



# Disentangling Diagnostic Overlap

A HYBRID SCOPING REVIEW OF  
NEURODEVELOPMENTAL PROFILES IN FASD  
AND AUTISM SPECTRUM DISORDER

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# Land Acknowledgement

## Where we Meet

Acknowledge the unceded traditional territories of the x<sup>w</sup>məθk<sup>w</sup>əy̓əm (Musqueam), Sk̓w̓x̓wú7mesh (Squamish), and səlilwətał (Tseil-Waututh) Nations.

## Where we Work

The land on which we did this work are the traditional lands of the Haudenosaunee Confederacy, which includes the Seneca, Cayuga, Onondaga, Oneida, Mohawk, and Tuscarora Nations.

**We are grateful for the opportunity to learn from their enduring connection to this land and to work towards a more just and inclusive future.**



Why  
ASD & FAASD?

# Prevalence Rates

## Autism

2.0 to 3.0% in U.S.



## FASD

1.1 to 5.0% in U.S.

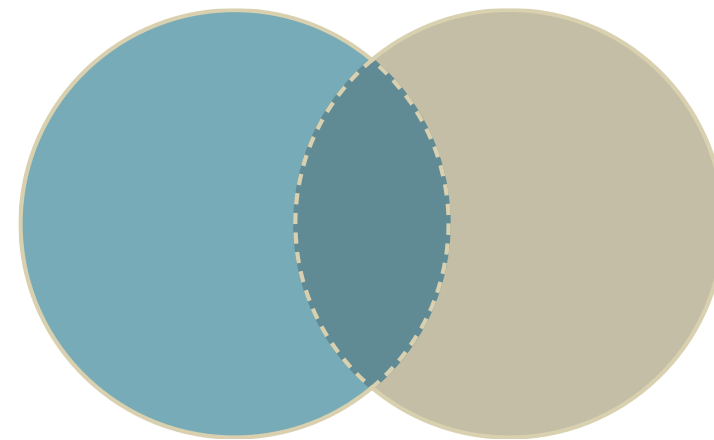


# FASD & ASD



**80%**

High rates of  
misdiagnosis or missed  
diagnosis of FASD



Wide range of  
co-occurrence between  
**5 - 72%**  
in clinical samples

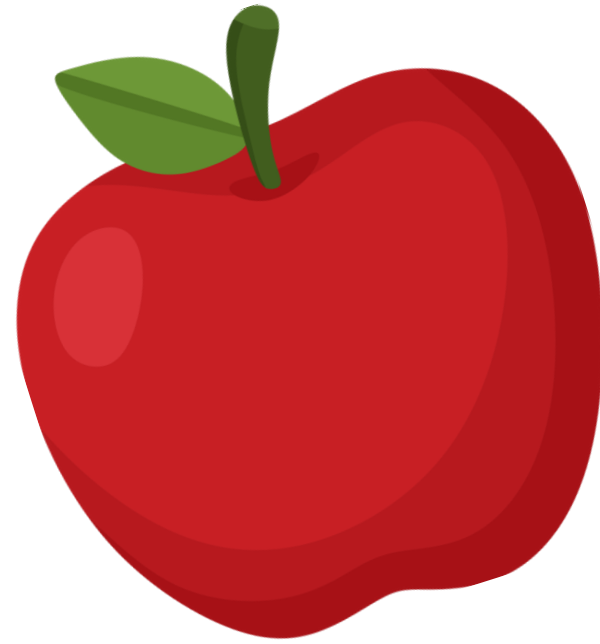


**No significant  
association**  
between  
low levels of PAE  
and ASD

# FASD & ASD

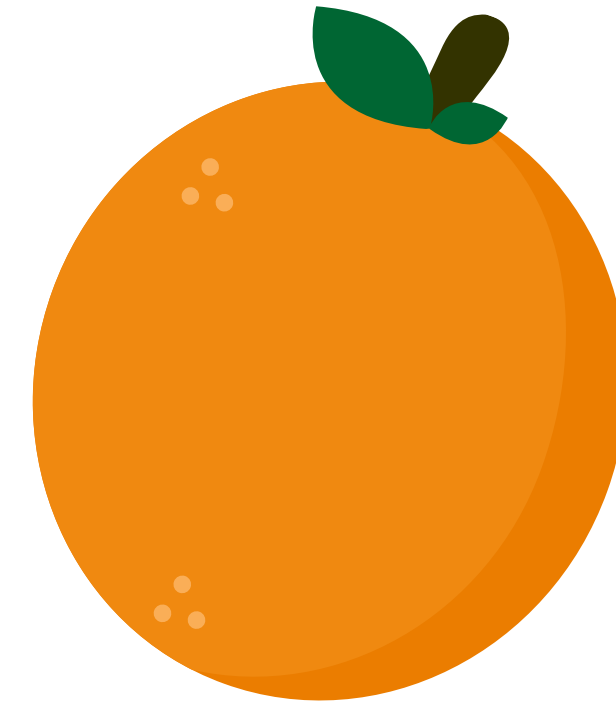


# FASD & ASD



Round

Tasty



Comes from trees

Used in fruit salad



# FASD & ASD





Diagnostic &  
Overlapping  
Features

# ASD Criteria

## Social Communication

Social Skills

