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Factors Influencing Continued Bicycle Riding in Youth With Disabilities

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Introduction

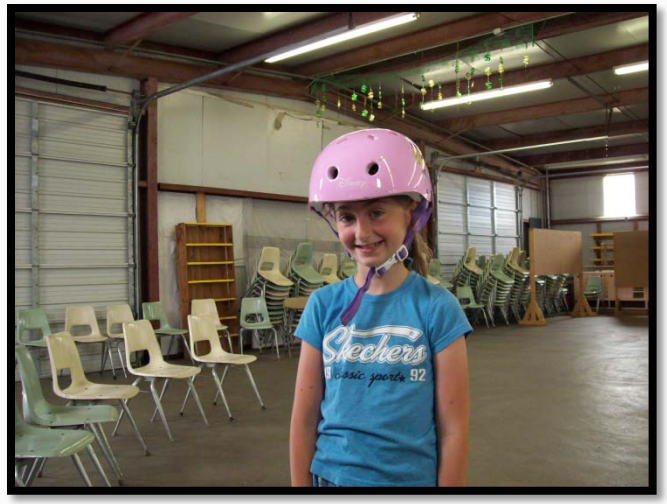
Kinesiology

- Physical activity to combat obesity (Goran et al. 1999)
- Physical inactivity as a factor contributing to obesity in intellectual disability (Reilly et al. 1993; USDHHS 1996, 2000, 2002; Healthy People 2010, 2000)
- Youth with DS and ASD display a very stable pattern of physical inactivity (Ulrich et al. 2011)
- Individuals with disabilities are less likely to participate in physical activity than the general population (Draheim et al. 2002)

Physical Activity (PA)

Kinesiology

- Lag behind their age-matched peers in motor milestones (Rubin et al. 1998)
- Small repertoire of activities (Ulrich et al. 2011)
  - For example, less than 10% of youth with DS can ride a two-wheeled bike with about 20% in ASD
- Recent recommendations to improve health of special populations has been considered a priority (Cooper et al. 1999; USDHHS 2002)



Lack of intervention research to increase physical activity (Ulrich et al. 2011)

Down syndrome (DS)

Kinesiology

- **Physical activity considerations of children with DS**
  - Hypotonia (Shields et al. 2010)
  - Ligamentous laxity (Tredwell et al. 1990)
  - Perceptual difficulties (Virgi-Babul et al. 2006)
  - Poor balance (Ulrich et al. 2011)
  - Extremely social
  - Take fewer physical risks (Lloyd et al. 2007)
  - Sedentary behavior (Whitt-Glover et al. 2006; Linn et al. 2000)

Autism Spectrum Disorder (ASD)

Kinesiology

- **Physical activity considerations of children with ASD**
  - Motor skill development behind peers (MacDonald et al. 2011; Staples & Reid 2010)
  - Motor coordination deficits (Fournier et al. 2010)
  - Physical activity decreases with age (Pan & Frey 2006)
  - Little participation in socially demanding physical activity (Pan & Frey 2006)
  - Need individualized instruction (Staples et al. 2006)

Why Bicycle Riding?

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- Societal norm
- Age appropriate
- Lifelong benefits
  - Social benefits (Menear, 2007)
  - Health enhancing (Ulrich et al. 2011)
  - Independent travel
- Psychological health (Gotham et al., in press)

Specific Aims

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- **Specific Aim 1:** *Examined the bicycle riding status of youth with DS and ASD who participated in a one week bicycle training intervention to determine those who retained this skill overtime*

- **Specific Aim 2:** *To understand the factors predicting continued bicycle riding three months following a bicycle training intervention*
  - Logistic regression

Method - Participants

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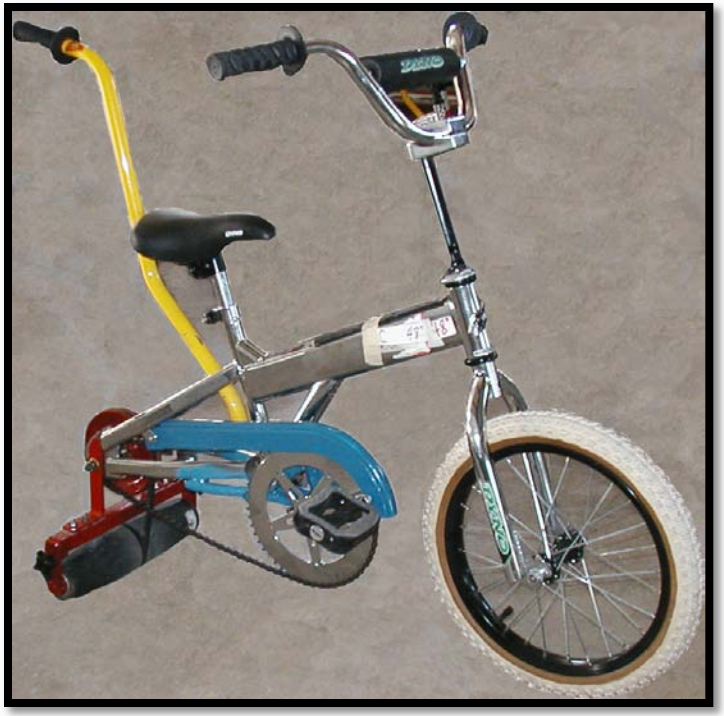
- **Participants**
  - N = 40 ASD, N = 16 DS
    - Aged 9-18 years
  - Data collected
    - Pre and Post



