


**APEX for Adults with  
Autism and an  
Intellectual Disability**

**Kelly Carr, Nadia Azar, Chad Sutherland, Sean Horton**  
APEX Research Group, Department of Kinesiology



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**The APEX Team**

**Kelly Carr, MHK**  
PhD Student  
APEX Program Coordinator

**Nadia R. Azar, PhD**  
Associate Professor

**Chad Sutherland, MSc**  
Applied Learning Coordinator

**Sean Horton, PhD**  
Associate Professor

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**The APEX History**

**2010**



**Community Living Essex County (CLEC) contacts Chad Sutherland to explore a partnership called "A Balanced Approach"**

- Ontario Ministry of Health Promotion, 2010-2011 Healthy Communities Fund

**Early 2011**

**"A Balanced Approach" program runs at the University of Windsor**

- 20 adult participants (13 males, 7 females) from CLEC
- All were diagnosed with an intellectual disability
- Cerebral Palsy, Down Syndrome, Autism and Asperger's

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### The APEX History



**Late 2011**

**Sean Horton and Nadia Azar team up with Chad**

- Master's student **Phillip McKeen**
- Master's student **Kelly Carr**
- Team secures funding to run a second program from the **Southern Network of Specialized Care** and the **University of Windsor**



**The Adapted Physical  
Exercise (APEX)  
Research Group is born!**


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### The APEX History

**Late 2012**

**Phase I of APEX program launches**

- 14 adult participants (12 males, 2 females)
- All were diagnosed with ASD and an ID
- Addition of motor skills training tasks


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### The APEX History

**2013**

**Phase I of APEX program ends**

- Potential of this program and partnership is realized
  - Opportunities for students, participants, and research
- Secured additional funding to run a second program
  - Department of Kinesiology Research Seed Grant
  - University of Windsor Strategic Priority Fund
  - Developmental Disabilities Division, Schulich School of Medicine and Dentistry (London, ON)


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## The APEX History

### Early 2014

**Phase II of APEX program begins**

- Equal division between cardiovascular and resistance training and sports/games components
- **New research questions**
  - Exercise intensity
  - Repetitive behaviours
  - Gait
- **Revision of existing protocols**
  - Static balance
  - Questionnaires
  - Reaction time

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## The APEX History

### Present Day

- **Analysis and presentation of research findings**
- **Identification of funding opportunities**
  - Grants
  - Fund-raising efforts (donations, sponsorships, etc.)
- **Planning Phase III**
  - Late 2015

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## What We Know...

- **Autism Spectrum Disorder (ASD):**
  - Impairment in social communication and interaction<sup>1</sup>
  - Repetitive, stereotyped behaviours, interests, and activities<sup>1</sup>
  - 31% co-occurrence with an intellectual disability (ID)<sup>2</sup>
- **Increase in ASD diagnoses<sup>3</sup>**
  - Most recent data: 1 in 68 children<sup>2</sup>
- **Most ASD-related research focuses on children<sup>4</sup>**
- **This is worrisome because:**
  - Children with ASD will inevitably become adults<sup>5,6</sup>
  - ASD creates lifelong impairments<sup>7</sup>
  - Individuals with ASD receive the majority of their care in adulthood<sup>8</sup>

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<sup>1</sup>American Psychiatric Association, 2013; <sup>2</sup>Centre for Disease Control and Prevention, 2014; <sup>3</sup>Weinstein et al., 2011; <sup>4</sup>Nelson & Shoenberger, 2009; <sup>5</sup>Mapple & Charlton, 2012; <sup>6</sup>Totsika et al., 2010; <sup>7</sup>Murphy et al., 2005; <sup>8</sup>Ganz, 2007

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**What We Know...**

- **Current documented trajectory of adult outcomes for individuals with ASD is poor<sup>9</sup>**
  - Deficits in behavioral, social, and communicatory domains<sup>10,11</sup>
  - Often compounded by psychiatric conditions<sup>12</sup>
- **Poorest trajectory of adult outcomes is for individuals with ASD and a co-occurrence of an ID<sup>10,11,13</sup>**

