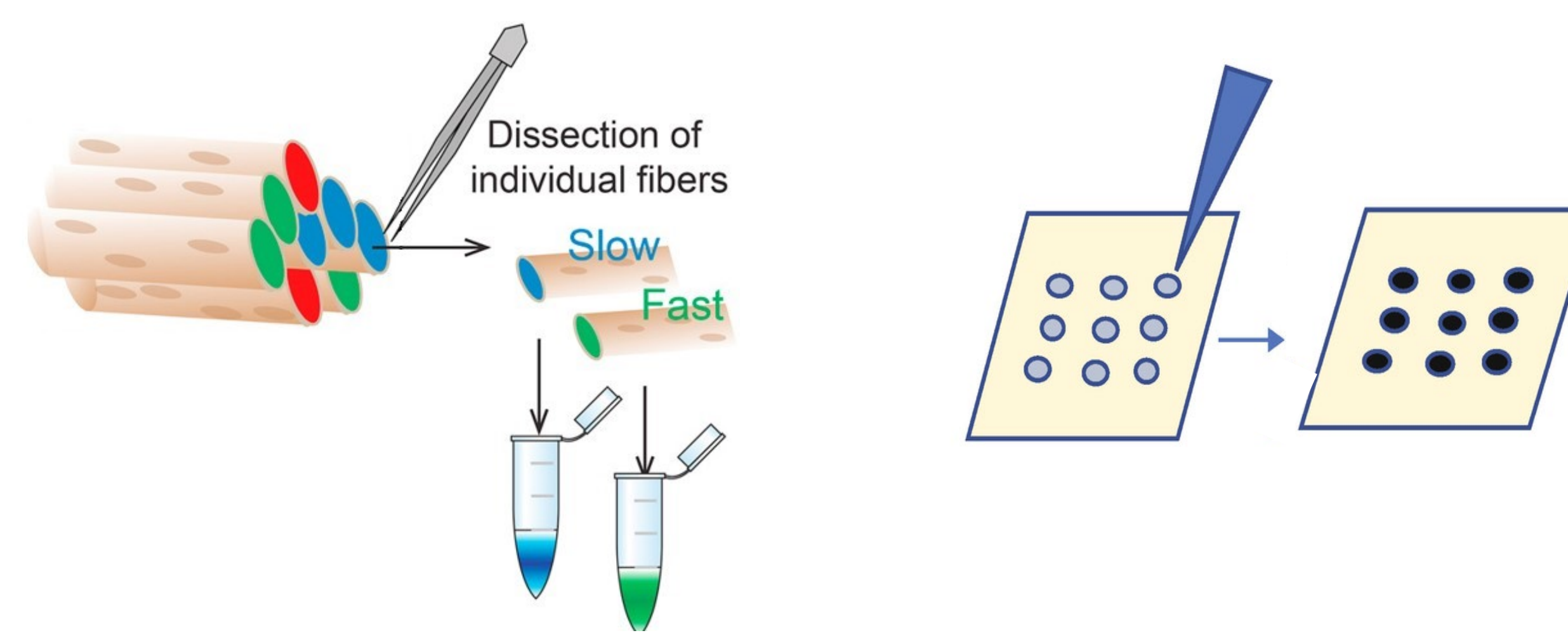


Figure 2: Schematic of isolating muscle fibers from a biopsy and aliquoting samples for the dot blot (Murgia *et al.* 2017; Nagarajan *et al.* 2018).

- Dot blot was practiced on rodent skeletal muscle fibers probed with an antibody specific for MHC protein (Fig. 3).

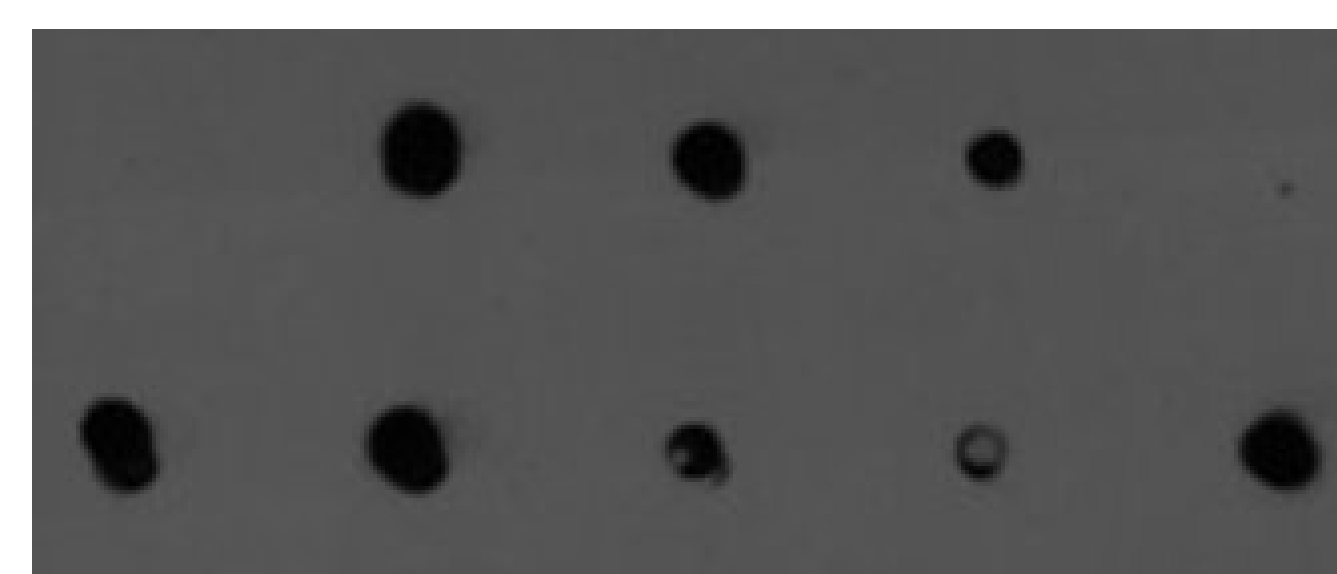


Figure 3: Dot blot image with antibody used to detect MHC protein in rodent skeletal muscle fibers. Black dots indicate detection of MHC protein.

- Muscle fibers were pulled from human muscle biopsies from an old and young adult and probed with an antibody specific for the denervation protein marker, NCAM (Fig. 4).

