



# **Executive Function Ability in Children with SLI and Normal Comparison Group**

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# Introduction

- Executive functions play a fundamental role in cognitive, behavioral, socioemotional development, and overall neuropsychological functioning (Vriezen & Pigott, 2002).
- Executive functions (EF) is an “umbrella construct” that encompasses a number of skills essential to controlling, supervising, and self-regulating all cognitive activities, emotional reactions, and explicit behavior (Isquith, Crawford, Espy, & Gioia, 2005).



# Processes and Components of Executive Functions

- Processes
    - Attention
    - Inhibition
    - Working Memory
  - Components
    - Goal selection
    - Planning/Organization
    - Initiation/Persistence
    - Flexibility
    - Execution/Goal Management
    - Self-Regulation
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# Link Between Language and Executive Functions

- Development of executive functions requires connection between verbal abilities and the regulation of behavior (as cited in Singer & Bashir, 1999).

# Difficulties with Executive Functions in Children with Developmental Disorders

- Autism

- Deficits in self-regulation, metacognition, flexibility

- Attention Deficit Hyperactivity Disorder (ADHD)

- Difficulty with metacognitive tasks including planning, organization, set-shifting, and self-monitoring.

- Traumatic Brain Injury (TBI)

- Difficulty with self-awareness, working memory, inhibitory control, and impulsiveness.



# Past Research

- Case study by Singer and Bashir (1999)
- Noterdaeme, Amorosa, Mildemberger, Sitter, and Minow (2001)
  - Computerized assessment
  - No difference between LI & Control on tasks of
    - Alertness
    - Sustained Visual Attention
    - Task Persistence
    - Inhibiting irrelevant stimuli
  - Differences between LI & Control Participants on tasks requiring
    - Sustained auditory attention
    - Selective auditory attention
    - Ability to shift attention



# Research Questions

- Is there a difference in the executive functions of children with specific language impairment (SLI) and children with typical language development?
- Is there a relationship between executive functions and language impairment?



# Research Design

- Comparative Group Descriptive Research Design
- Assigned Independent Variable
  - SLI group
  - Control group
- Dependent Variable
  - Teacher & Parent BRIEF scores





# Participant Selection

- Fourteen 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> grade students
  - Seven students with specific language impairment as identified by school SLP, on SLP caseload for language
  - Seven student with typical language development
- Average IQ, Normal hearing & visual acuity, No comorbid conditions
- The current investigator administered the Comprehensive Assessment of Spoken Language to all participants to describe the participants language




# Comprehensive Assessment of Spoken Language (CASL)

- The Comprehensive Assessment of Spoken Language (CASL)
    - 5 core tests
      - Antonyms
      - Syntax Construction
      - Paragraph Comprehension
      - Nonliteral Language
      - Pragmatic Judgment
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# Participants

Participant	Gender	Age	Grade	CASL Composite Score
S1	M	9-7	4 <sup>th</sup>	81
S2	F	9-2	4 <sup>th</sup>	74
S3	M	10-8	5 <sup>th</sup>	89
S4	F	12-3	5 <sup>th</sup>	70
S5	M	9-0	3 <sup>rd</sup>	74
S6	M	11-4	5 <sup>th</sup>	81
S7	F	8-8	3 <sup>rd</sup>	78
C1	M	9-10	4 <sup>th</sup>	97
C2	F	10-1	4 <sup>th</sup>	112
C3	M	10-6	5 <sup>th</sup>	107
C4	F	10-8	5 <sup>th</sup>	102
C5	M	8-10	3 <sup>rd</sup>	74
C6	M	11-2	5 <sup>th</sup>	100
C7	F	8-7	3 <sup>rd</sup>	109