Social  
Communication  
& Reciprocity

Relationship  
building &  
awareness

## Restrictive Repetitive Beh.

Restrictive or  
perseverative  
interests

Cognitive  
rigidity, rituals

Stereotyped  
& repetitive  
behavior

Sensory  
symptoms

## Other Common Considerations

Cognitive  
Functioning

Adaptive  
Behavior

Executive  
Functioning

# FASD Criteria

Prenatal  
Alcohol  
Exposure

Facial  
Features

Growth  
Pattern

Neurologic  
Symptoms

Cognitive  
Symptoms

Memory, EF,  
academic  
achievement

Attention,  
Self-Regulation

Language

Adaptive  
Functioning

Sensory  
Processing

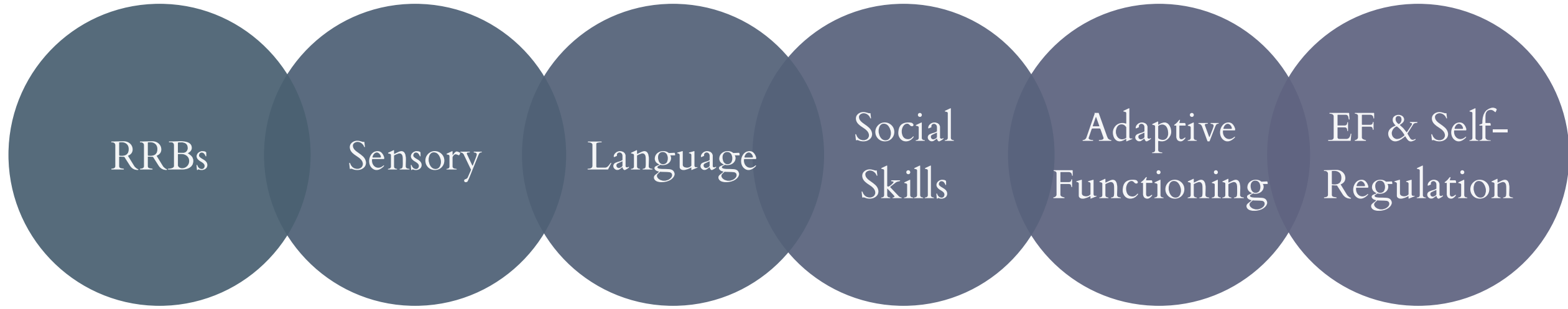
Social Skills

Common  
Considerations

# FASD Criteria

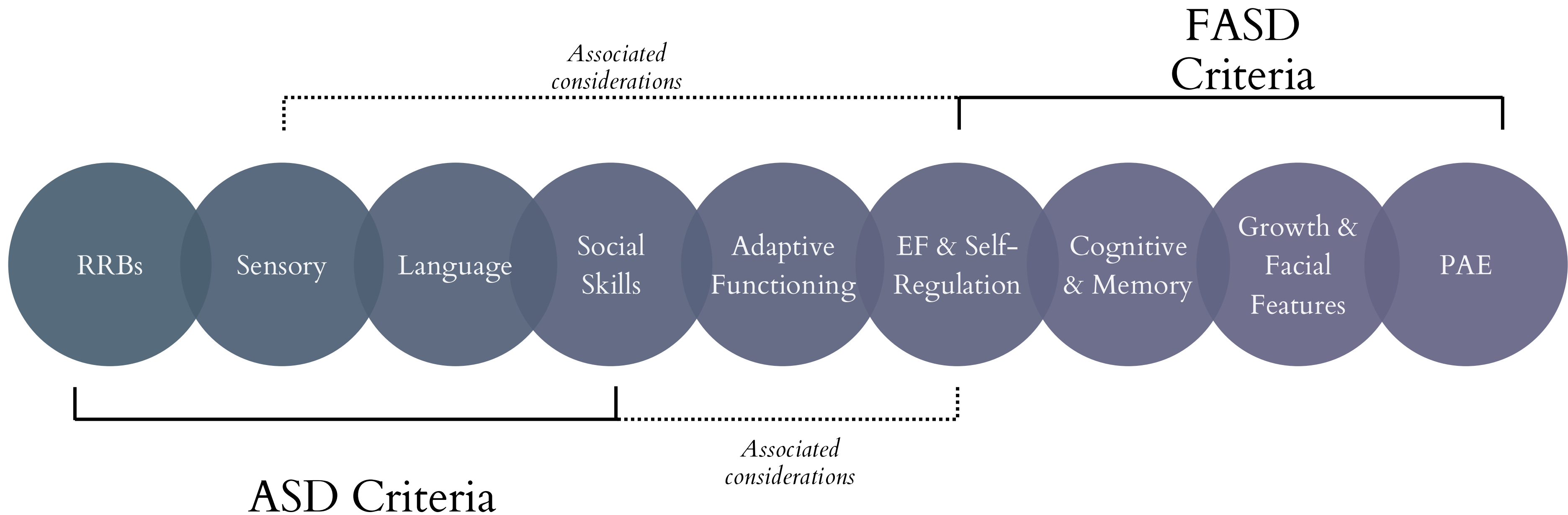
*Associated considerations*





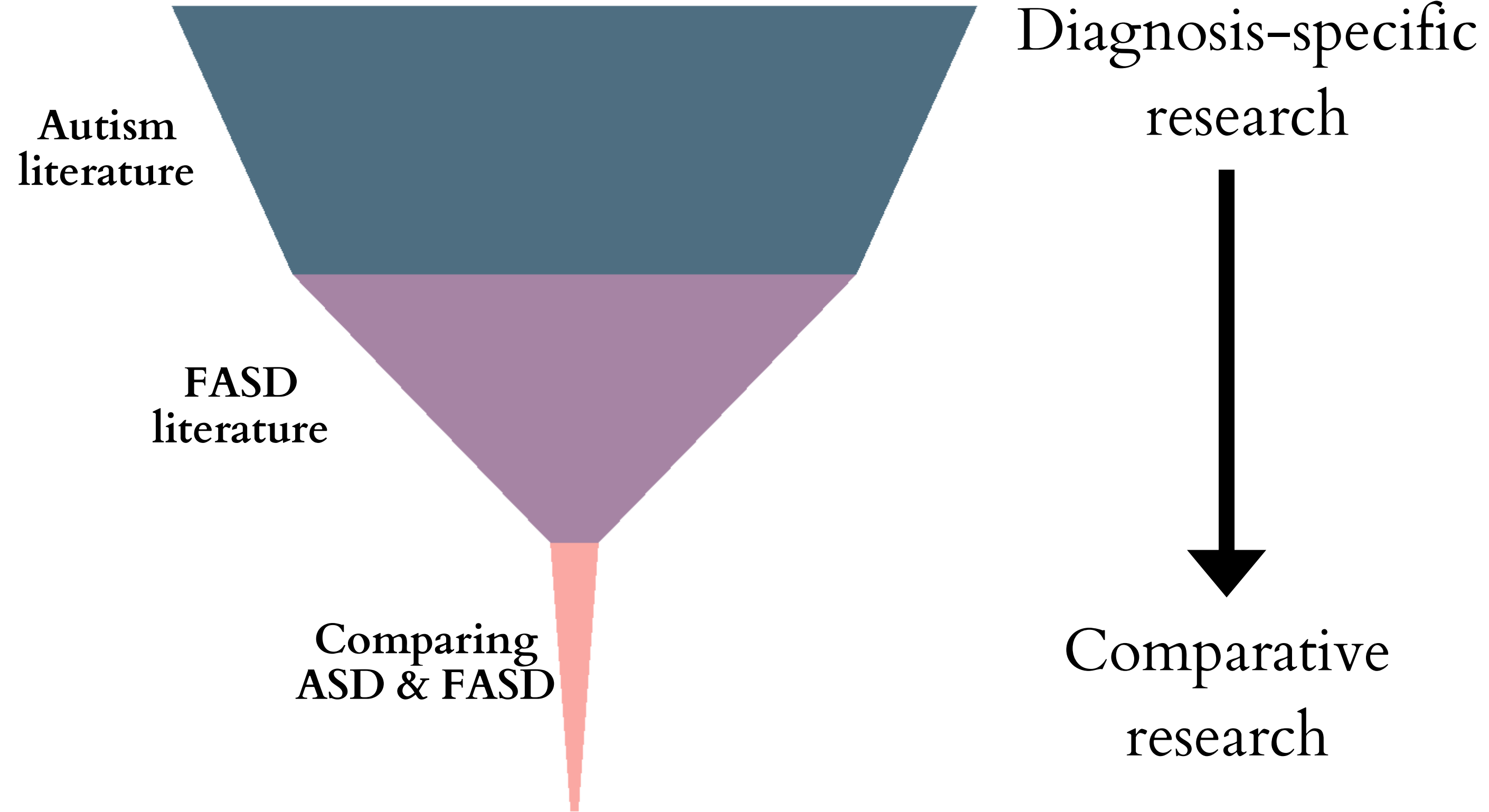
ASD Criteria

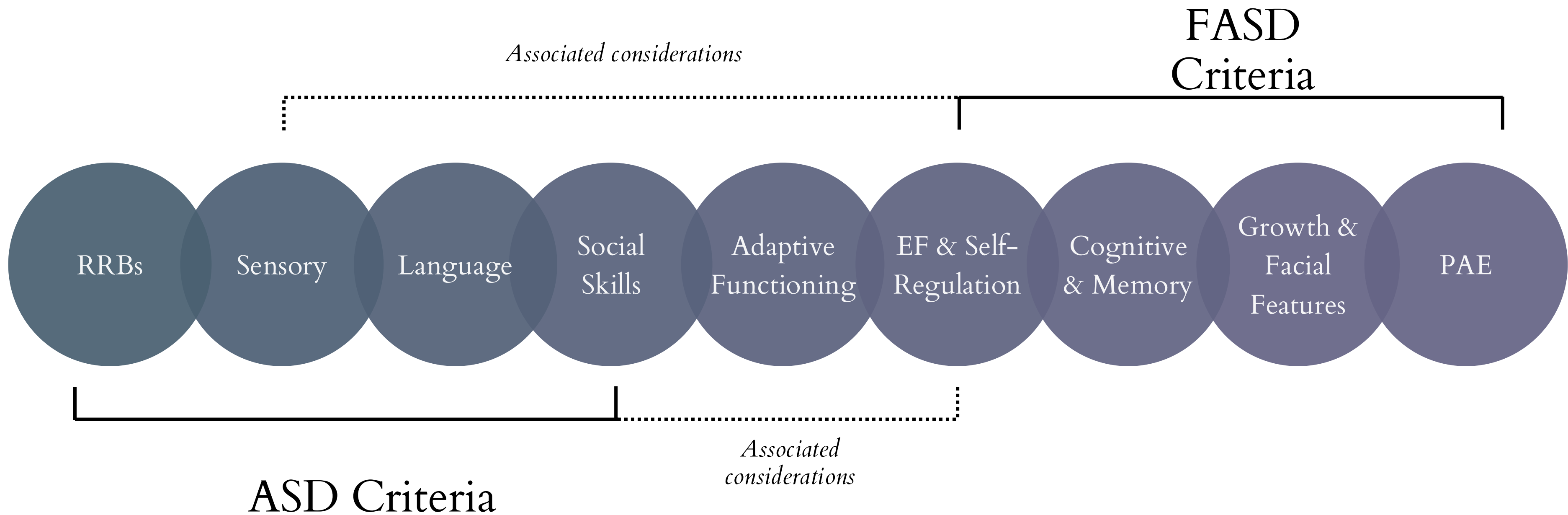
*Associated considerations*

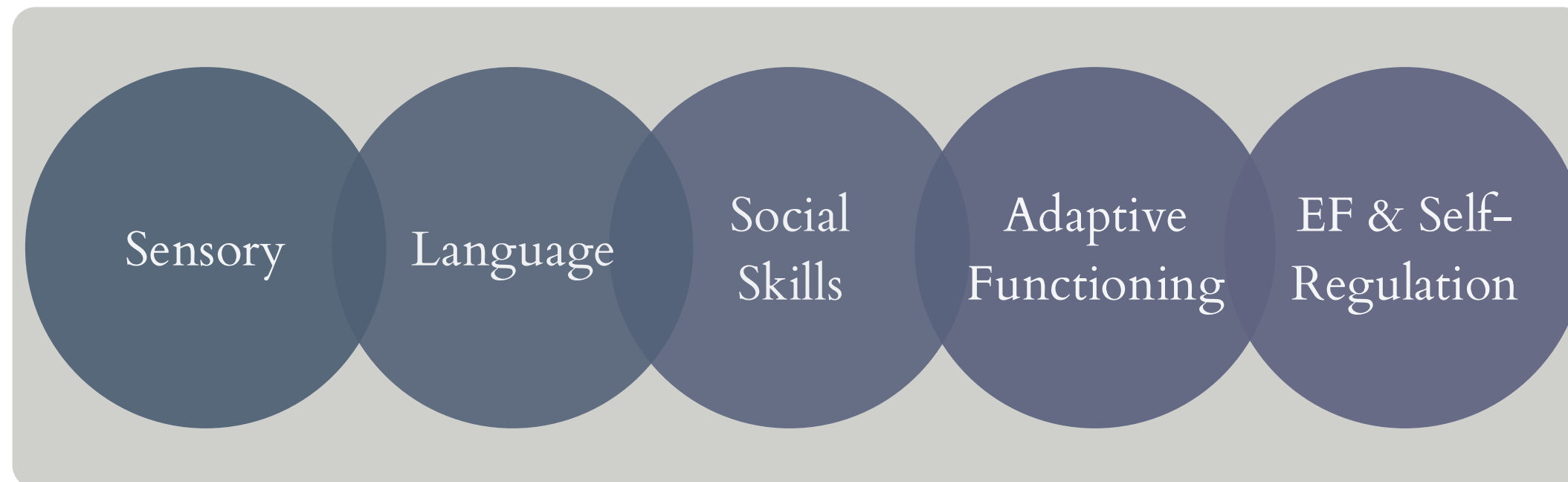


# Differentiation

# Literature Base for FASD, ASD, & Comparison







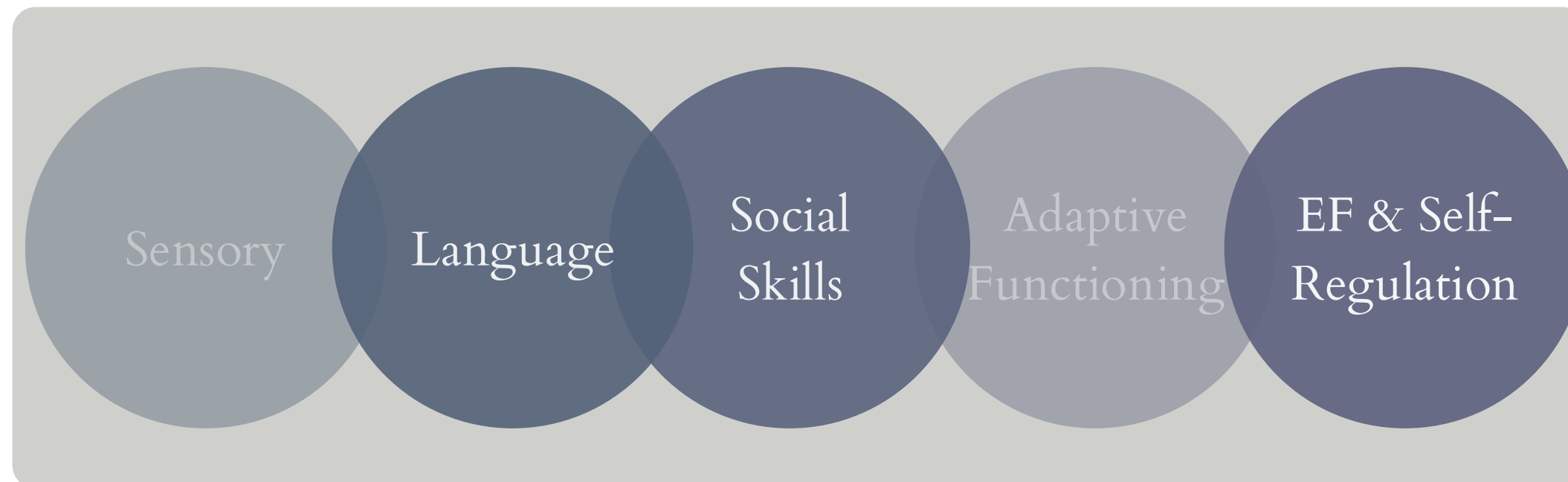
Sensory

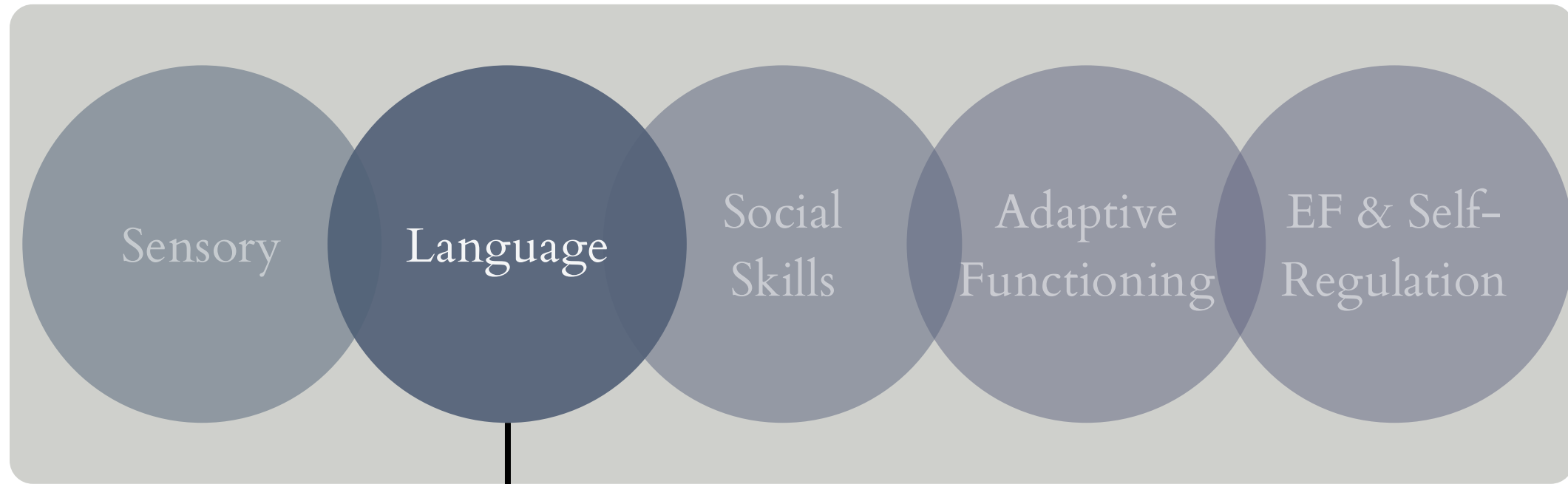
Language

Social  
Skills

Adaptive  
Functioning

EF & Self-  
Regulation





### Similarities

- Slower rate of speech
- Low processing speed and communication symptoms

### Differences

#### FASD

- Challenges with narrative cohesion (more challenges with clearly stating critical details that help advance story)