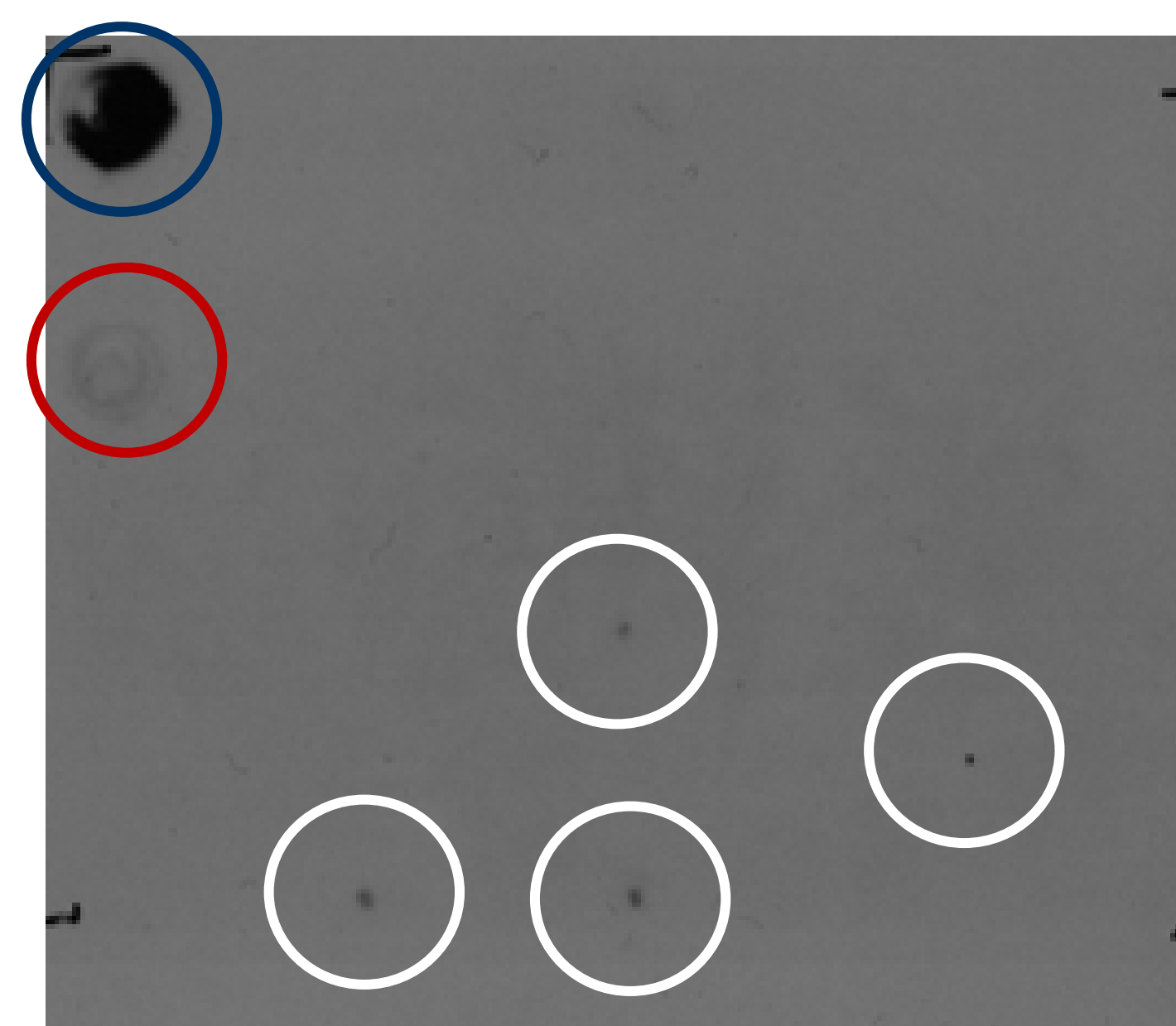


Figure 4: Dot blot with NCAM positive control (blue circle) and individual skeletal muscle fiber samples. Four of 18 fibers (white circles) appeared positive for NCAM, suggesting denervation. Homogenate sample (red circle) containing hundreds of fibers from an old participant suggests denervation.

- To verify protein detection, the same single fibers were tested on repeat dot blots (Fig. 5).

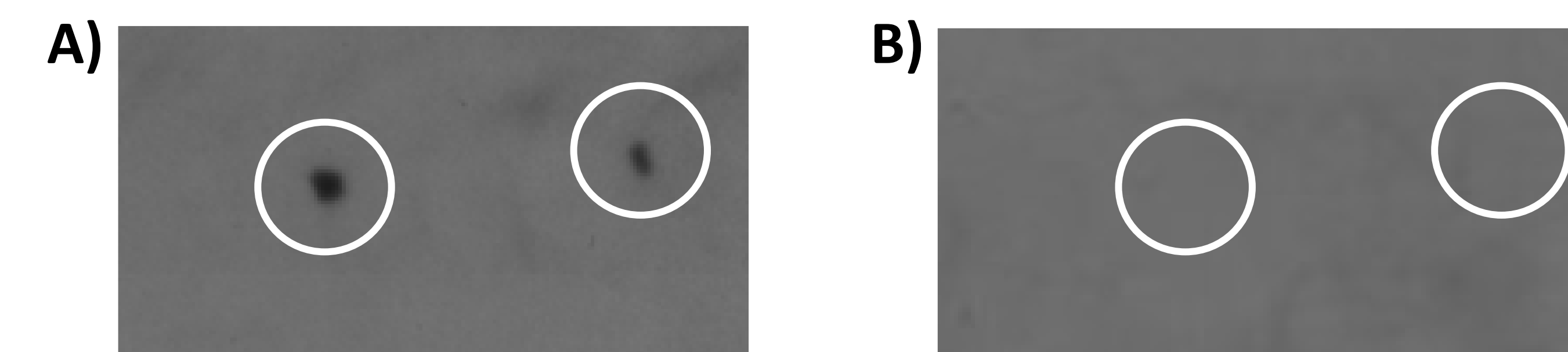


Figure 5: Apparent NCAM detection in skeletal muscle fibers (A) were not apparent when the same skeletal muscle fibers were retested (B).

- A Western blot was performed to verify that the antibody used in the dot blot was detecting NCAM in the skeletal muscle samples.