# The Behavior Rating Inventory of Executive Function (BRIEF)

- Teacher Form

- Parent Form



- Behavior Regulation Index

- Subscales- Inhibit, Shift, & Emotional Control

- Metacognition Index

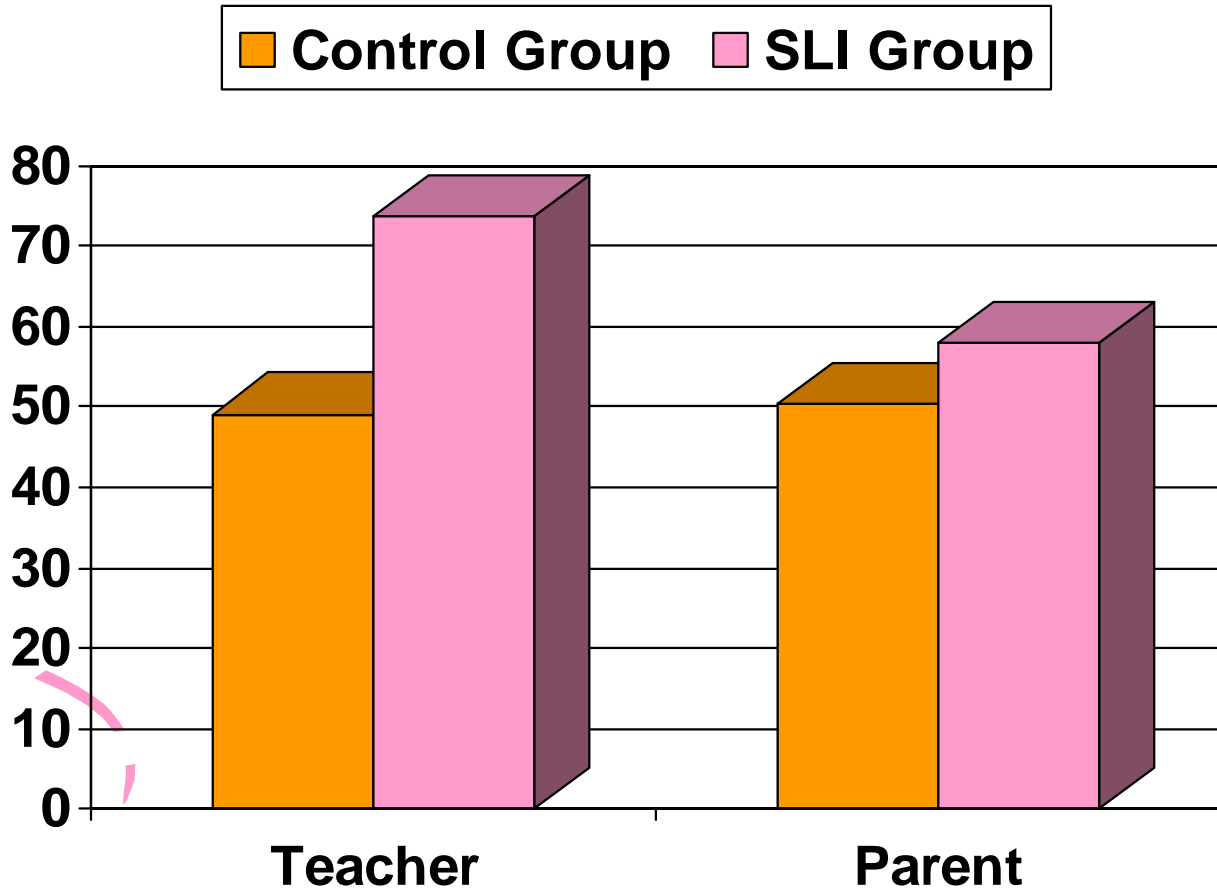
- Subscales- Initiate, Working Memory, Planning/Organization, Organization of Materials, & Monitor



