The research reported here was supported by the Institute of Education Sciences, U.S. Department of Education through Grant R324C120006 awarded to UNC-Chapel Hill. The opinions expressed represent those of the authors and do not represent views of the Institute or the U.S. Department of Education.
Heterogeneity in Autism Symptoms

- Between-individual variation in symptom severity
- Within-individual variation in symptom severity with age

(Georgiades et al., 2013; Howlin et al., 2014; Kim et al., 2016; Louwerse et al., 2015; Seltzer et al., 2003, 2004; Shattuck et al., 2007; Wallace et al., 2017; Woodman et al., 2015)
# Phenotypic Profiles in Autism

<table>
<thead>
<tr>
<th>Adaptive behavior</th>
<th>Age at diagnosis</th>
<th>Cognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>Sensory Processing</td>
<td>What about Adolescence and Adulthood??</td>
</tr>
</tbody>
</table>

(Georgiades et al., 2013; Klopper et al., 2017; Kim et al., 2016; Matthews et al., 2015; Wiggins et al., 2017)
Additional Adolescence and Adulthood Phenotype Characteristics

- Self-determination
- Support Needs

(Biggs & Carter, 2016; Carter et al., 2013; Chou et al., 2017; Gotham et al., 2015; Shogren et al., 2017; Wehmeyer et al., 2010; Woodman et al., 2015, 2016)
Research Goal

To identify underlying subgroups of adolescents with autism across autism symptom severity, cognition and adaptive behavior, self-determination, and supports at home and in the classroom.
## Methods

<table>
<thead>
<tr>
<th>Variable</th>
<th>Assessment</th>
<th>Students</th>
<th>Parents</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonverbal IQ</td>
<td>Leiter-3 BRIEF IQ &lt;br&gt;(Roid, Miller, Pomplun, &amp; Koch, 2013)</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic Achievement</td>
<td>Woodcock Johnson III &lt;br&gt;Passage Comprehension/Academic Knowledge &lt;br&gt;(Woodcock, McGrew, &amp; Mather, 2007)</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adaptive Behavior</td>
<td>Vineland-II Teacher Form &lt;br&gt;(Sparrow et al., 2005)</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Autism symptoms</td>
<td>Social Responsiveness Scale &lt;br&gt;(Constantino &amp; Gruber, 2012)</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Communication Questionnaire &lt;br&gt;(Constantino, 2002)</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Determination</td>
<td>AIR Self-Determination Scale &lt;br&gt;(Wolman et al., 1994)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Support</td>
<td>Supports Intensity Scale &lt;br&gt;(Thomson et al., 2004)</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
Self-Determination Scale
Student and Teacher

Self-Determination

Capacity
- Ability
- Knowledge
- Perception

Opportunity
- Home
- School

(Wolman et al., 1994)
Self-Determination Scale

Parent

Self-determination

Ability
Things my Child Does

Opportunity
Home
School

(Wolman et al., 1994)
## Supports Intensity Scale

<table>
<thead>
<tr>
<th>Category</th>
<th>No extra support needed</th>
<th>Medium support needed</th>
<th>Total support needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Living</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Community &amp; Neighborhood</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>School Participation</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>School Learning</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Health and Safety</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Social</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Advocacy</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

(Thompson et al., 2004)
Methods

Latent Classes

- Nonverbal IQ
- Academic Achievement
- Adaptive Behavior
- Autism symptoms
- Self-determination
- Support

School

- Age
- Gender
- Race

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## Results

### Model Fit Statistics

<table>
<thead>
<tr>
<th>No. of Profiles</th>
<th>AIC</th>
<th>BIC</th>
<th>Entropy</th>
<th>LMR</th>
<th>BLRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>20,469.75</td>
<td>20,612.39</td>
<td>.898</td>
<td>1177.75***</td>
<td>1191.59***</td>
</tr>
<tr>
<td>3</td>
<td>20,090.31</td>
<td>20,294.08</td>
<td>.867</td>
<td>404.68**</td>
<td>409.44***</td>
</tr>
<tr>
<td>4</td>
<td>19,965.98</td>
<td>20,240.87</td>
<td>.840</td>
<td>152.53(ns)</td>
<td>154.32***</td>
</tr>
</tbody>
</table>

***$p < .001$  **$p < .05$
Results

Overall Latent Profiles

Class 1 N =178
Class 2 N =176
Class 3 N =81
Cognition and Adaptive Behavior

Nonverbal IQ
- Class 1: 103.13
- Class 2: 83.421
- Class 3: 46.884

Adaptive Behavior Composite
- Class 1: 90.97
- Class 2: 73.317
- Class 3: 54.077

Passage Comprehension and Academic Knowledge
- Class 1: 513.558
- Class 2: 491.76
- Class 3: 424.589
Autism Symptoms

- Social Communication Questionnaire (Parents):
  - Class 1: 17.794
  - Class 2: 20.796
  - Class 3: 26.47

- Social Responsiveness Scale (Teachers):
  - Class 1: 61.685
  - Class 2: 73.394
  - Class 3: 80.823
Self-Determination

<table>
<thead>
<tr>
<th>Class 1</th>
<th>Class 2</th>
<th>Class 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers</td>
<td>3.597</td>
<td>3.024</td>
</tr>
<tr>
<td>Parents</td>
<td>3.502</td>
<td>3.281</td>
</tr>
<tr>
<td>Students</td>
<td>3.807</td>
<td>3.688</td>
</tr>
</tbody>
</table>
Family and School Supports

Parents

Class 1: 2.754
Class 2: 3.55
Class 3: 4.085

Teachers

Class 1: 2.38
Class 2: 3.482
Class 3: 4.426
Conclusion

Class 1
- High cognition, adaptive behavior, & self-determination
- Low autism symptoms and support needs

Class 2
- Mid cognition, adaptive behavior, & self-determination
- Mid autism symptoms and support needs

Class 3
- Low cognition, adaptive behavior, & self-determination
- High autism symptoms and support needs

Bar chart indicating various factors across classes:
- Self Determination
- Cognition and Adaptive Behavior
- Family and School Supports
- Autism Symptoms

Graph showing data points for each class.
Discussion

• Heterogeneity present in large sample of diverse adolescents
• Classes may require different targeted interventions to promote skills
• Next Steps: Examining LPA as a moderator of CSESA treatment
Acknowledgements

The entire CSESA research team as well as all of the students, families, teachers, and schools who are a part of the project!

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