#### ASD

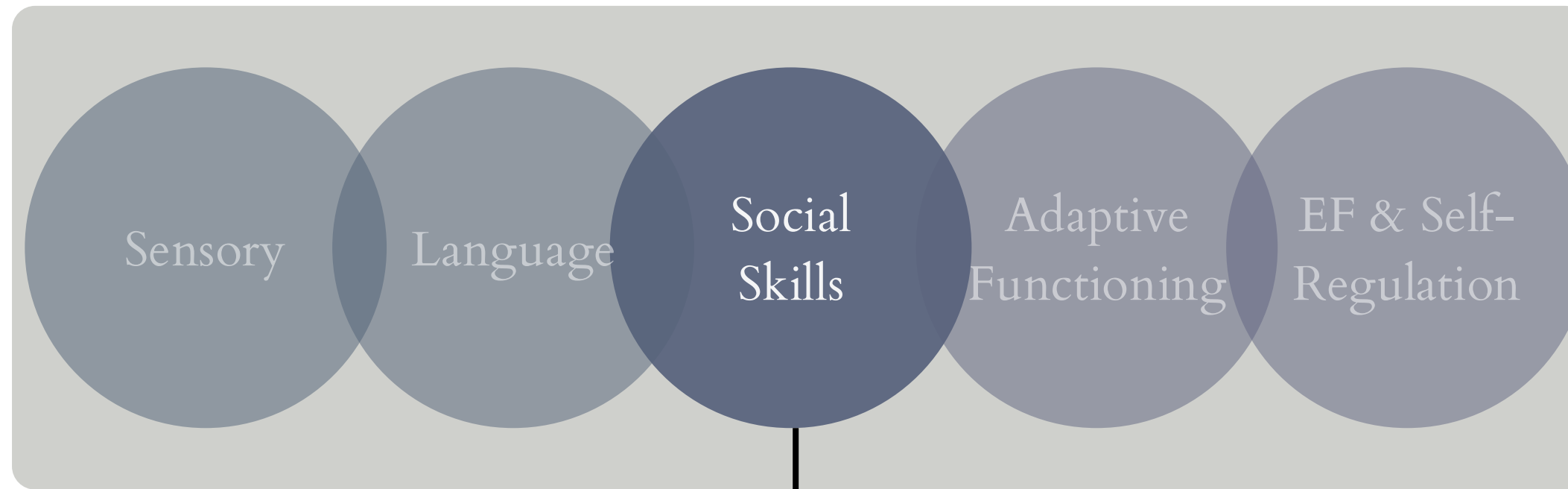
- Higher levels of filled pauses, repetitions and revisions, unintelligible utterances, and irrelevant comments (i.e. mazes)
- Difficulty with mental state (e.g. point of view, emotions) in language



Bishop et al. 2007



Stevens et al. 2013



### Similarities

- Impaired quality of social interaction
- Socially inappropriate behaviors
- Difficulty with peers
- Theory of mind challenges
- Difficulty with turn taking
- Tendency for sameness or withdrawal

### Differences

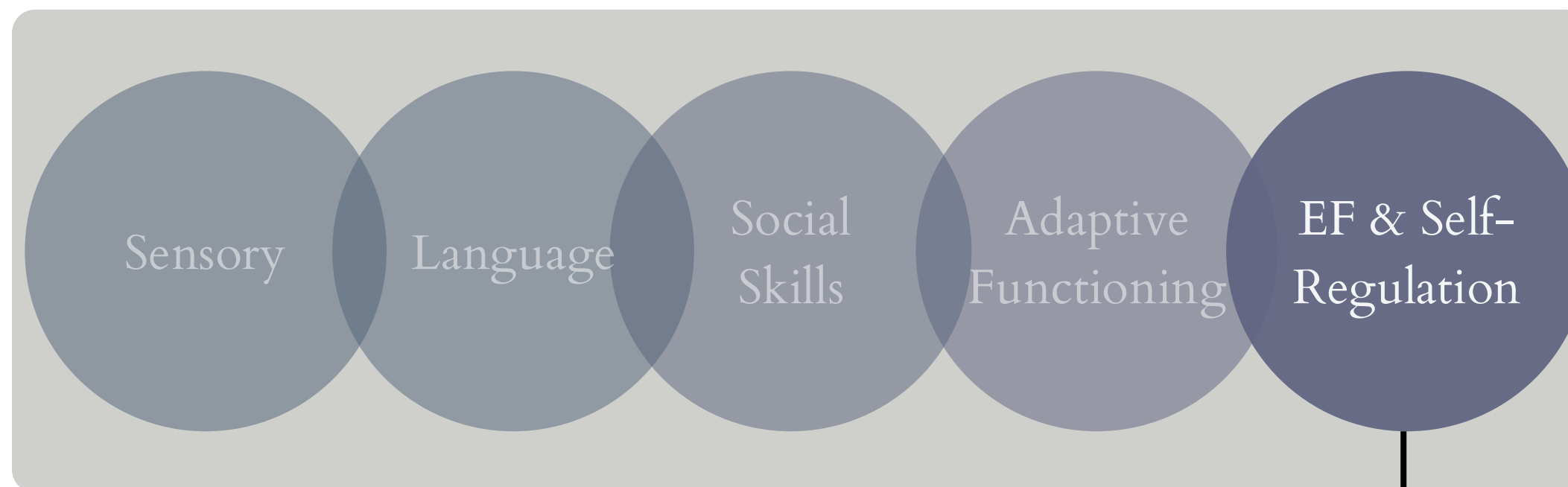
<u>FASD</u>	<u>ASD</u>
<ul style="list-style-type: none"><li>• Propensity for social interaction</li><li>• Struggle interpretation of complex pragmatics</li><li>• Social interactions are affected by EF, attention, &amp; impulsivity</li></ul>	<ul style="list-style-type: none"><li>• Social initiation challenges</li><li>• Struggle with interpretation of most pragmatics</li><li>• Difficulty sharing affect</li><li>• Nonverbal communication</li></ul>



Stagnone et al. 2025



Benson et al. 2023



### Similarities

- Elevated executive-function difficulties
- Associated with social functioning

### Differences

#### FASD

- Higher amount of problem areas
- More challenges in Working Memory than ASD
- Significant challenges with Planning/ Organizing

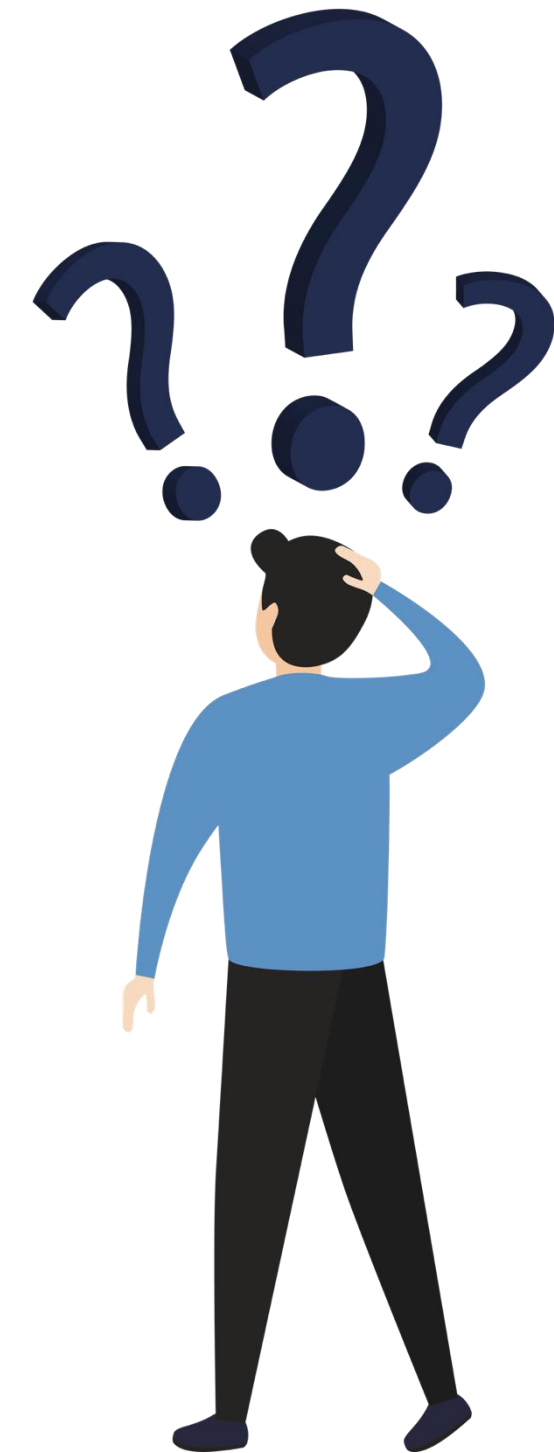
#### ASD

- Less challenges with Working Memory in comparison
- Mixed results on differences in other subdomains of BRIEF