- Data Analysis

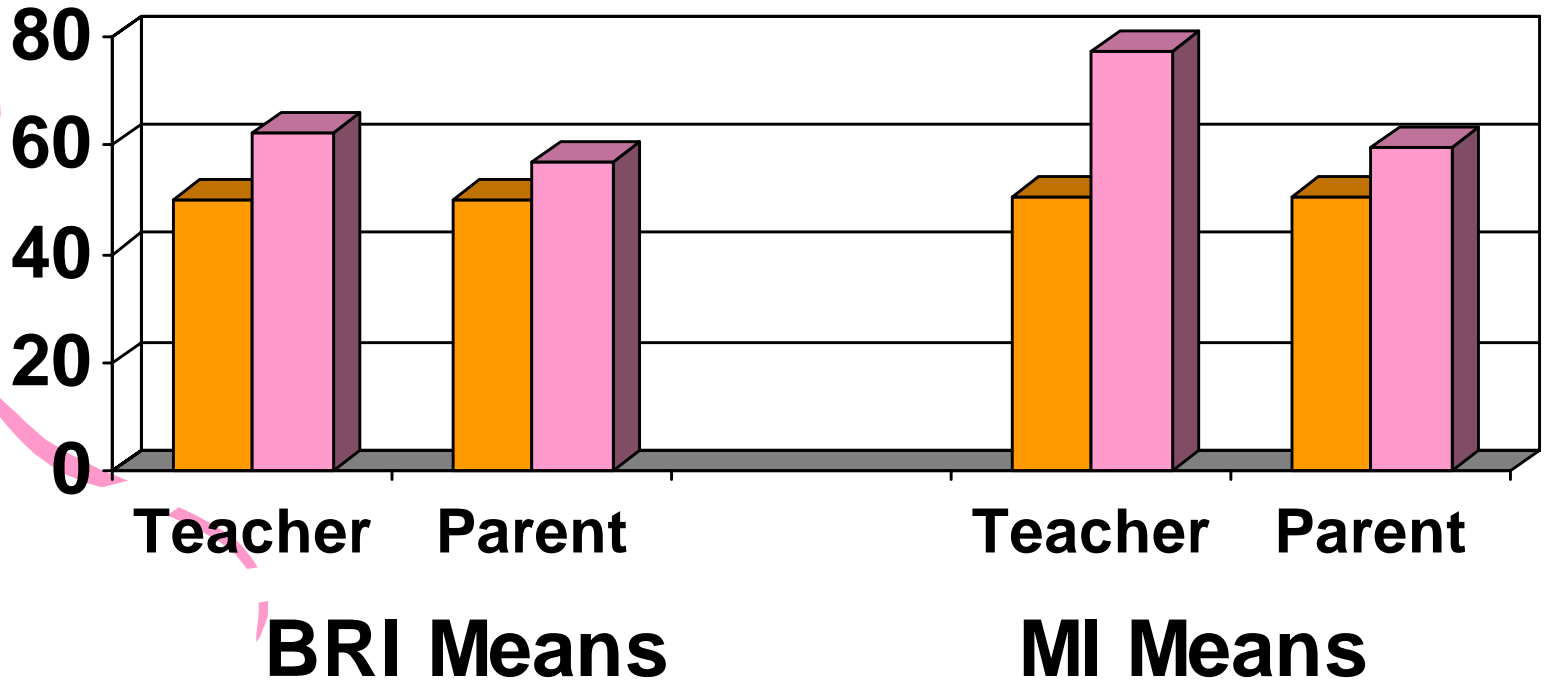
- Difference between SLI & Control Groups
- Relationship between language and executive function skills