University of Windsor <sup>9</sup>Howlin et al., 2012; <sup>10</sup>Billschroff et al., 2007; <sup>11</sup>Howlin et al., 2004; <sup>12</sup>Hofvander et al., 2009; <sup>13</sup>Cederlund et al., 2008

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**What We Know...**

**Health patterns of individuals with ASD**

**Compared to typically developing peers:**

- ↓ physical activity levels for children<sup>14</sup> and adolescents<sup>15</sup>
- ↓ measures of fitness<sup>16</sup>
- ↑ obesity<sup>17</sup>
- ↑ obesity-related secondary health conditions<sup>17</sup>

**Increase in age is associated with an increase in sedentary behaviours among individuals with ASD<sup>18</sup>**

University of Windsor <sup>14</sup>Pan et al., 2011a; <sup>15</sup>Pan et al., 2011b; <sup>16</sup>Pan, 2014; <sup>17</sup>Rimmer et al., 2010; <sup>18</sup>MacDonald et al., 2011

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**What We Know...**

**Benefits of physical exercise among individuals with ASD**

- ↓ stereotyped behaviours<sup>19</sup>
- ↓ aggressive behaviours<sup>19</sup>
- ↑ measures of health<sup>20</sup>
- ↑ motor skills<sup>20,21</sup>
- ↑ on-task behaviour<sup>19</sup>
- ↑ social skills<sup>21</sup>

University of Windsor <sup>19</sup>Lang et al., 2010; <sup>20</sup>Sorensen & Zarrett, 2014; <sup>21</sup>Sowa & Meulenbroek, 2012

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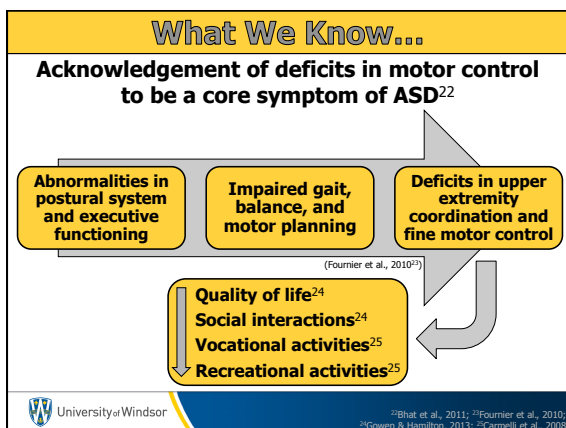
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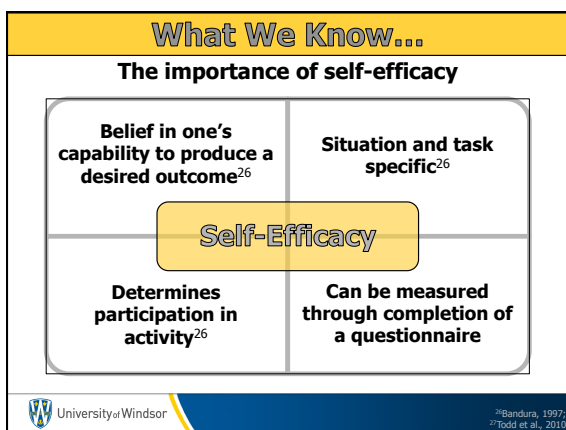
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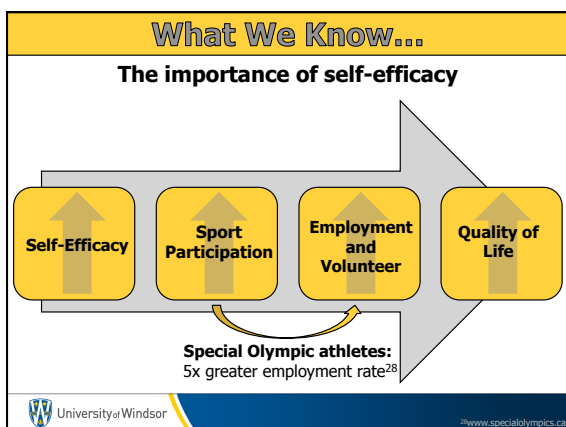
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### Purpose of the APEX Program