# FASD & ASD

Clinical overlap between FASD  
and ASD present for decades

Not enough  
direct comparative evidence  
to resolve questions





# Literature Review

# What does the literature say?



## Literature review

Hybrid design  
 $n = 92$

ASD



Huge literature



Narrow down



Umbrella review of  
systematic reviews

FASD



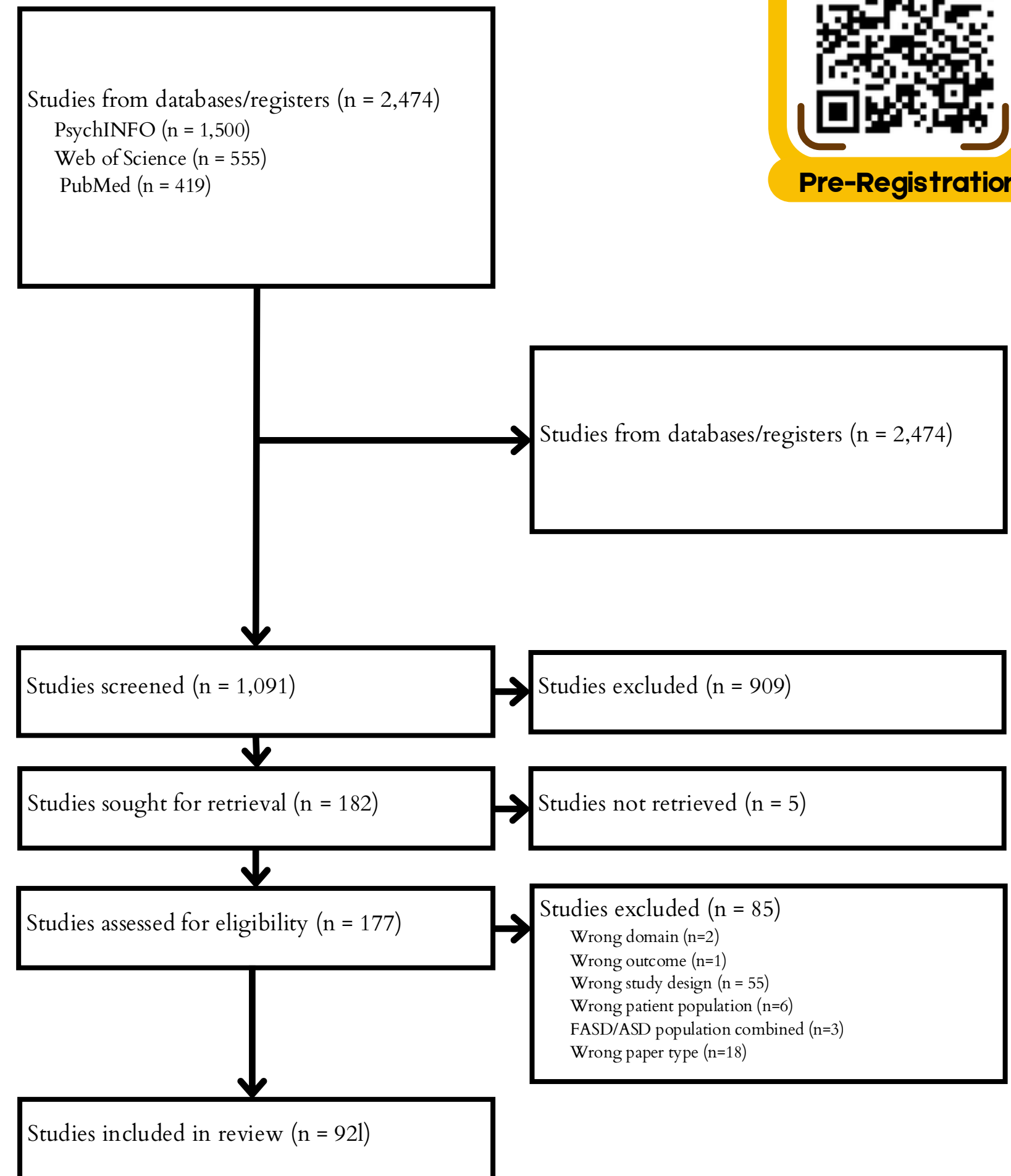
Growing literature

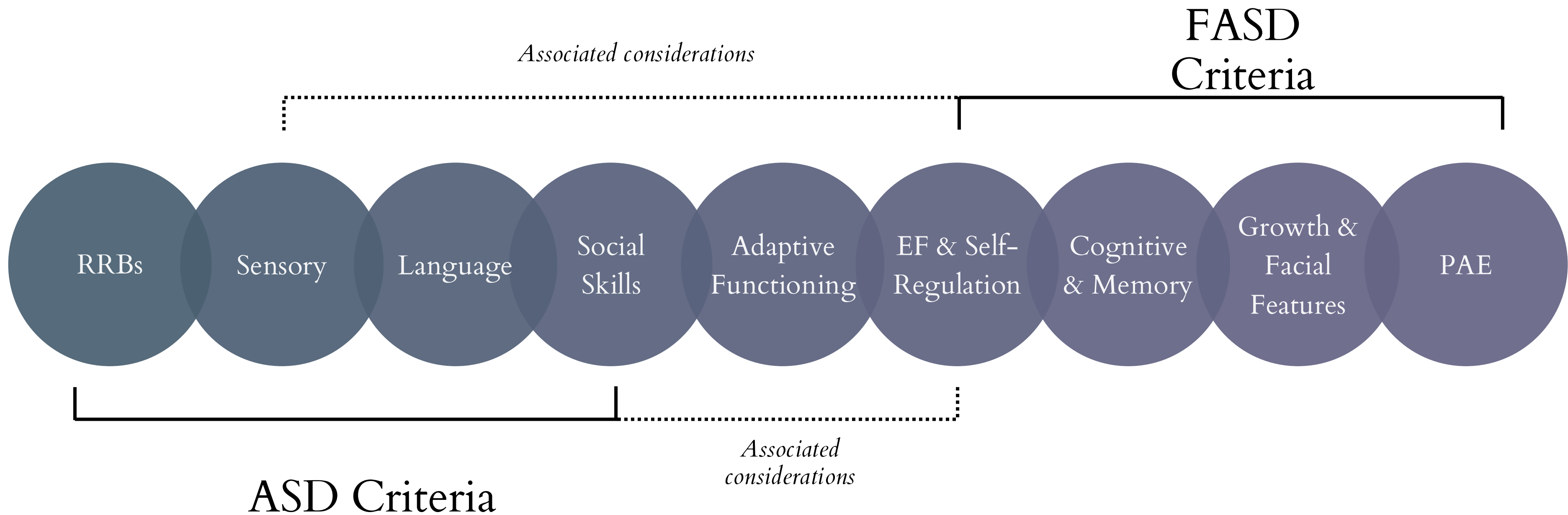


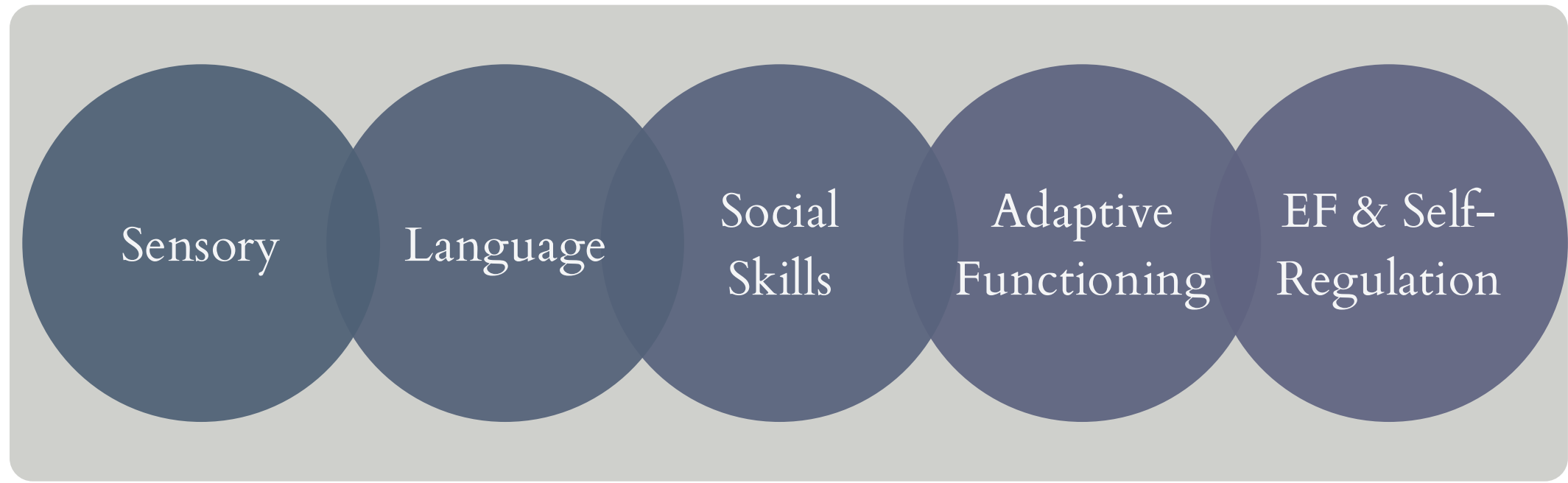
Build up



Scoping review of  
primary articles

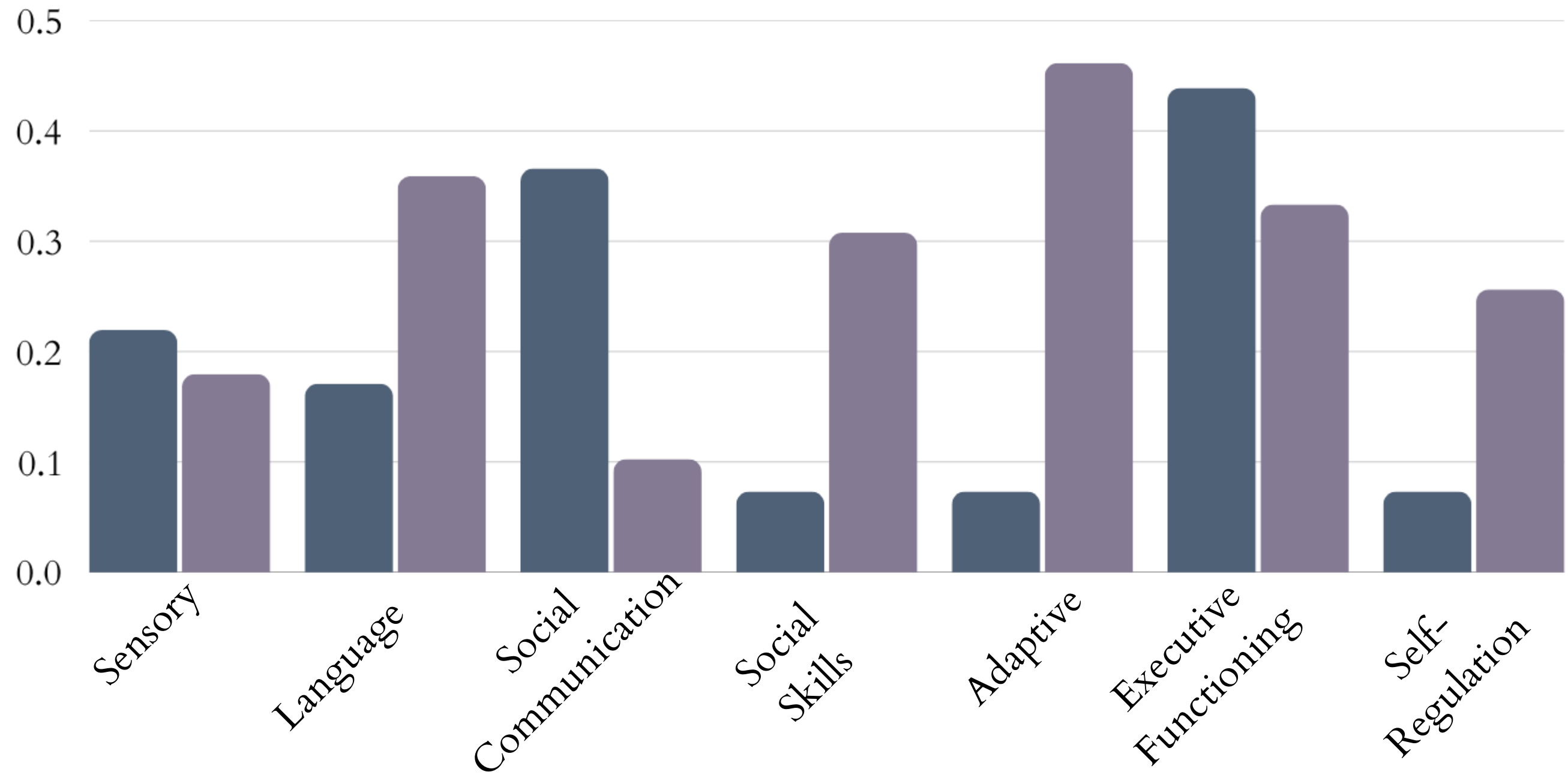
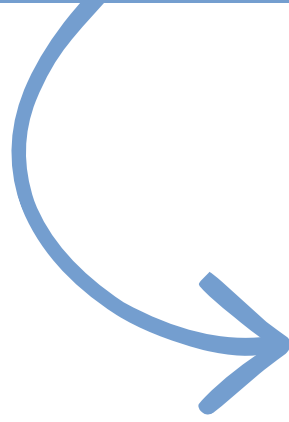






