**Slide 1**

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# Visuomotor Profiles in Hispanic Children with Autism

## Preliminary findings and impact on disparities

Haylie L. Miller, Ph.D.

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**Slide 2**

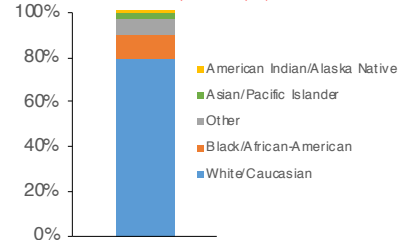## Disparities in the Autism Community

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United States: 1 in 54 children
*(CDC, 2018)*

### Racial/Ethnic Groups

Hispanics: 1 in 99 *(CDC, 2018)*

### Women & Girls

1:151 females vs. 1:37 males
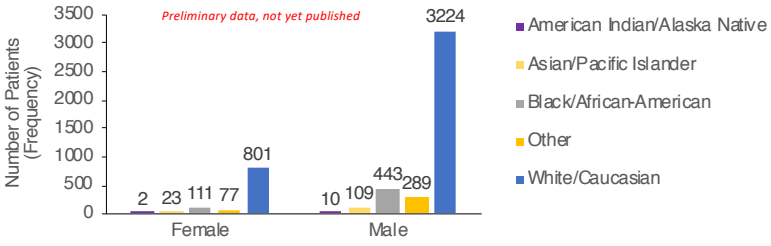*(Constantino & Charman, 2012; Loomes et al., 2017)*

*Preliminary data, not yet published*

- American Indian/Alaska Native
- Asian/Pacific Islander
- Other
- Black/African-American
- White/Caucasian

**Local children's hospital EMR review:**
All autism charts from 2007-2018, age 0-21

*Kata, Bowman, Mauk, & Miller (under review)*

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**Slide 3**

## Disparities in the Autism Community

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*Preliminary data, not yet published*

Number of Patients (Frequency)

Female: 2, 23, 111, 77, 801
Male: 10, 109, 443, 289, 3224

- American Indian/Alaska Native
- Asian/Pacific Islander
- Black/African-American
- Other
- White/Caucasian
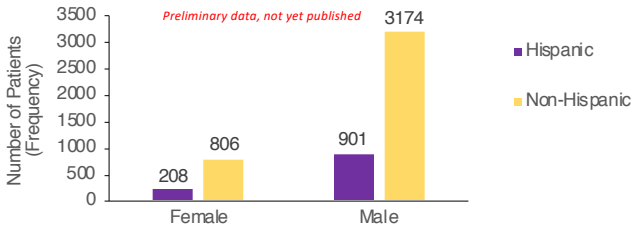
1:4 ratio of females to males
1:4 ratio of non-white children to white children

*Kata, Bowman, Mauk, & Miller (under review)*

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**Slide 4**

## Disparities in the Autism Community

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*Preliminary data, not yet published*

Number of Patients (Frequency)

Female: 208, 806
Male: 901, 3174

- Hispanic
- Non-Hispanic

1:4 ratio of Hispanic to white non-Hispanic females
1:3.5 ratio of Hispanic to white non-Hispanic males
**1:15** ratio of Hispanic females to white non-Hispanic males

*Kata, Bowman, Mauk, & Miller (under review)*

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## Slide 5

### Disparities in the Autism Community
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**Age of Diagnosis by Gender & Ethnicity**

7.6 yrs in girls, 7.1 yrs in boys when symptoms are mild, despite equivalency when symptoms are severe *(Chen, Marvin, & Lipkin, 2015)*

8.8 yrs among Hispanic children, 6.3 yrs among white non-Hispanic children *(Mandell et al., 2002)*

**Delayed diagnosis → later intervention → worse outcomes**

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## Slide 6

### Disparities in the Autism Community
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*Preliminary data, not yet published*

**Centers for Disease Control**
**SLAITS data**

**n = 840** (M = 686, F = 154)

For males (but not females), mean age of first concern was higher at poverty levels (PL) 3 and 4 for White Hispanics vs. White Non-Hispanics

$ PL 1: ≤ 100%
$$ PL 2: 101–200%
$$$ PL 3: 201–400%
$$$$ PL 4: > 400%

*Miller, Thomi, Patterson, & Nandy (under invited revision)*

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## Slide 7

### Disparities in the Autism Community
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*Preliminary data, not yet published*