**To provide an adapted physical exercise (APEX) program for adults with ASD and an intellectual disability**

APEX 2012	APEX 2014
(1) Motor skills (2) Self-efficacy (3) Perceptions of personal support workers	(1) Health and fitness (2) Motor skills (3) Activity preferences (4) Impact on personal trainers (5) Impact on other gym members

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### APEX 2012

#### Participants

- 14 adults diagnosed with ASD and an intellectual disability**
  - Mean age = 32.71 years (range = 20-61 years); 2 females
  - ASD and IQ determined through previous clinical diagnosis

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### Program Design

**Setting**

- University of Windsor

**Program Duration**

- 12 weeks

**Session Frequency**

- 2 times per week

**Session Length**

- 1 hour 30 minutes

**Participant/Trainer Ratio**

- 1+ trainers : 2-3 participants

Pre-Testing

APEX Program

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Weeks 1 - 6

Mid-Testing

APEX Program

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Weeks 7 - 12

Post-Testing

No Program

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Weeks 13 - 16

Retention Testing

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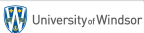

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Program Design	
Warm-Up	Sports and Games
 	

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Program Design		
Circuit Training		
Free Weights	Resistance Bands	Stationary Bike
 		

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Program Design	
Circuit Training	
 	

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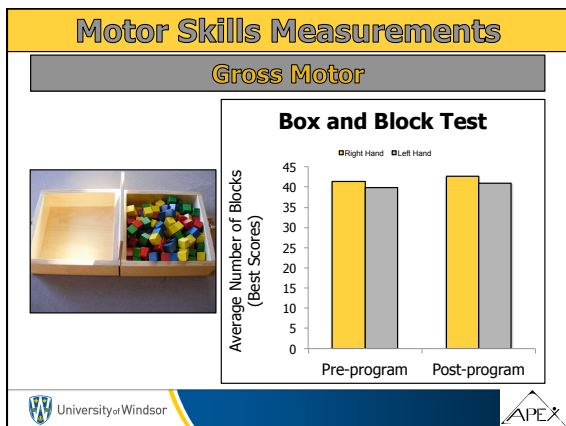
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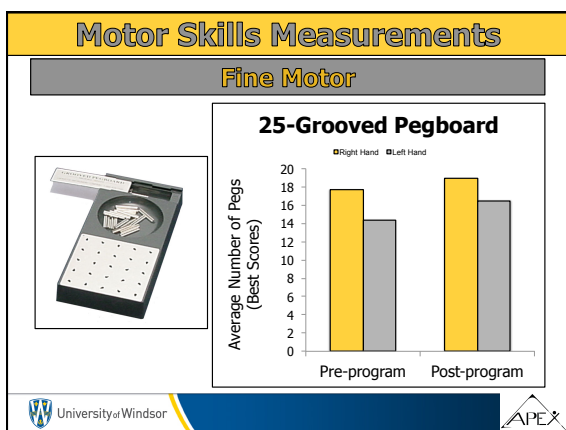
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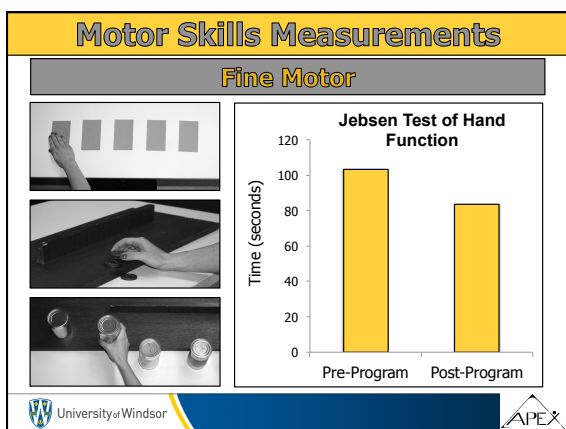
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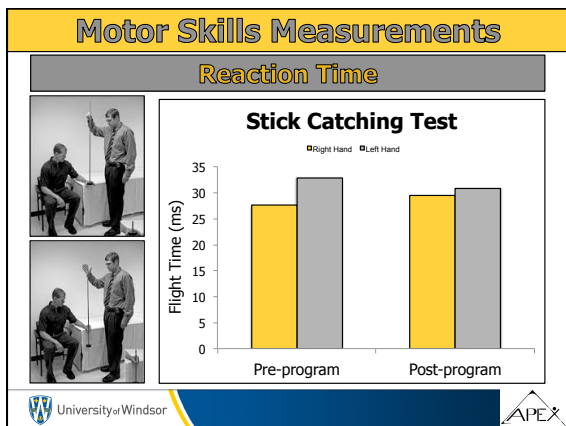
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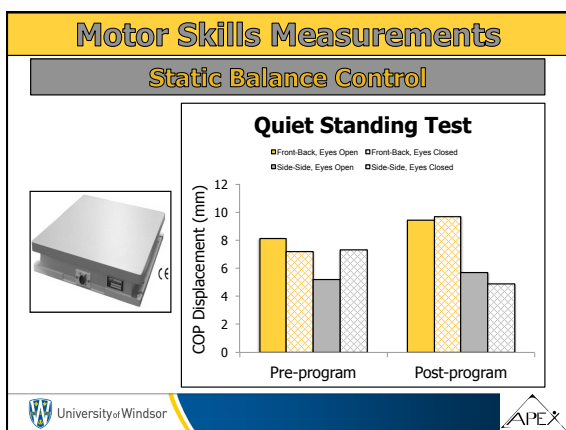
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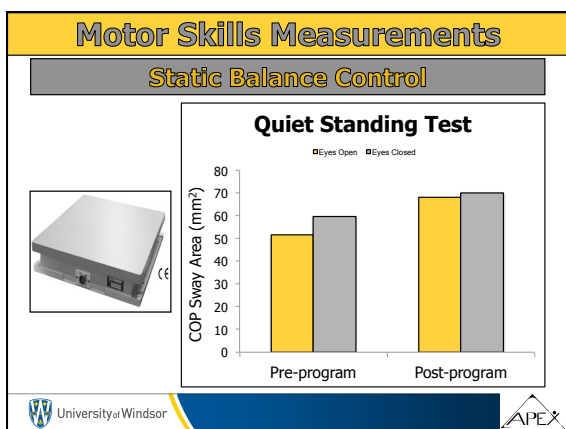
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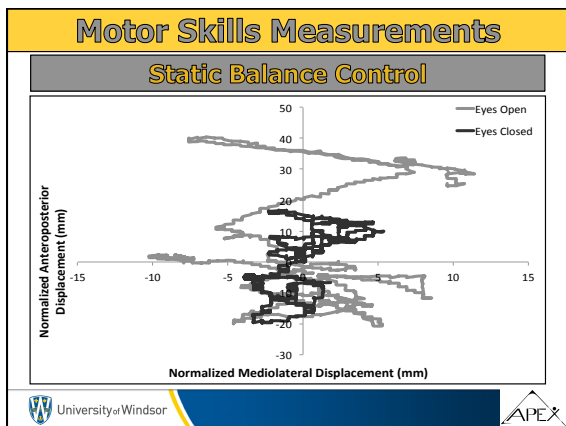
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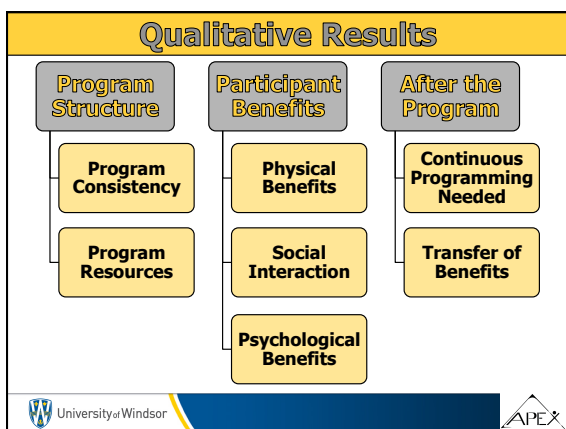
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## APEX 2014

### Participants

- **14 adults with ASD and an intellectual disability**
  - Mean age = 34.36 years (range = 18-62 years); 2 females
  - ASD and IQ determined through clinical diagnosis