● ASD ● FASD

Percentage compared to overall review



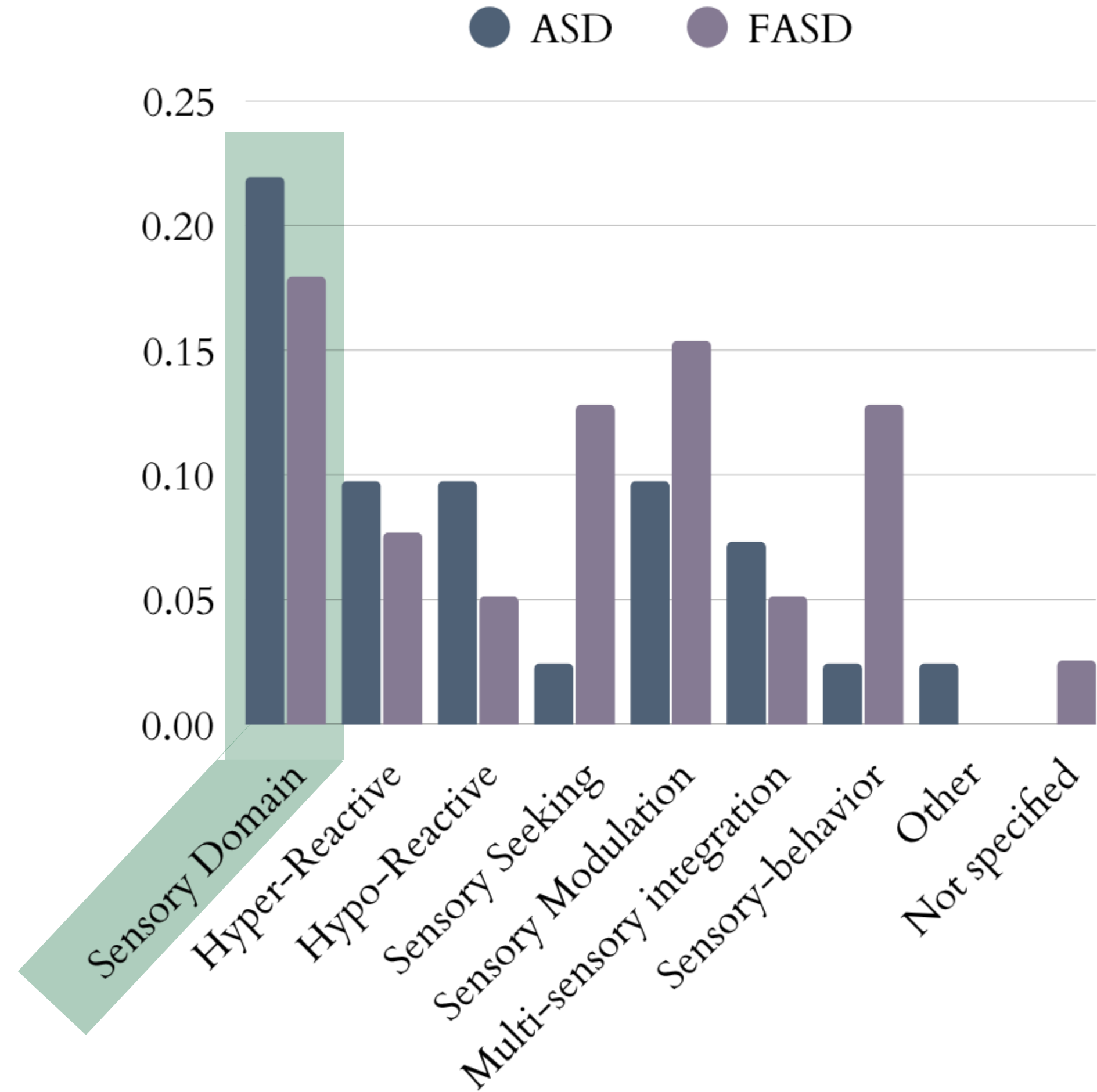


# Sensory

How sensory information is detected,  
integrated, and responded to

# Sensory

**Both Autism and FASD have high levels of sensory processing challenges**

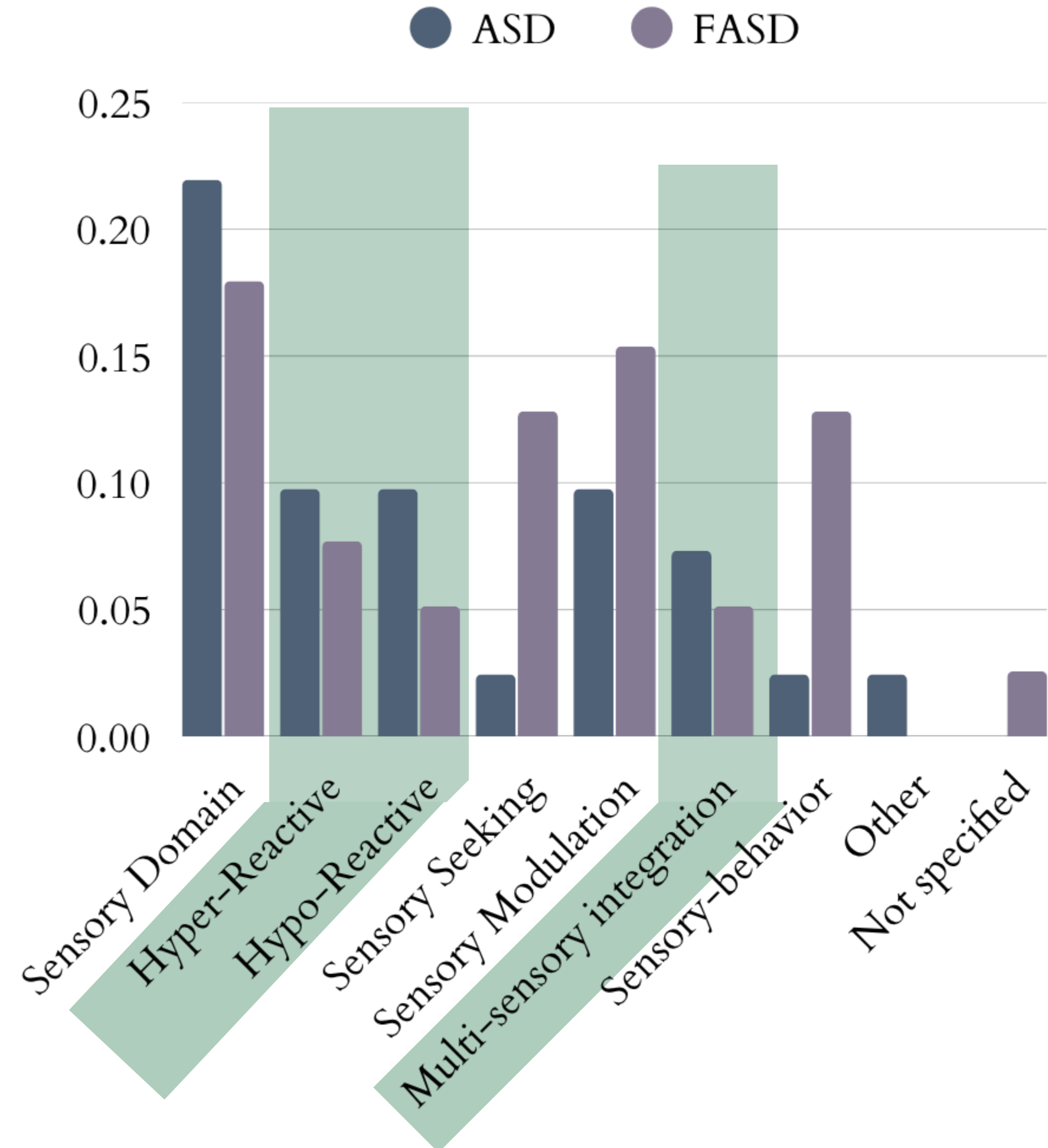


# Sensory

## Autism

"atypical sensory reweighting"

how the brain chooses which  
sense to listen to

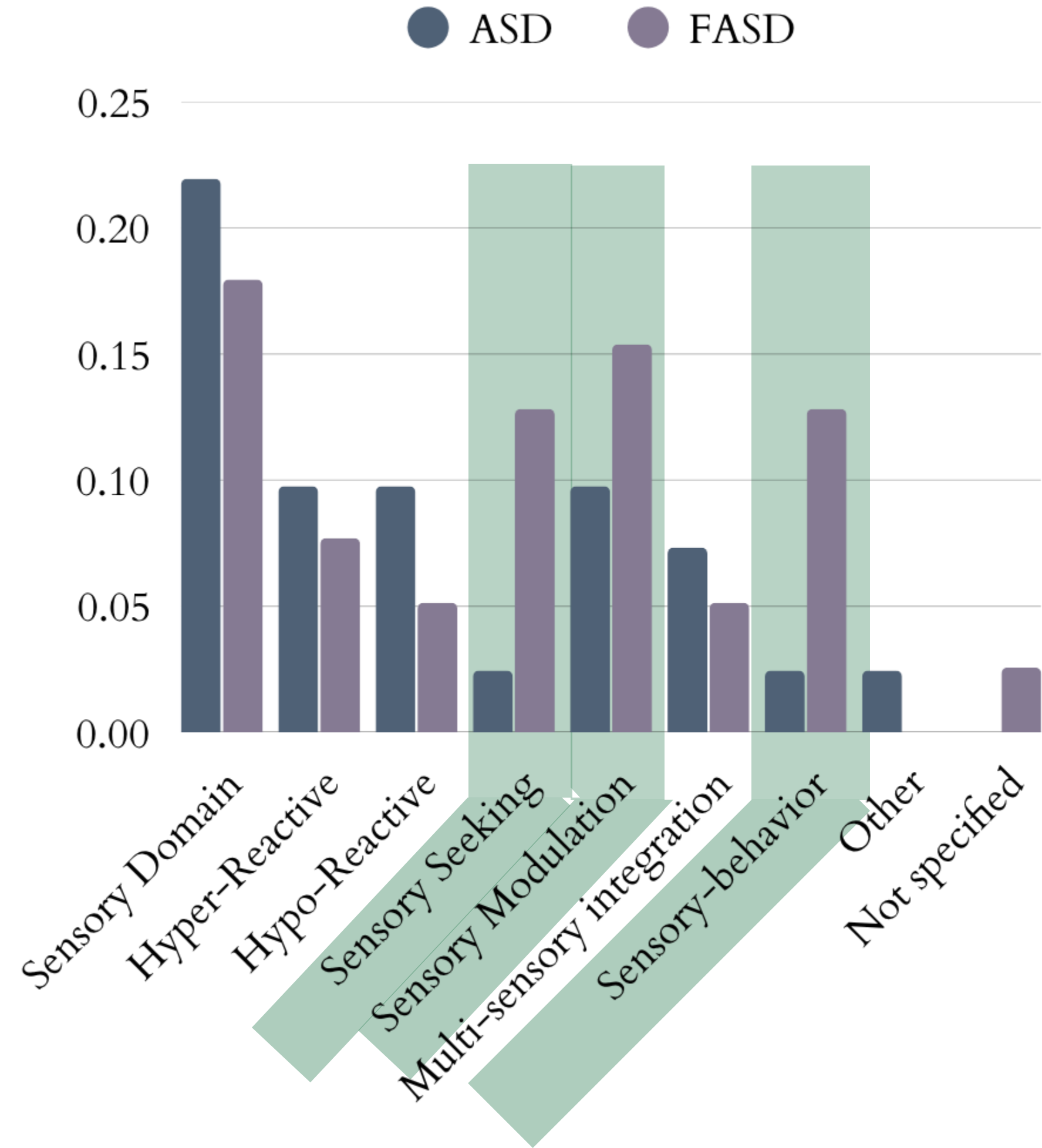


# Sensory

## FASD

High amount of sensory seeking

sensory deficits "co-occur with problem behaviors at a high rate"