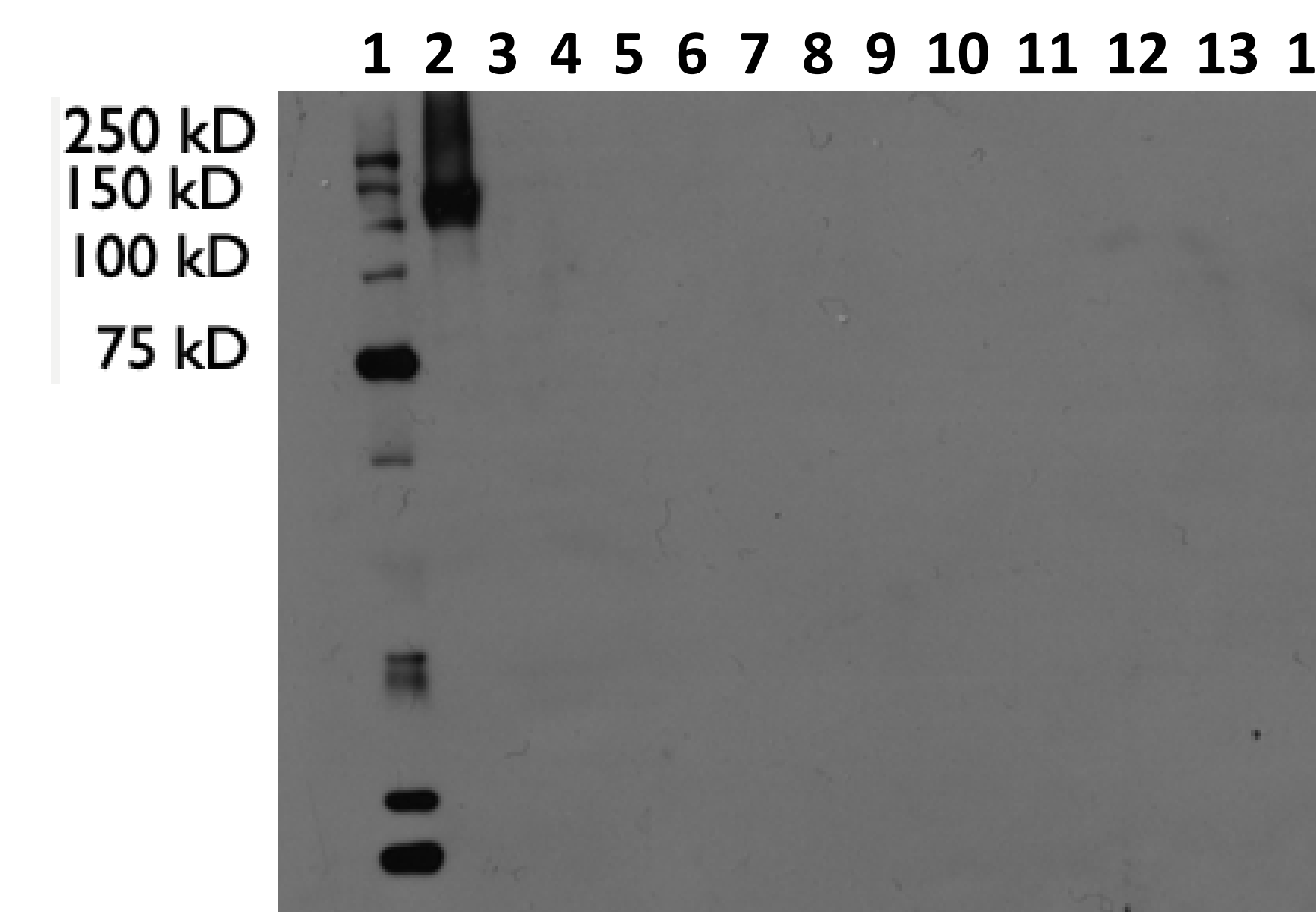


Figure 6: Western Blot with molecular-weight size marker (Lane 1) and NCAM positive (Lane 2) and NCAM negative (Lane 3) controls to verify NCAM antibody function. Lanes 4-12 are single skeletal muscle fibers and Lanes are 13-14 skeletal muscle homogenate. NCAM was not detected in skeletal muscle samples.

FUTURE STUDY

- Test dot blot with rodent muscle fibers that are known to be denervated (e.g., spinal cord injury animals).
 - If signal is detected from denervated rodent muscle, then testing may continue on human skeletal muscle samples.

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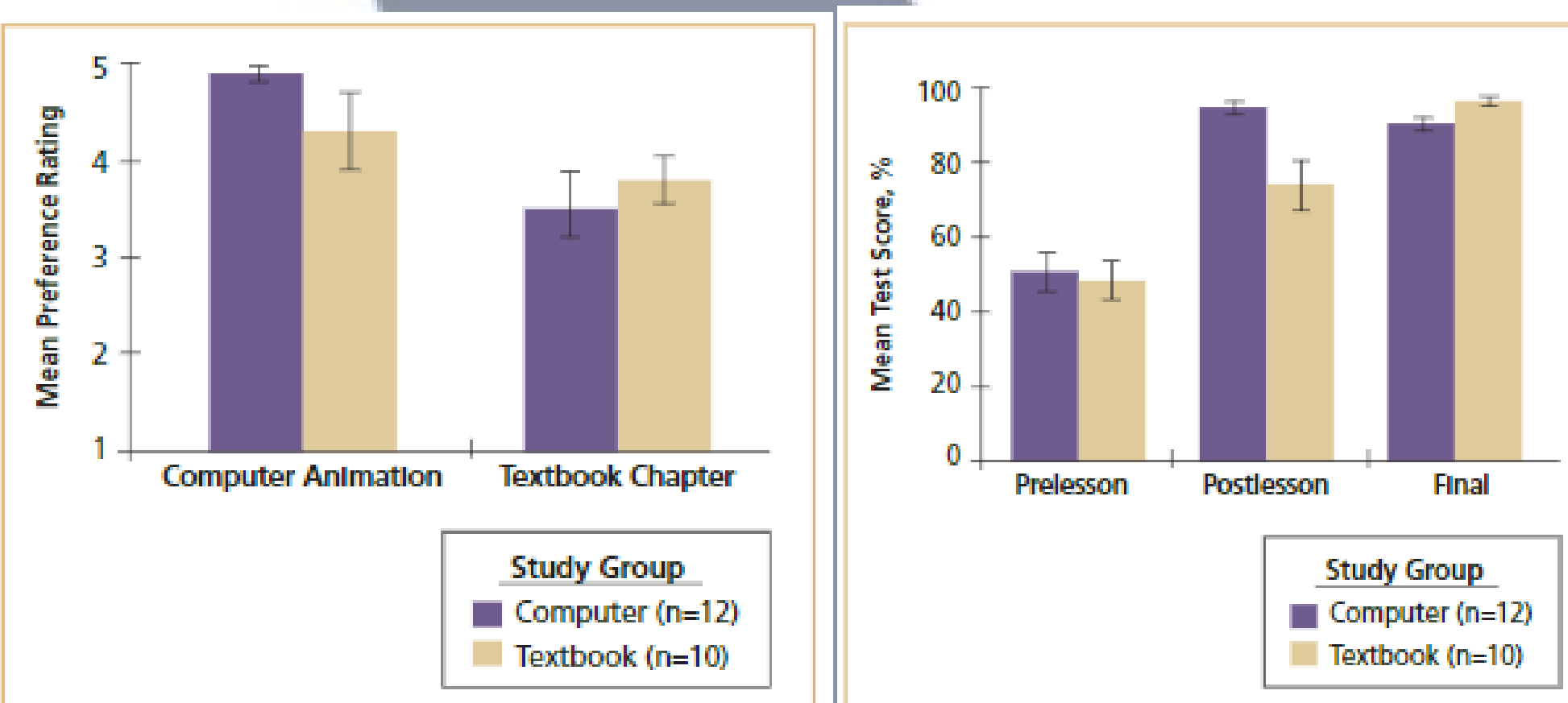
DEVELOPING A 3D NEUROANATOMY LEARNING TOOL