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## APEX Program Design

**Setting**

- Forge Fitness Centre

**Program Duration**

- 12 weeks

**Session Frequency**

- 2 times per week

**Session Length**


- 1 hour 30 minutes

**Participant/Trainer Ratio**

- One to one



**Measurements**

- Familiarization
- Pre-, mid-, post-program



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graph TD
    A[Exercise Session] --> B[Warm Up  
5 minutes]
    B --> C[Cardiovascular Training  
20 minutes]
    C --> D[Strength Training  
30 minutes]
    D --> E[Stretching/Cool Down  
5 minutes]
    E --> F[Sports and Games  
30 minutes]
            
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## Cardiovascular Training


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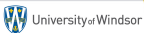

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**Strength Training**

**Exercise Prescription**  
2 sets of 8 repetitions with individualized progressions

**Sessions 1 – 15**  
Leg press  
Chest press  
Machine rows  
Bicep curls  
Shoulder press

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**Strength Training**

**Exercise Prescription**  
2 sets of 8 repetitions with individualized progressions

**Sessions 16 – 24**  
Lat. Pull Down  
Leg Curl  
Triceps Extension

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**Strength Training**

**Exercise Prescription**  
2 sets of 8 repetitions with individualized progressions

**Sessions 16 – 24**  
Free Weights

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## Sports and Games

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## Exercise Intensity

Average Intensity Level

**BodyMedia FIT Armband**

Participant	Average Energy Expenditure (MET)
1	3.0
2	4.5
3	4.5
4	3.8
5	4.8
6	2.2
7	4.2
8	4.2
9	4.2
10	3.8
11	4.2
12	1.8

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## Results

Strength Training Volumes

**Average Training Volumes Across Training Sessions**

Training Session	Average Training Volume
1	2000
3	3500
5	4000
7	4500
9	5000
11	5500
13	6000
15	6500
17	5500
19	7000
21	7500
23	8000