# Language

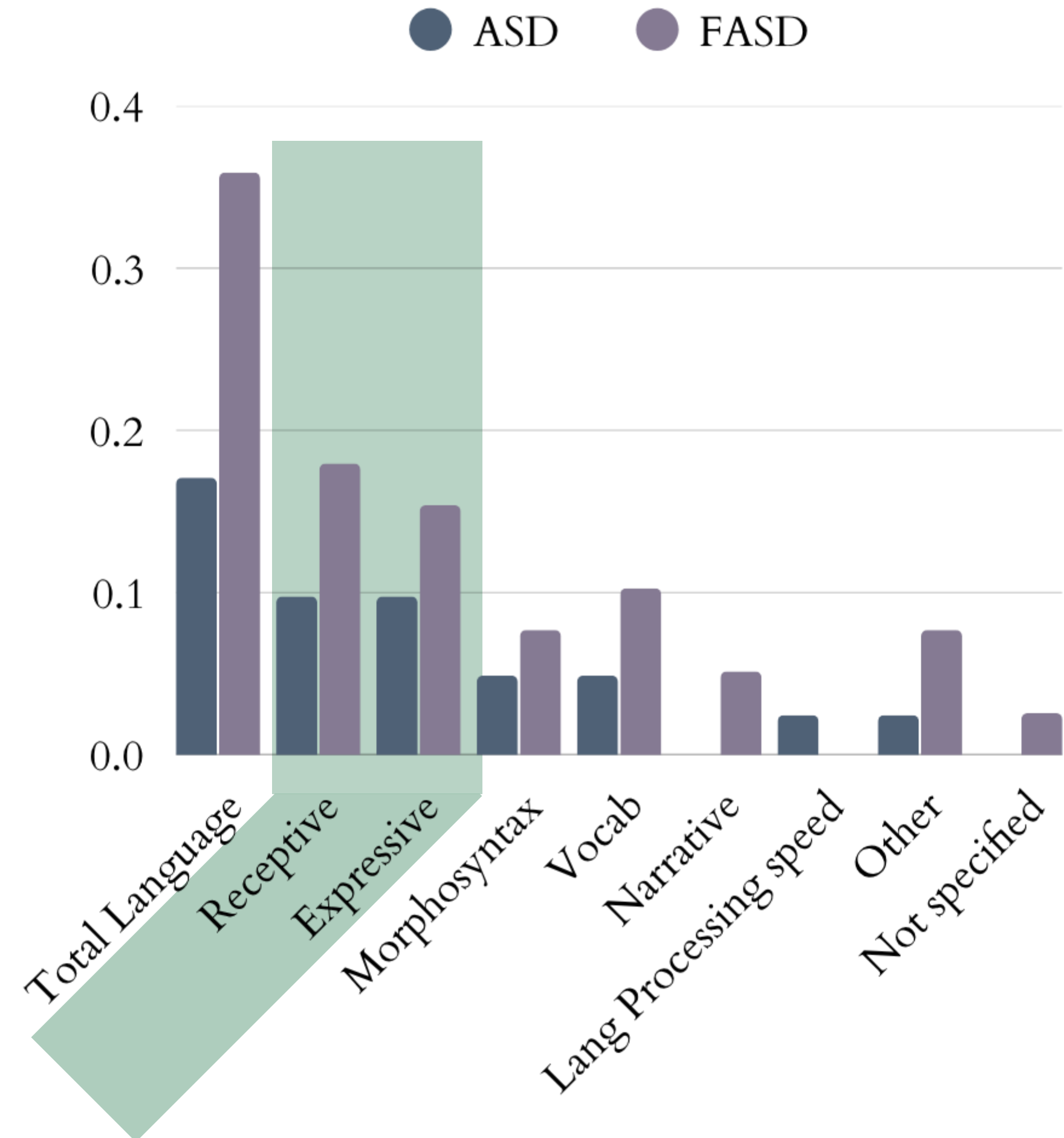
Understanding and producing  
spoken or signed language

# Language

## Both Autism and FASD

- Speech development disorders in first 3 years of life\*
- Difficulties with expressive & receptive language
- Grammatical & articulation errors

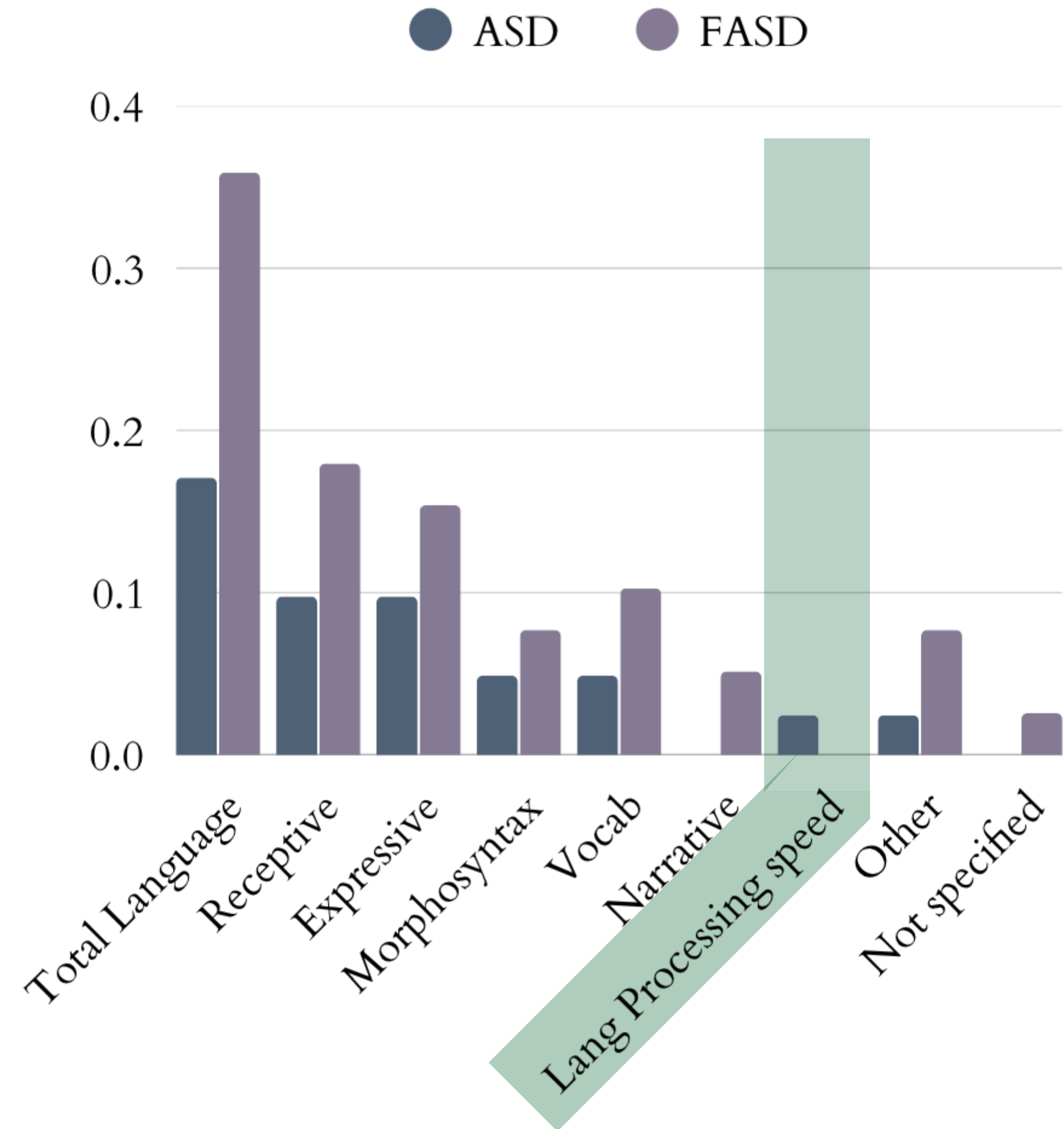
\* Impacted by home environment



# Language

## Autism

Receptive-to-Regulation link  
(how well comprehension  
affects regulation)