The Need

Our project integrates technology with education. We asked, "Does a web based interactive 3D brain model facilitate learning neuroanatomy?"

Previous evidence suggests it would....

Images and animation improves learning science



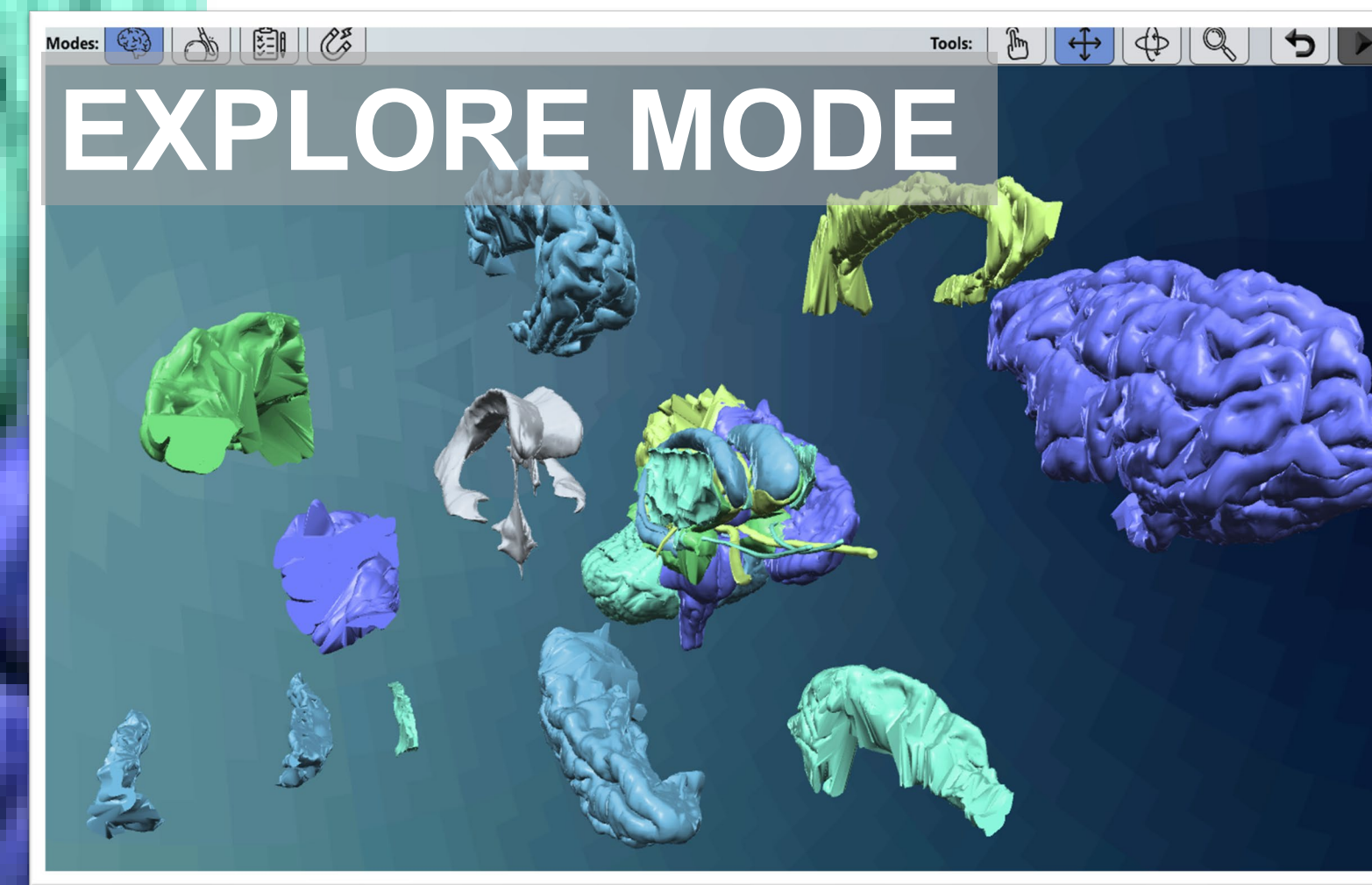
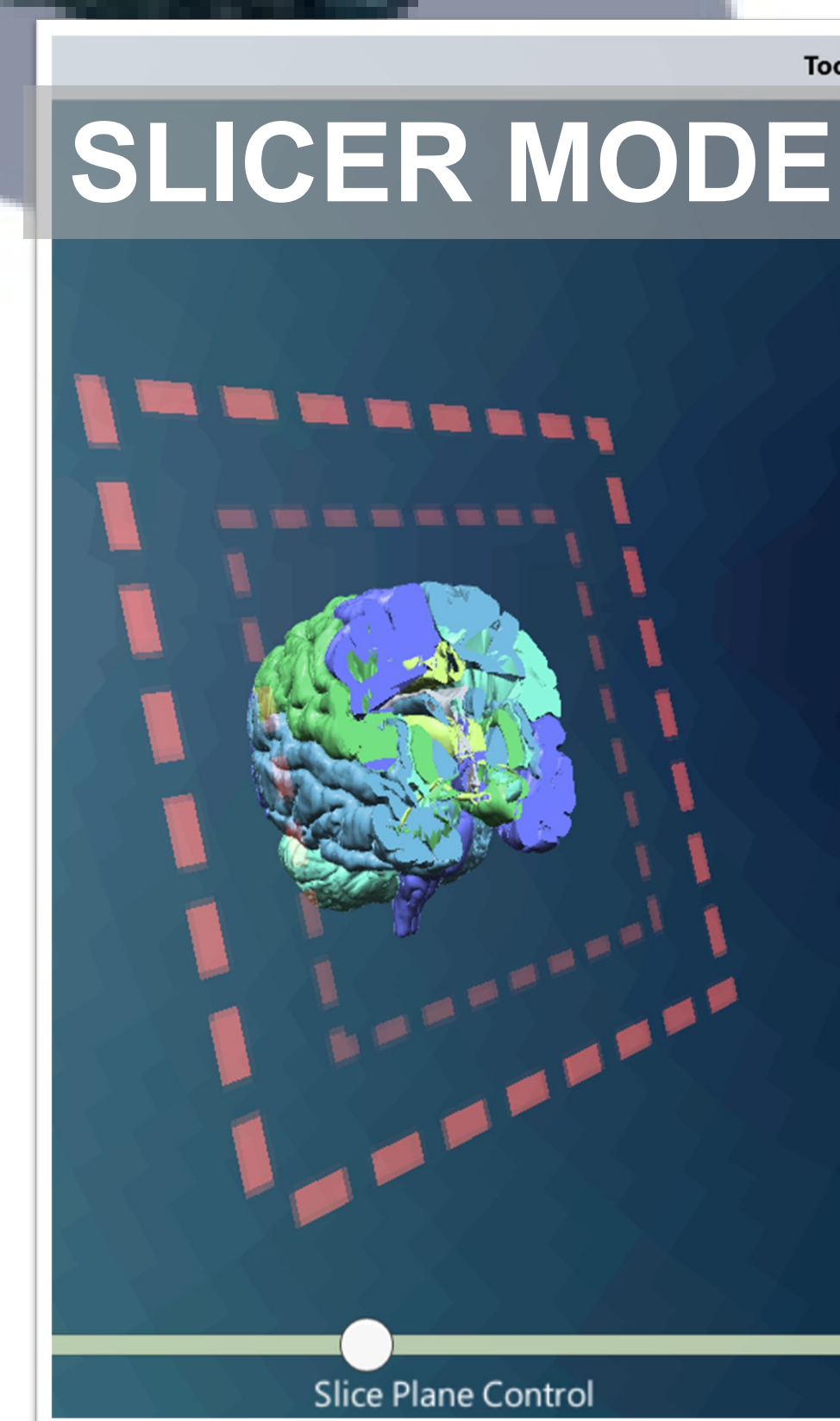