**Centers for Disease Control**
**SLAITS data**

**n = 840** (M = 686, F = 154)

For males (but not females), mean age of first concern was also higher at poverty levels (PL) 3 and 4 for Other Hispanics vs. Other Non-Hispanics

$ PL 1: ≤ 100%
$$ PL 2: 101–200%
$$$ PL 3: 201–400%
$$$$ PL 4: > 400%

*Miller, Thomi, Patterson, & Nandy (under invited revision)*

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## Slide 8

### Disparities in the Autism Community
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*Preliminary data, not yet published*

**Centers for Disease Control**
**SLAITS data**

**n = 840** (M = 686, F = 154)

The opposite pattern existed for (c) Black Hispanic vs. Black-Non-Hispanics

$ PL 1: ≤ 100%
$$ PL 2: 101–200%
$$$ PL 3: 201–400%
$$$$ PL 4: > 400%

*Miller, Thomi, Patterson, & Nandy (under invited revision)*

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## Intersectionality & Diagnostic Tools

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**Minority girls** at greatest risk for missed or delayed diagnosis
*(Slopen et al., 2016; Alegria, Vallas, & Pumariega, 2011)*

Still primarily **screening based on social symptoms**
(e.g., poor eye contact)

This leaves room for biases rooted in social norms

Few objective, sensitive, specific tools available to characterize non-social symptoms

Gold-standard diagnostic tools tailored to male symptom profile

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## Toward More Objective Markers...

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**Atypical visual and motor control** common in ASD
*(Freitag et al., 2007; Lloyd et al., 2013; Miller et al., 2019; Morris et al., 2015; Mosconi et al., 2015; Mostofsky et al., 2007; Travers et al., 2013)*

**Visuomotor skills** emerge much earlier than core symptoms, but are not usually prioritized for intervention *(McLeod et al., 2017)*

Critical for ADLs, communication & functional independence
*(Nebel et al., 2016; Georgopoulos & Grillner, 1989)*

May be a promising biomarker, less susceptible to social bias?

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## Ongoing Project: Preliminary Data

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*Assess differences in knowledge of visuomotor symptoms of ASD and beliefs about barriers to assessment, diagnosis, and care between Hispanic and WNH caregivers and self-advocates.*
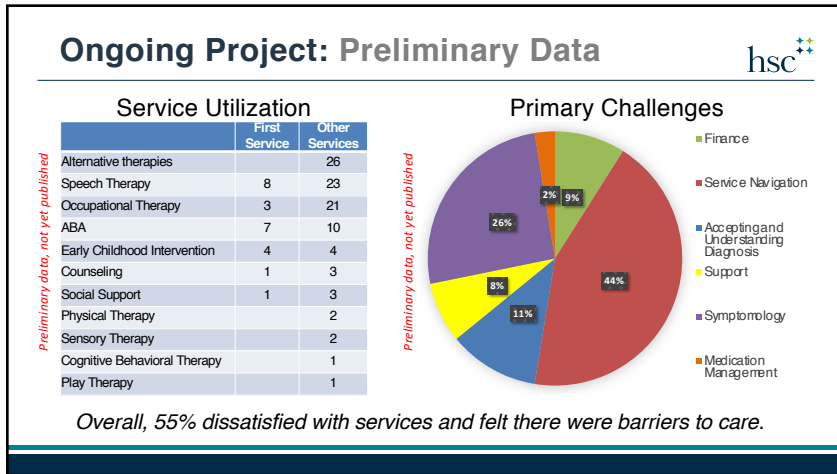
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## Ongoing Project: Preliminary Data

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*Preliminary data, not yet published*

| Variable | Level | Frequency | Percent | Frequency | Percent |
|---|---|---|---|---|---|
| | | **Hispanic** | | **Non-Hispanic** | |
| Race/Ethnicity | White | 7 | 17% | 23 | 56% |
| | Black/African-American | 1 | 2% | 5 | 12% |
| | American Indian/Alaskan Native | 0 | 0% | 0 | 0% |
| | Asian | 0 | 0% | 1 | 2% |
| | Native Hawaiian/Pacific Islander | 0 | 0% | 1 | 2% |
| | Other | 2 | 5% | 1 | 2% |
| | Total (*n* = 41) | 10 | 24% | 31 | 76% |
| Sex | Male | 9 | 22% | 24 | 59% |
| | Female | 1 | 2% | 7 | 17% |
| | Total (*n* = 41) | 10 | 24% | 31 | 76% |
| Household Income | Less than $10,000 | 0 | 0% | 1 | 2% |
| | $10,000 to $24,999 | 0 | 0% | 1 | 2% |
| | $25,000 to $49,999 | 3 | 7% | 6 | 15% |
| | $50,000 to $100,000 | 3 | 7% | 16 | 39% |
| | $100,000 or more | 4 | 10% | 7 | 17% |
| | Total (*n* = 41) | 10 | 24% | 31 | 76% |