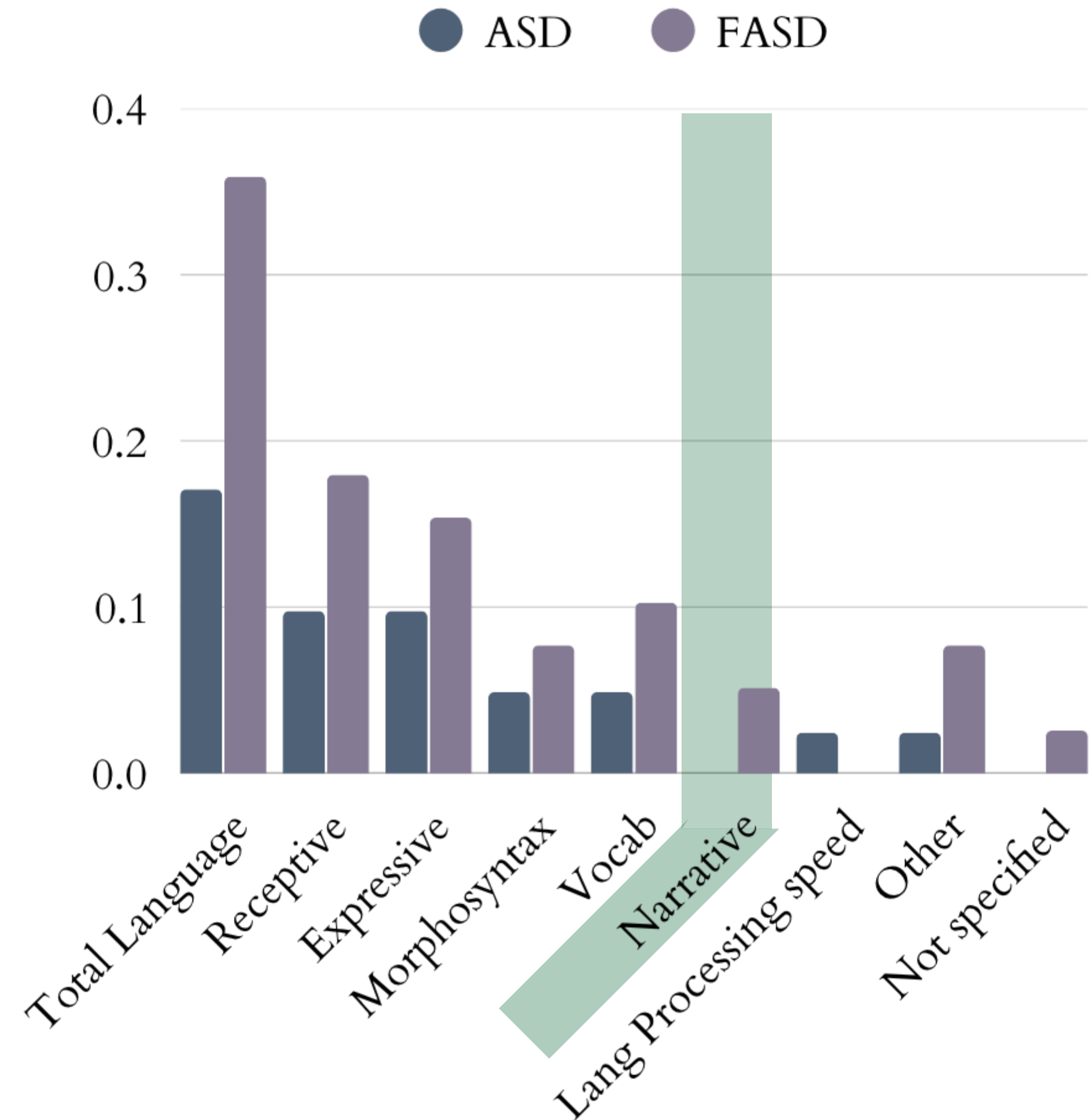


# Language

## FASD

Challenges with overall language structure and skills

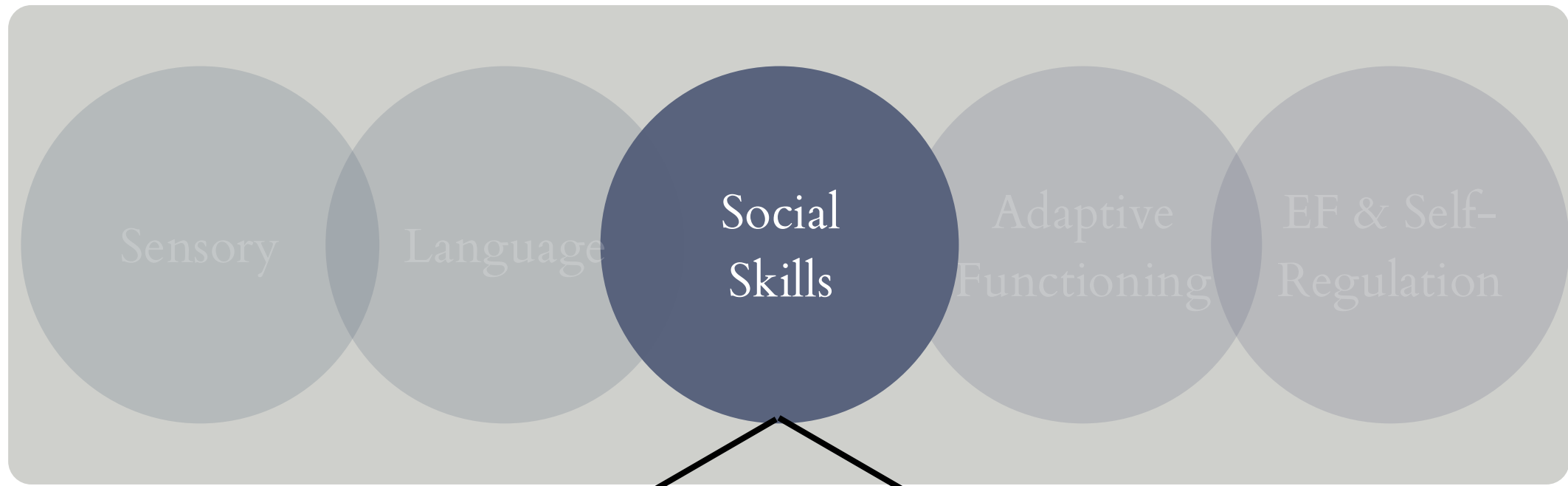
Especially figurative language & word generation





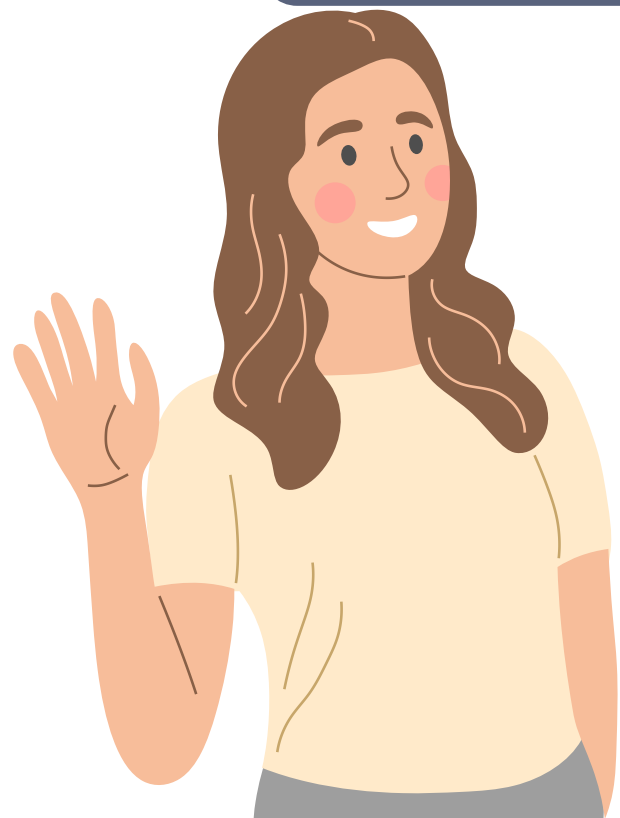
# Social

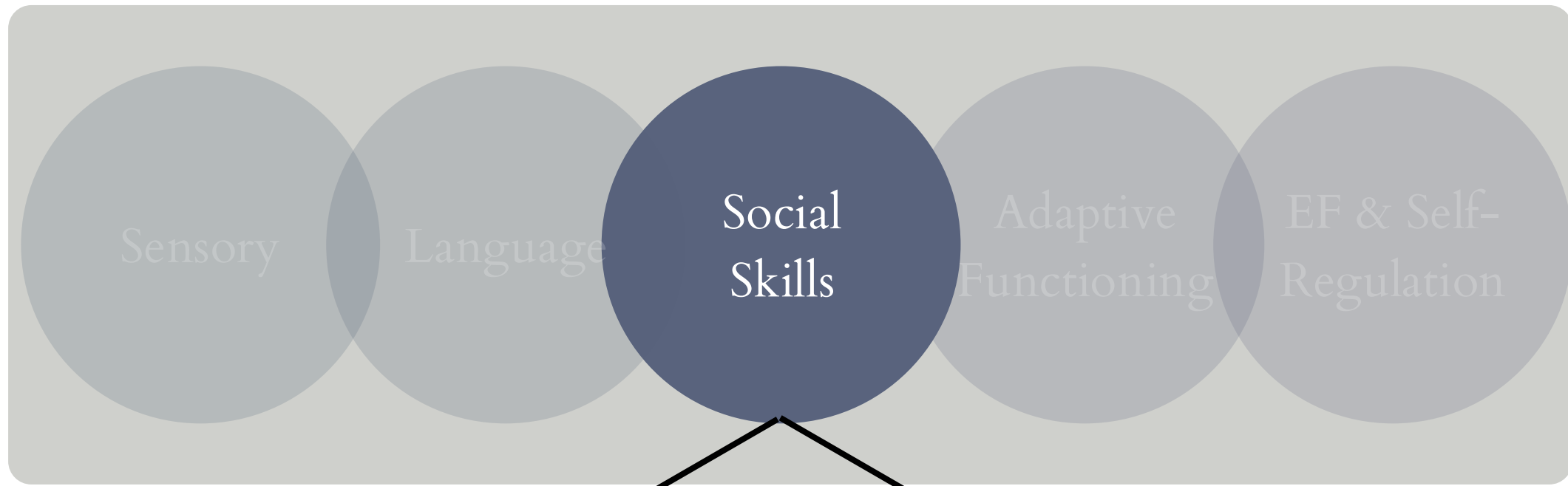
Navigating social interactions using  
Social Communication & Social Skills