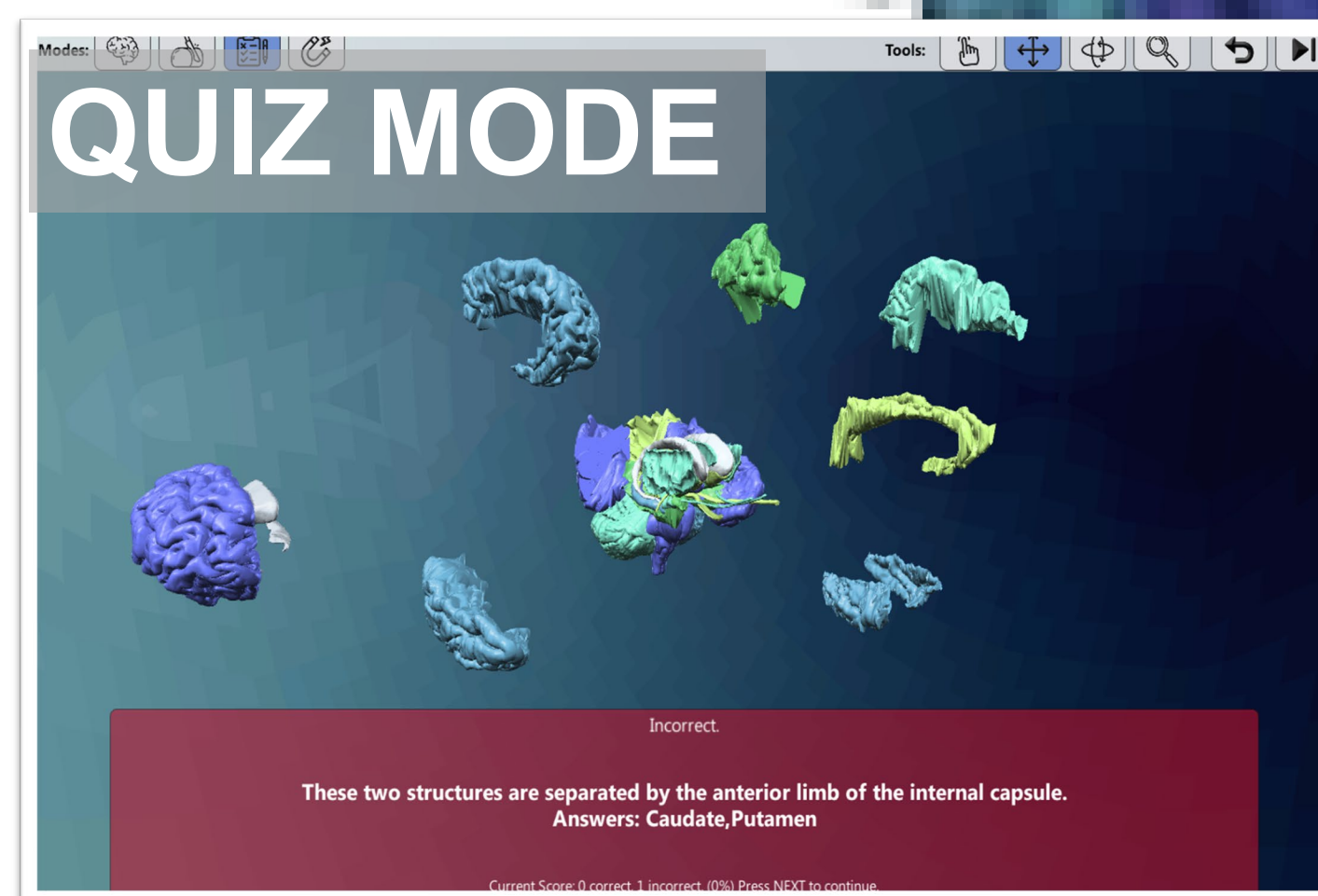
Using computer graphics and animation for learning molecular and cellular biology principles was preferred over standard textbook (left) and increased mean test scores (right). This suggests computer animation enabled students to learn the material more quickly.