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## Ongoing Project: Preliminary Data

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### Service Utilization

*Preliminary data, not yet published*

| | First Service | Other Services |
|---|---|---|
| Alternative therapies | | 26 |
| Speech Therapy | 8 | 23 |
| Occupational Therapy | 3 | 21 |
| ABA | 7 | 10 |
| Early Childhood Intervention | 4 | 4 |
| Counseling | 1 | 3 |
| Social Support | 1 | 3 |
| Physical Therapy | | 2 |
| Sensory Therapy | | 2 |
| Cognitive Behavioral Therapy | | 1 |
| Play Therapy | | 1 |

### Primary Challenges

*Preliminary data, not yet published*



Pie chart values: 2%, 9%, 44%, 11%, 8%, 26%

Legend:
- Finance
- Service Navigation
- Accepting and Understanding Diagnosis
- Support
- Symptomology
- Medication Management

*Overall, 55% dissatisfied with services and felt there were barriers to care.*

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## Ongoing Project: Preliminary Data

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12.5% of Hispanic caregivers (relative to 7.7% of white non-Hispanic caregivers) reported motor symptoms as their first concern about their child's development.

BUT, only 12.5% of Hispanic caregivers (relative to 26.9% of white non-Hispanic caregivers) were aware that sensorimotor problems were a symptom of ASD *prior* to diagnosis.
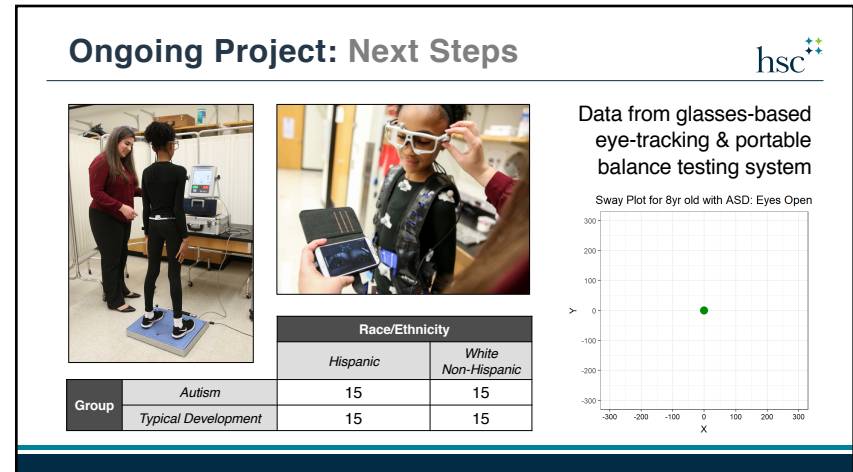
*Preliminary data, not yet published*

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## Ongoing Project: Next Steps

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*Quantify differences in the visuomotor integration skills of Hispanic vs. white non-Hispanic children with and without ASD.*

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## Ongoing Project: Next Steps

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Data from glasses-based eye-tracking & portable balance testing system

Sway Plot for 8yr old with ASD: Eyes Open

| Group | | Race/Ethnicity | |
|---|---|---|---|
| | | Hispanic | White Non-Hispanic |
| Group | Autism | 15 | 15 |
| | Typical Development | 15 | 15 |

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## Conclusions & Future Directions

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**Major disparities exist in who gets diagnosed, and when.**

Families struggle with **access to and coordination of care**, especially services related to motor problems.

**Untreated motor problems** can significantly impact learning opportunities, independence, and quality of life.

**Provider knowledge** may also play a role – need to assess and potentially educate primary-care physicians and educators.

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## Long-Term Goals

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**Paradigm shift** away from reliance on subjective provider judgments of social skills and toward efficient, objective, quantifiable measures of non-social symptoms.

Provider awareness that underrepresented communities need **heightened surveillance and support**

Reduction in health disparities as a result of **more objective tools and increased knowledge**

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## Autism does not discriminate.

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## Thank you to our supporters…

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NIH  NSF  AUTISM SPEAKS

**Most importantly, our thanks to the amazing families who give time & effort so generously to advance our understanding of ASD!**

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**Questions?**

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