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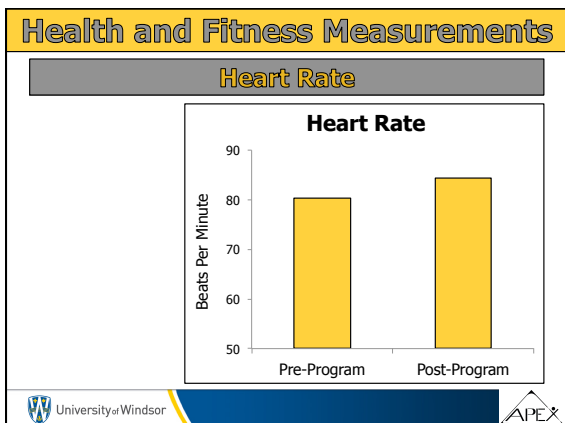
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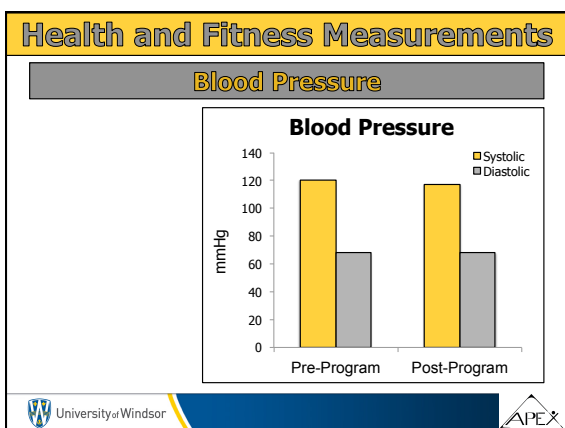
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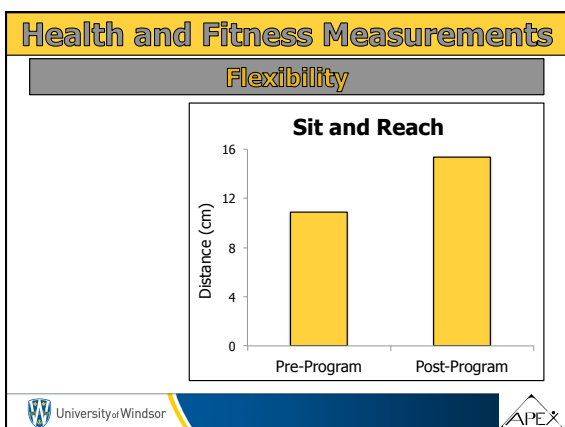
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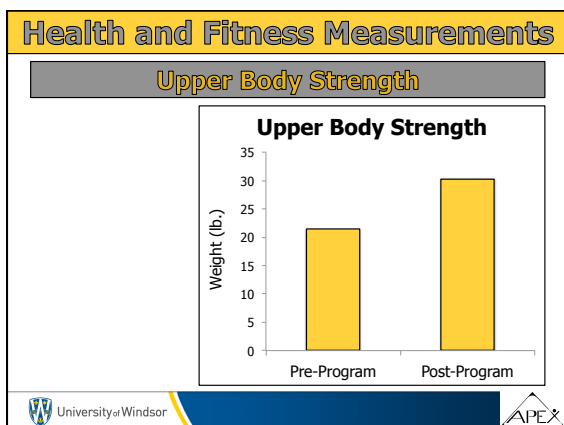
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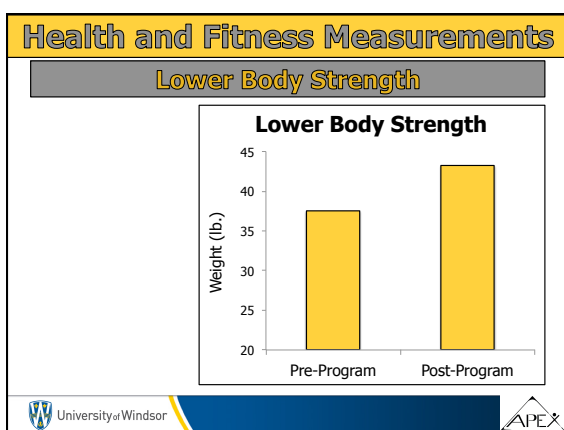