Methods - Measures

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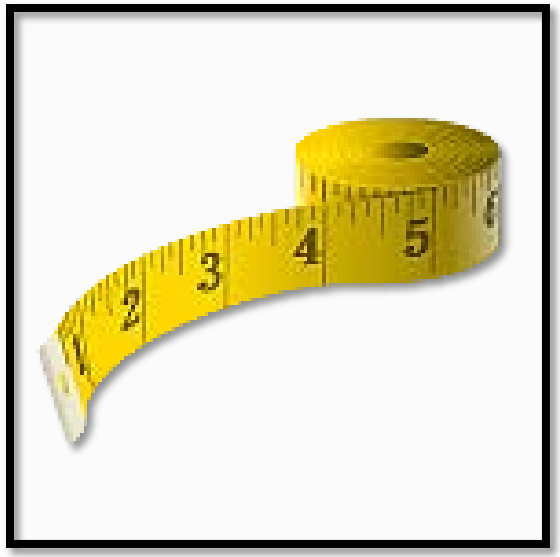
- **Success criteria**
  - 100 feet independent riding
  - Self-braking & starting
- **Pre/post-camp measures**
  - Height, weight, & BMI
  - One-leg standing balance
  - Leg strength (knee flexion & extension)
  - Skinfold (mid-tricep & mid-calf)
  - Waist circumference
  - Physical activity



Descriptive Data

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Sample Characteristics	*ASD Mean ± SD*	*DS Mean ± SD*
Sample Size	n = 40	n = 16
Age (years)	12.31 ± 2.36	12.58 ± 2.41
Gender (% females)	30%	56.3%
Height (cm)	148.85 ± 36.82	136.06 ± 24.77
Weight (kg)	50.08 ± 20.10	42.37 ± 14.93
BMI (kg/m^2)	21.39 ± 5.40	21.99 ± 4.62
BMI Percentile	66.46 ± 29.19	78.14 ± 16.99
SRS	2.61 ± 0.59	2.55 ± 0.64
Light PA (min)	213.57 ± 58.65	215.35 ± 59.35
Leg Extension (kg)	16.47 ± 5.79	16.46 ± 5.54

Results – Riding Status 3 Months Following Intervention

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3-Month Follow Up	Maintained Skill	Lost Skill	Percent (%) Skill Maintained
ASD (n=40)	30	10	75%
DS (n = 16)	11	5	69%
TOTAL	41	15	73%

Results – Overall Model Prediction

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	Predicted Rider	Predicted Non-Rider	Percent Correct
Observed Rider	**24**	4	85.7%
Observed Non-Rider	4	**11**	73.3%
Overall Percentage			**81.4%**

Hosmer & Lemeshow = 0.496
Sensitivity = 85.7%
Specificity = 73.3%

Results – Logistic Regression

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Factors Predicting Bicycle Skills	OR	95% CI	*P*	% Change in Odds
Light PA	1.014	.999 – 1.029	.071	1.4
BMI %ile	.946	.902 - .993	.023*	-5.4
SRS	.183	.036 - .944	.042*	-81.7
Leg Extension	1.283	1.008 – 1.634	.043*	28.3

*<0.05, OR=Odds Ratio, CI=Confidence Interval, P=Significance Level, PA=Physical Activity, BMI=Body Mass Index, SRS=Social responsiveness scale

Results – Group Differences

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	ASD (n = 40)				DS (n = 16)			
3-Month Follow Up	**Maintained Skill (n = 30)**	**Lost Skill (n = 10)**	**P**	**ES**	**Maintained Skills (n= 11)**	**Lost Skill (n= 5)**	**P**	**ES**
BMI %ile	65.22 ± 31.61	70.17 ± 21.30	.017*	0.18	73.29 ± 18.22	88.82 ± 6.70	.172	1.13
SRS	2.54 ± 0.64	2.80 ± 0.42	.020*	0.48	1.3 ± 0.48	1.80 ± 0.45	.420	0.63
Light PA (min)	221.39 ± 59.38	193.27 ± 54.31	.529	0.49	223.68 ± 67.08	193.57 ± 38.81	.099	1.12
Leg Extension (kg)	17.15 ± 5.84	14.78 ± 5.57	.988	0.42	16.23 ± 4.05	13.61 ± 3.29	.524	1.23

*<0.05, ASD=Autism Spectrum Disorder, DS=Down syndrome, P=Significance Level, ES=Effect Size, BMI=Body Mass Index, SRS=Social responsiveness scale, PA=Physical Activity

Discussion

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Discussion

- Variables in model can be modified
- Indoor movement opportunities

Limitations

- Missing data - sample size

Future Directions

- Test model by disability group

Conclusions

- Determining which factors predict continued riding status are important as we can address these variables before the intervention begins in order to increase the odds of continued riding status

Acknowledgements

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Contributors

- Members of the Center for Physical Activity & Health in Pediatric Disabilities

Thank You

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