Our History

Brain model for the MARVL visualization lab created a classroom experience



3-D MARVL model ported into a single-user head-mounted virtual reality device



We programmed sounds, colors, menu bar, buttons, and cameras to create a **WebGL Platform**

Student Feedback

"Learning from 2D structures makes it difficult to understand how the structures connect and work together as a system. With Neuroplay we have the ability to pull entire structures out instead of simply visualizing a coronal section of the structure."

"I liked the quiz and the ability to move parts of the brain around."

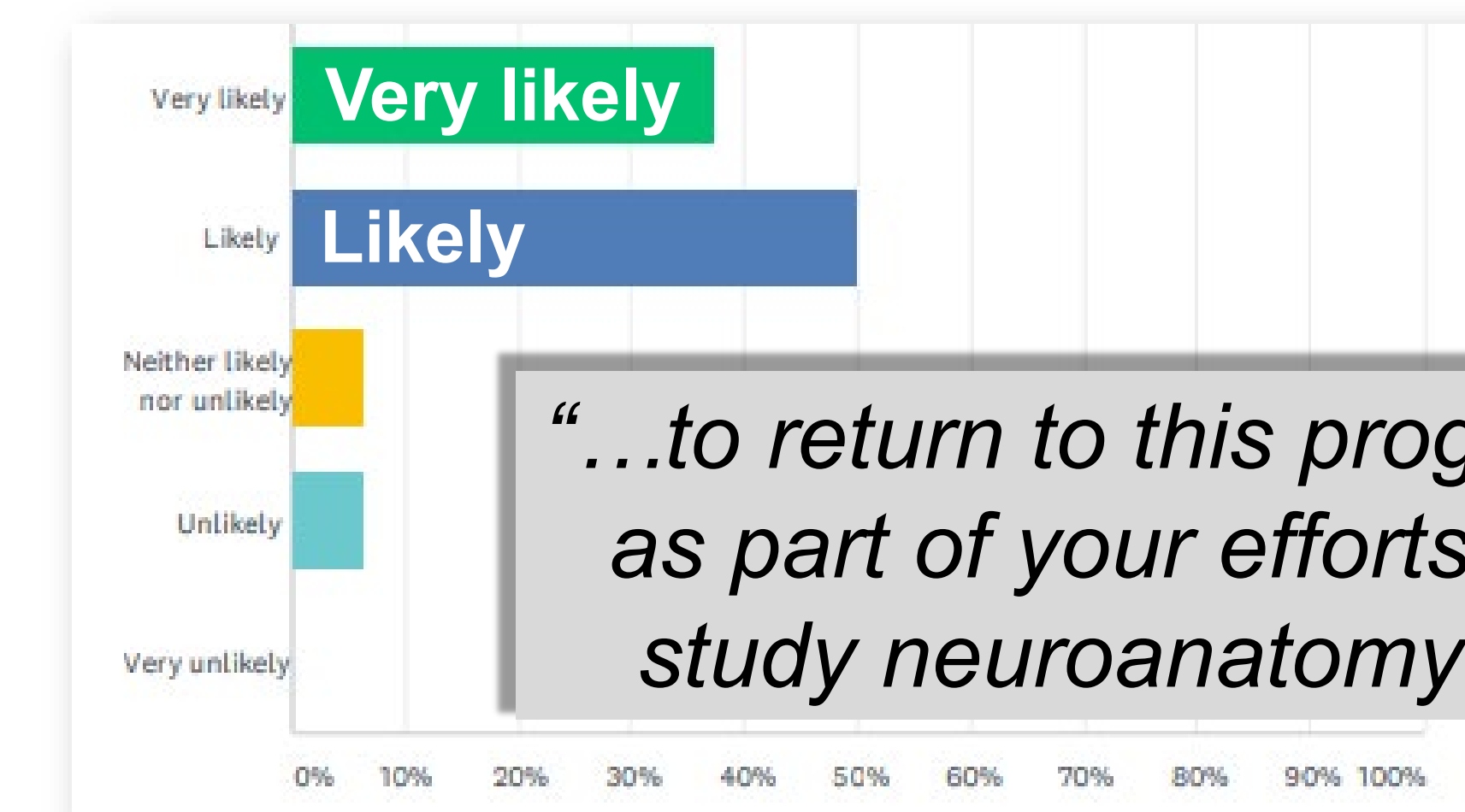
"I liked being able to consider the subcortical structures that are usually difficult to wrap my mind around."

"I think the quizzes were really useful for preparing for our class's lab practical.."

"It helped me to visualize 3D aspects of structures in their entirety that I had previously only learned to identify in either coronal or horizontal sections."