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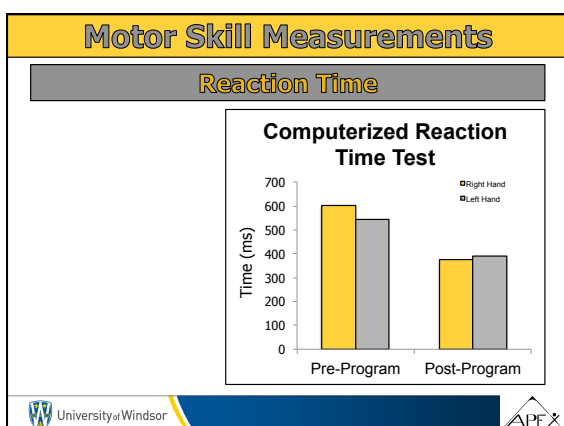
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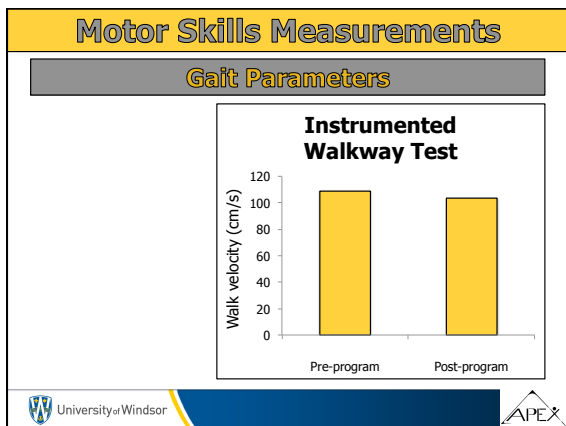
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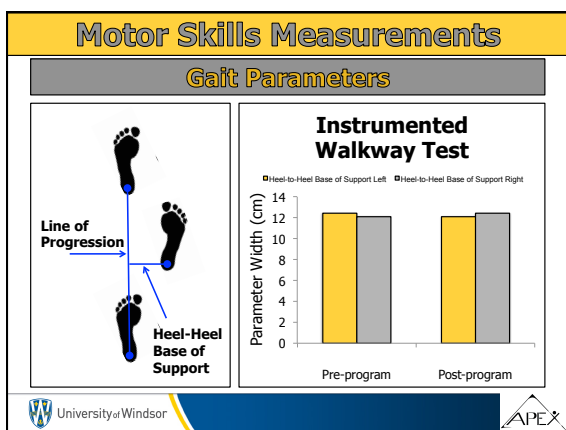
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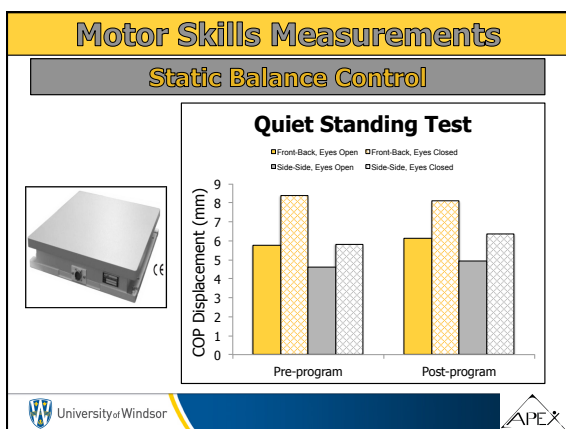
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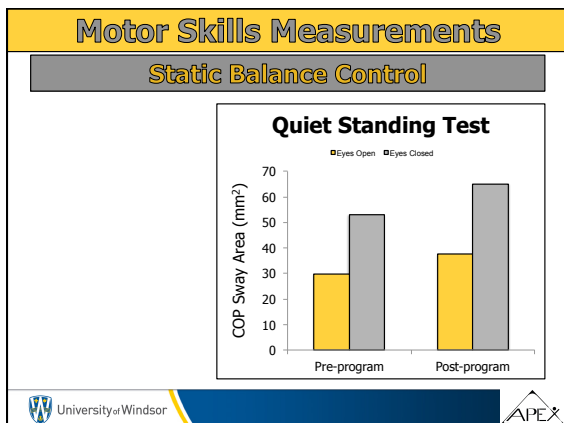
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### Additional Measurements