# Teacher and Parent BRIEF Mean Composite Scores

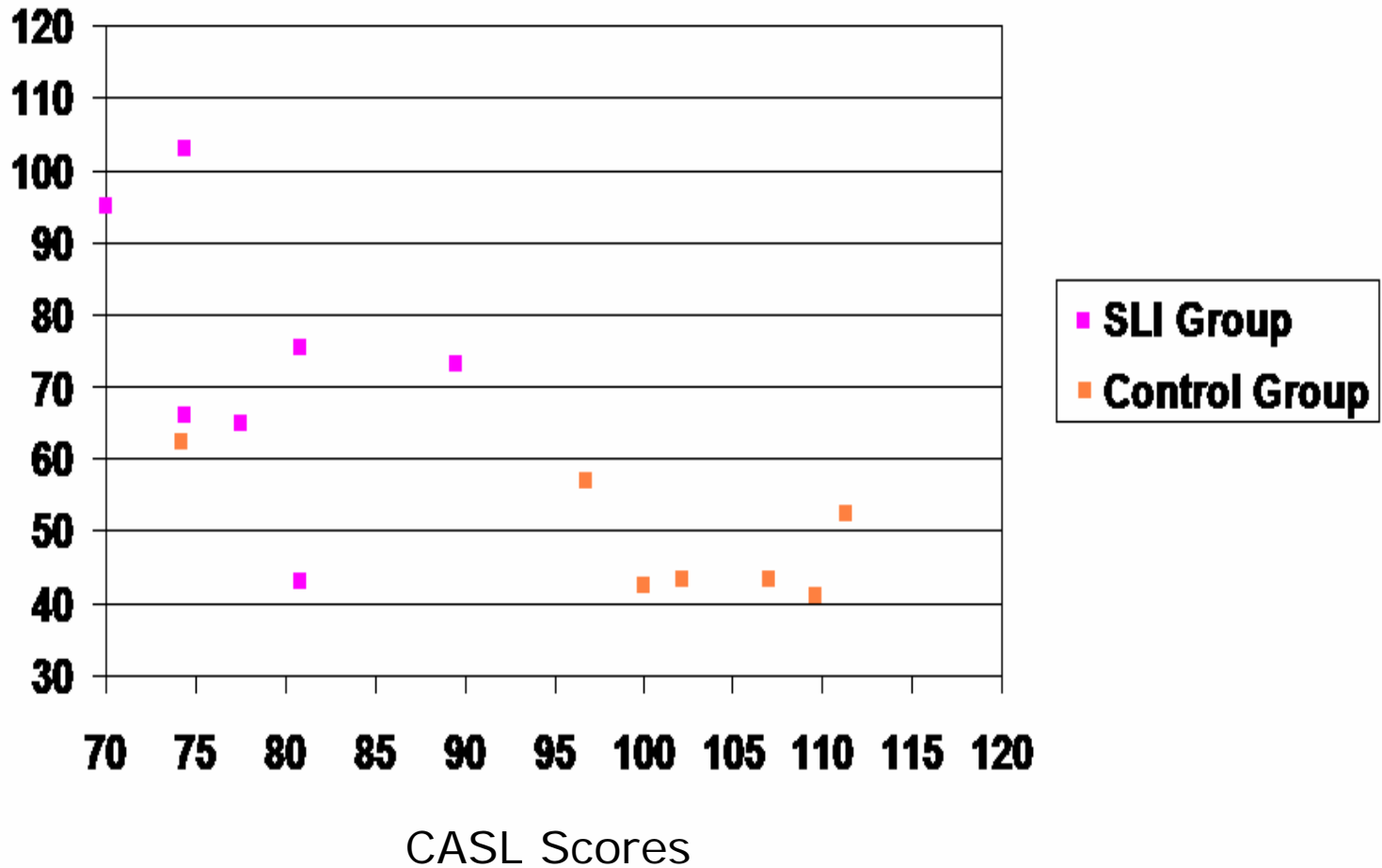


# BRIEF Teacher and Parent Index Means

Control SLI



# CASL and BRIEF Teacher Composites



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# Discussion

- Teacher BRIEF scores indicated SLI children were significantly different than controls on executive function skills
- Parent BRIEF scores were not as different between the groups



# Discussion

- Noterdaeme et al reported children with SLI had deficits in **shifting** attention compared to control group but no significant differences in **task persistence** or **inhibiting irrelevant stimuli**
  - Current Study- **Inhibiting and Shifting** were part of the BRI score which was not significantly different between the groups from Parent or Teacher BRIEF ratings.



# Implications

- According to teachers in this study, children with SLI may have difficulty with executive function skills.
  - May need to teach metacognitive strategies
- The use of more detailed assessments among children with SLI should be considered because they may present with deficits that are related to general language skills, but which could affect higher-order cognitive processes.



# Limitations

- Only a small number of participants were included in this study.
- Outlier scores in both the SLI and Control Groups altered the group results.
- The BRIEF is an indirect rather than a direct measure of executive function, ability.



# Future Research

- More participants should be included using both indirect and direct measures of executive functioning.
- Identifying specific deficit areas of language and relating them to specific executive function processes and components.

# Teacher and Parent BRIEF Composites and Indexes Means

Group	Behavioral Regulation Index	Metacognition Index	Global Executive Composite
SLI			
Parent	57.00(14.19)	59.71(12.16)	58.00(12.58)
Teacher	62.29(17.76)	77.43(20.74)	73.71(20.74)
Control			
Parent	50.17(5.23)	50.67(9.93)	50.50(7.45)
Teacher	50.00(9.09)	50.29(10.48)	49.14(9.55)
Significance Scores			
Parent	p= .290	p= .175	p= .228
Teacher	p= .129	p= .015*	p= .015*

# CASL Composites and BRIEF Global Executive Composites

Group/ Number	CASL Composite	BRIEF Teacher GEC	BRIEF Parent GEC
S4	70	96**	82**
S2	74	103**	53
C5	74	66**	52
S5	74	62	48
S7	78	65**	66**
S1	81	76**	54
S6	81	42	45
S3	89	72**	58
C1	97	57	-
C6	100	42	40
C4	102	43	53
C3	107	43	56
C7	109	41	43
C2	112	52	58