Davina Lettau B.S. '23

Mentors: Chris Larkee, SuJean Choi, John LaDisa



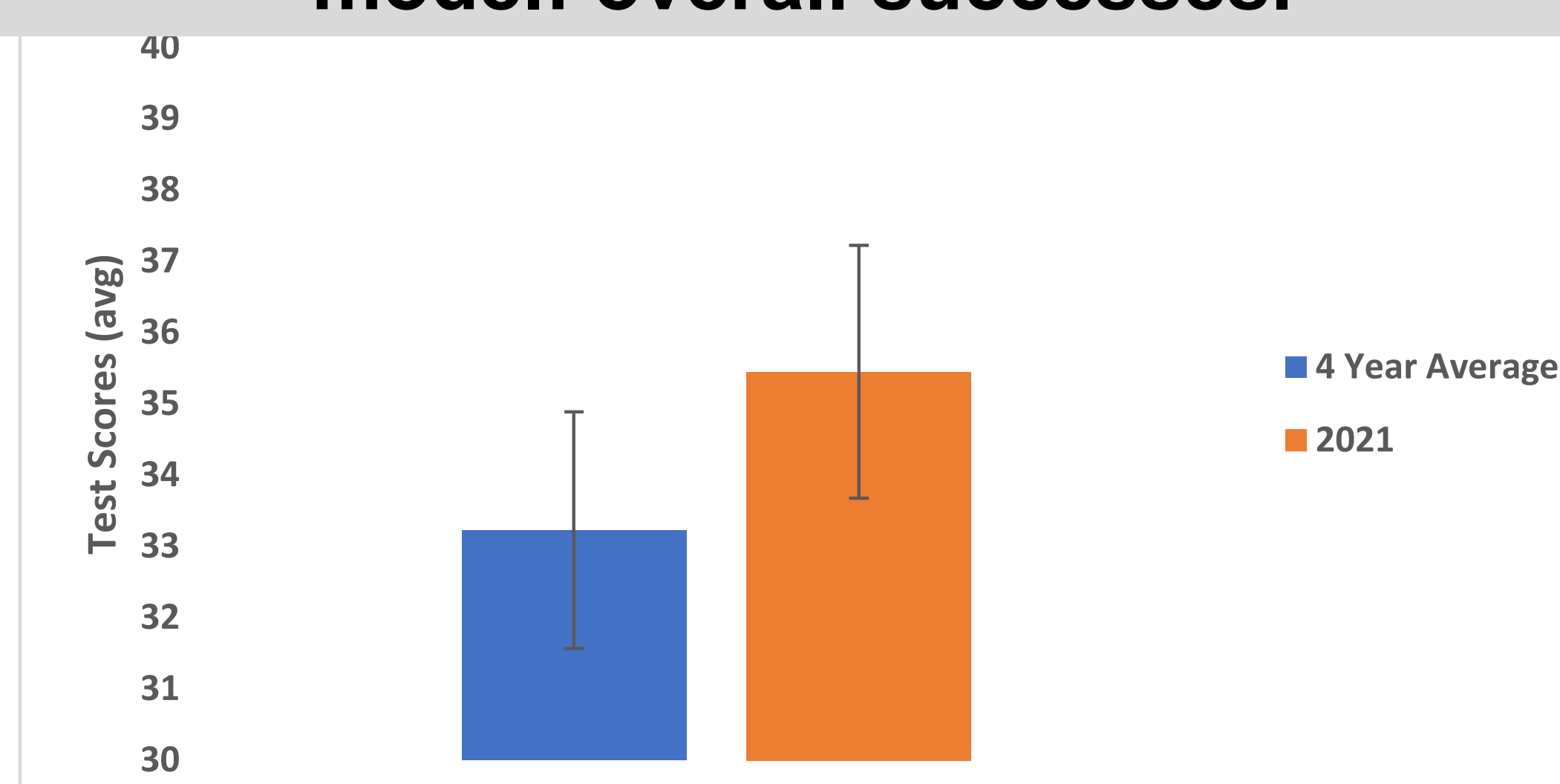
"...to return to this program as part of your efforts to study neuroanatomy?"

Impressions

"Do you find the quiz feature useful in solidifying your understanding of neuroanatomy and associated functions?"

Exam Results

Scores before and after using the brain model: overall successes.



Average exam scores from the past four years compared to this year's Spring 2021 exam average.

Conclusions

- Brain model allowed students to develop a deeper understanding of brain anatomy and function.
- Students developed a greater interest in the subject due to the visual appeal and active learning feature.
- Students plan to use the tool as a resource and shows promise for improving exam scores and overall comprehension.

Pain Assessments and Functional Characteristics of COVID-19 Survivors

Brianna Weibye, Lauren Opielinski, Toni Uhrich, Sandra Hunter, Marie Hoeger Bement

Introduction

- Coronavirus disease 2019 (COVID-19) is a severe acute respiratory syndrome that is transmitted by infected respiratory droplets between persons.
- Symptoms of COVID-19 include fever, cough, shortness of breath, fatigue, muscle and/or body aches, headache, and loss of taste or smell (www.cdc.gov)
- Long term effects of COVID-19 are unknown, especially regarding the development of chronic pain (Kemp et al., 2020).

Aim: To increase our understanding of how survivors of COVID-19 perceive pain, classify the type(s) of pain, and the impact of pain on function.

Methods

Eight COVID-19 survivors (5 male, 3 female, 38 years avg. age) completed three pain protocols: pain questionnaires, movement-evoked pain, and conditioned pain modulation.

1. Self-Report Pain Questionnaires

- Short-Form McGill Pain Questionnaire: multidimensional chronic pain assessment (Melzack, 1987)
- PROMIS Intensity Scale: 1) current pain intensity and 2) average and worst pain intensity during COVID-19; 1= no pain to 5= very severe pain.

2. Movement Evoked Pain

Participants were asked to rate their pain intensity (0 = no pain to 10 = worst pain) during the following activities:

- Maximal Isokinetic Leg Strength and Fatigue
- Spirometry (i.e., breathing function test)
- Aerobic Capacity

Methods (cont.)

3. Conditioned Pain Modulation

The concept that “pain inhibits pain” and reflects the integrity of descending pain inhibition (Alsouhibani et al., 2019).

- Pressure pain thresholds (PPTs) are measured via a computerized pressure algometer at the quadriceps and upper trapezius muscles before and during the participant’s foot submersion in a cold-water bath (Figure 1)
- An increase in PPTs during the cold-water bath indicates a normal response (i.e., efficient conditioned pain modulation)