**Activity Preference: PECS Questionnaire**

1. What do you like?

**Cardiovascular Endurance: PWC<sub>170</sub>**

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### Impact on Personal Trainers

**An experience of personal growth and self-reflection**

"It might have humbled me a little bit more... Just seeing like, spending a regular amount of time with a person with a disability... It makes me more grateful."

"You see a totally different world in a very different perspective and it kind of makes you feel very fortunate for what you have."

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### Impact on Personal Trainers

**Positively changed perspective of disabilities**

"My perception might have changed just because... I feel like at face value a lot of times people just shrug off people with disabilities, or don't really have that understanding or give them a chance... But I feel like spending all this time learning to communicate in the participants' way just kind of changed my... Almost more like empathic towards people with disabilities... Even though he isn't communicating the same way that we might communicate, he's still a person, he's still there you know?"

"I didn't think some would do as well as they actually did in the program... I think I underestimated them."

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### Impact on 'Bystanders'

**Bystander workouts were unaffected**

"It never disrupted my workouts or anything like that."

"[They're] just like anybody else in the gym."

"It was like any other day at the gym basically."

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### Impact on 'Bystanders'

**Support the inclusion of individuals with disabilities**

"I would rather work out in a place like that [the inclusion of individuals with special needs] than an exclusionary gym."

"If I had a gym that did not allow that [the inclusion of individuals with special needs] I probably wouldn't join that gym."

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## The Bigger Picture


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## Future Directions

- **Continue to improve rigor of research**
- **Seek out long-term funding sources**
- **Continue to increase awareness of the APEX Research Group**
- **Focus on building partnerships**
- **Plan for APEX Program 2015**


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## Thank You

Southern Network of Specialized Care  
University of Windsor  
Schulich School of Medicine and Dentistry  
Developmental Disabilities Division  
Community Living Essex County  
Especially Nancy Wallace-Gero, Lori  
Huson, and Lynne Shepley  
St. Denis Centre & Forge Fitness Centre  
management and staff

**A special thank you to the participants, their personal support workers, and families for their hard work and continued support.**

**The dedicated and enthusiastic student volunteers**


University of Windsor


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