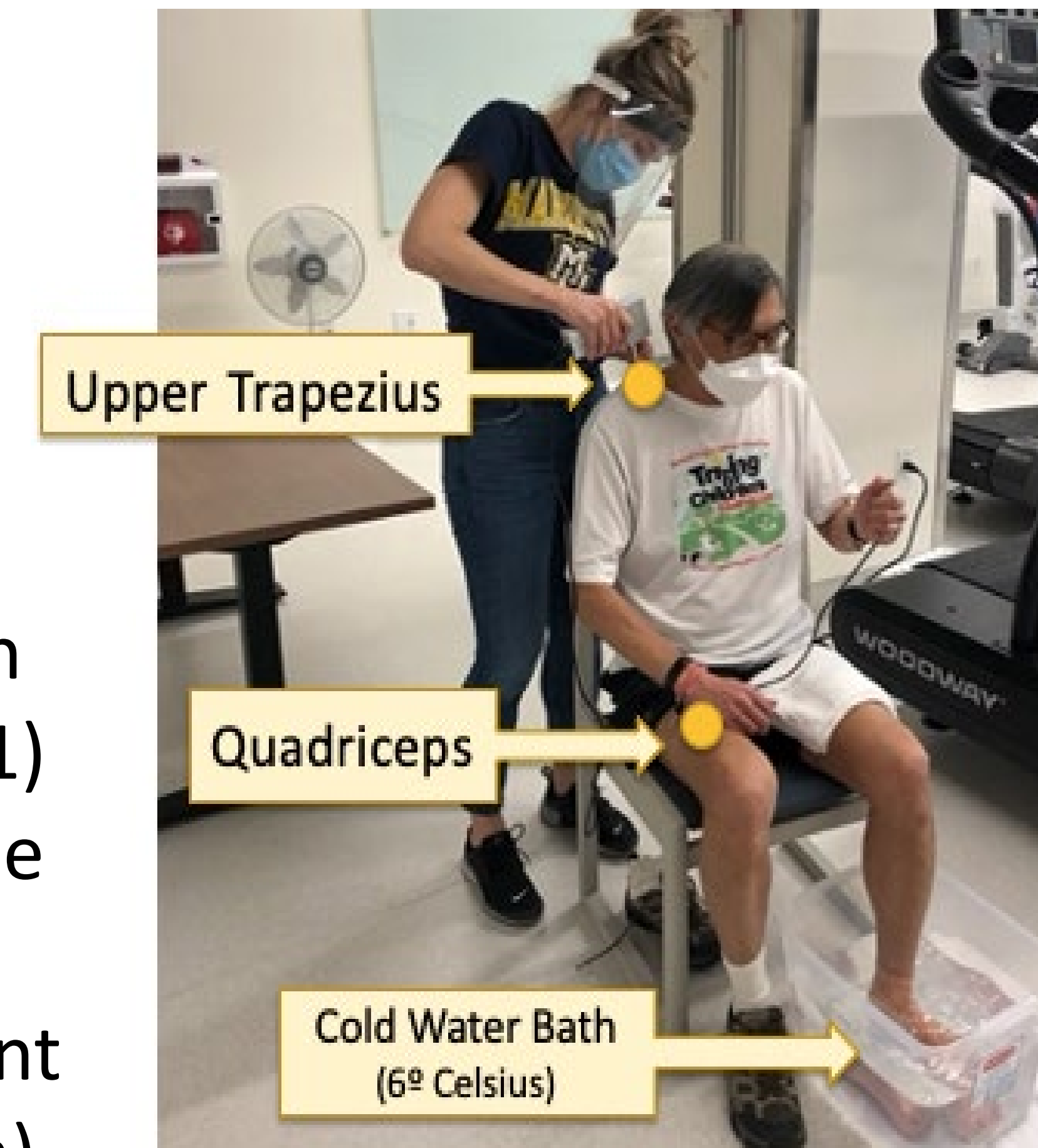


Figure 1

Conditioned Pain Modulation

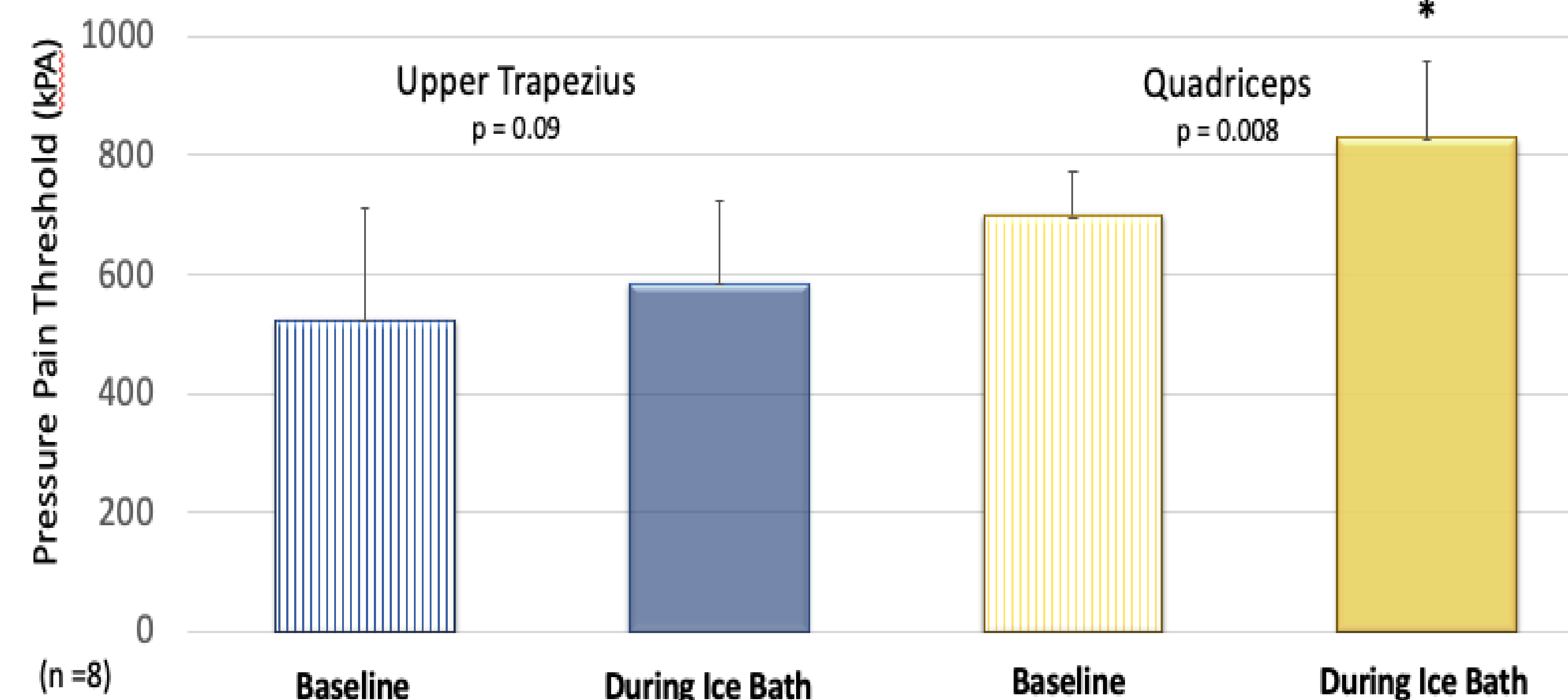


Figure 2

Preliminary Results

- Participants reported minimal chronic pain with the McGill Pain Questionnaire.
- Current pain intensity as well as worst and average pain during COVID-19 were all in the mild-to-moderate range.
- Movement-evoked pain during physical activity was reported as mild following leg strength and fatiguing exercise and spirometry, whereas with submaximal aerobic exercise the intensity was mild-to moderate.
- Conditioned pain modulation was normal at quadriceps muscle and inefficient at the upper trapezius muscle (Figure 2).

Clinical Implications

- COVID-19 survivors report minimal chronic pain; although the inefficient conditioned pain modulation in the upper extremity suggests that these individuals are at risk of developing chronic pain.
- From a functional perspective, pain intensity should be addressed during movement due to reports ranging from mild-to-moderate pain.

Acknowledgments

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