**Social Communication**  
Using communication behaviors to share meaning within social contexts

**Social Skills**  
Applying social understanding and communication in real-world interactions

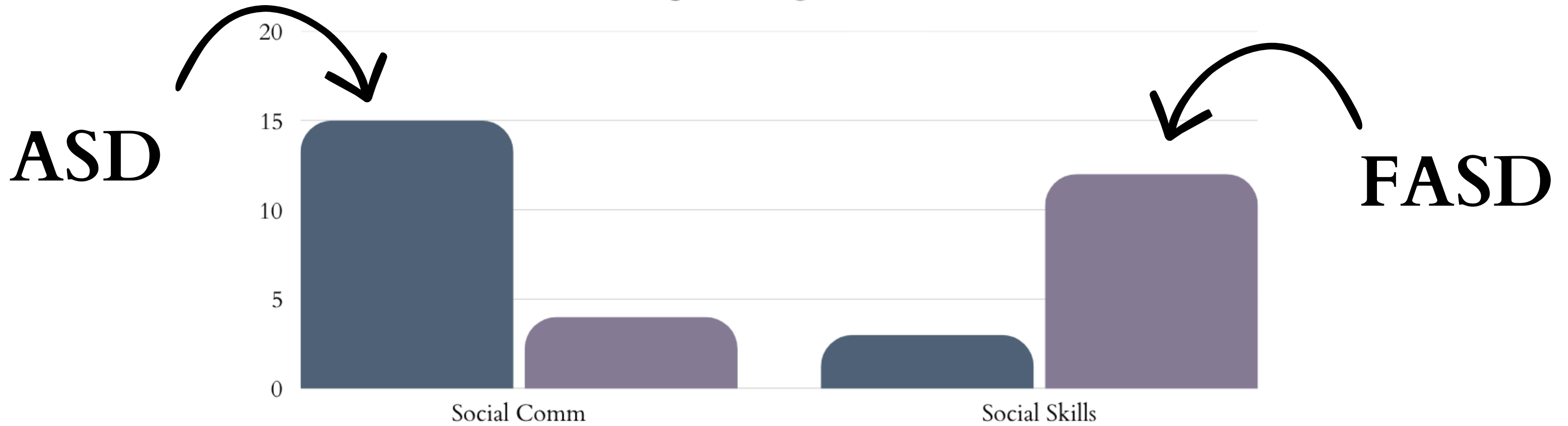


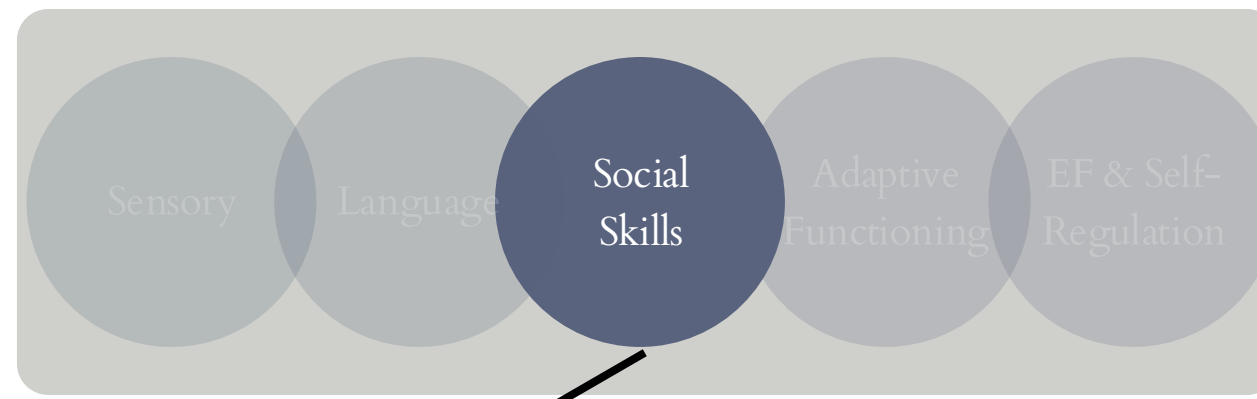


Social Communication

Social Skills

● ASD   ● FASD



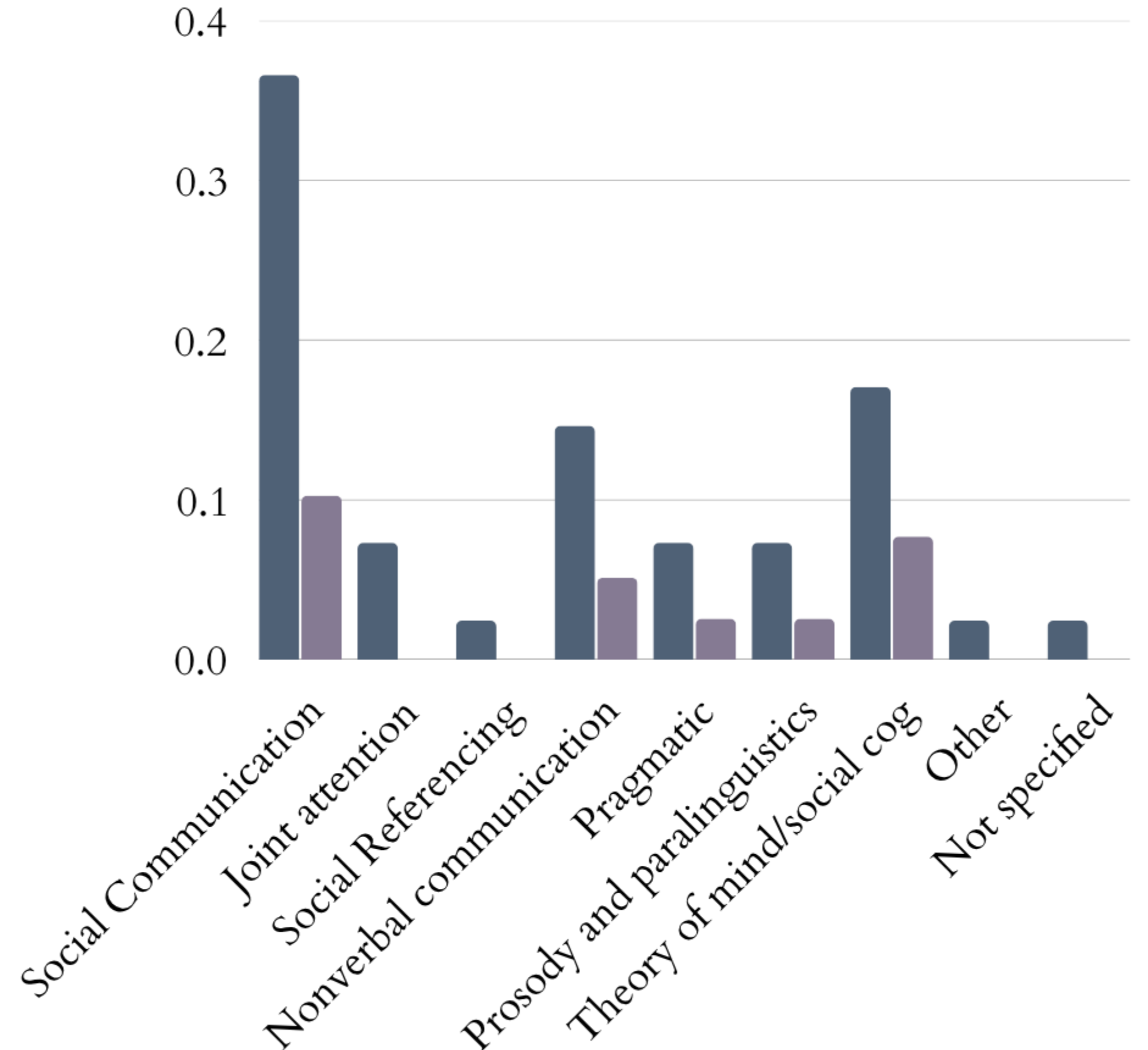


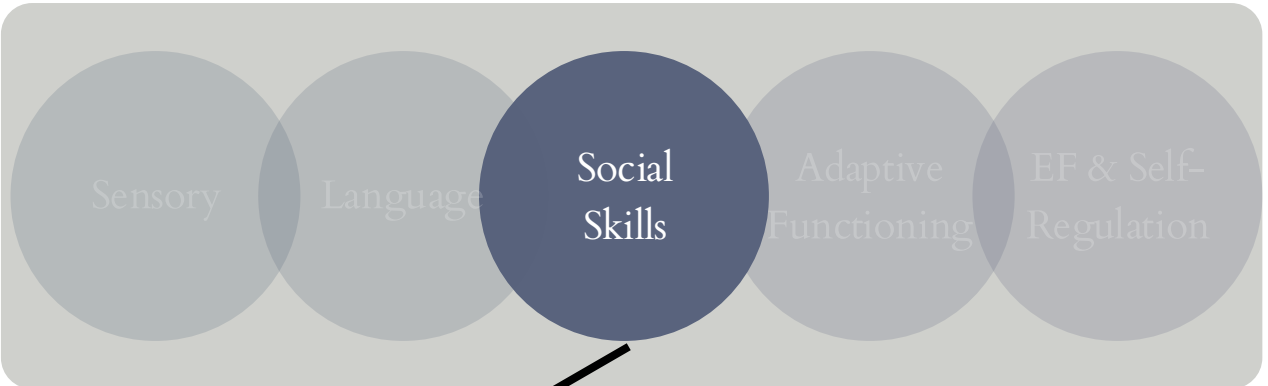
● ASD ● FASD

Social Communication

## Both Autism and FASD

- Social problem-solving challenges
- Difficulty with turn taking
- Tendency for sameness or withdrawal





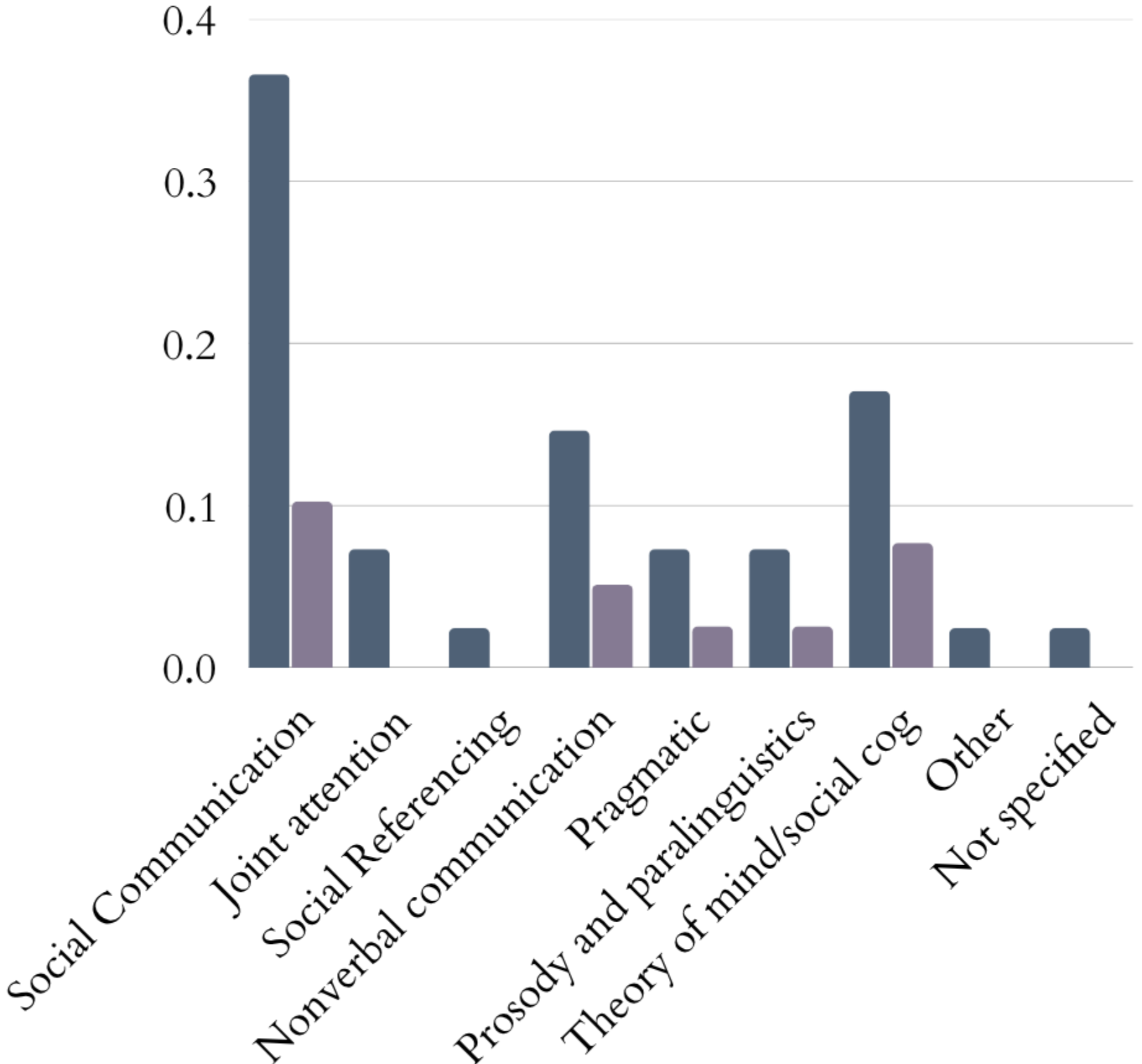
● ASD ● FASD

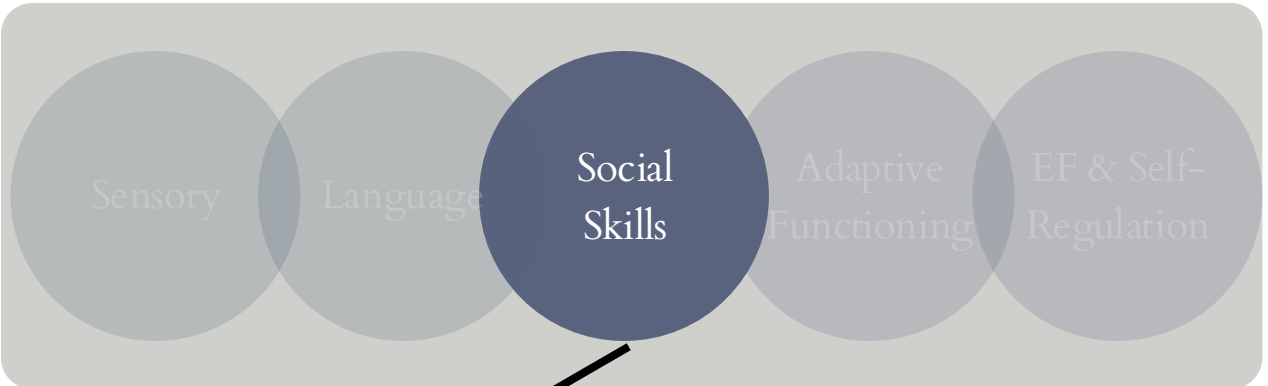
Social Communication

ASD

More challenges across all areas

Matches diagnostic criteria



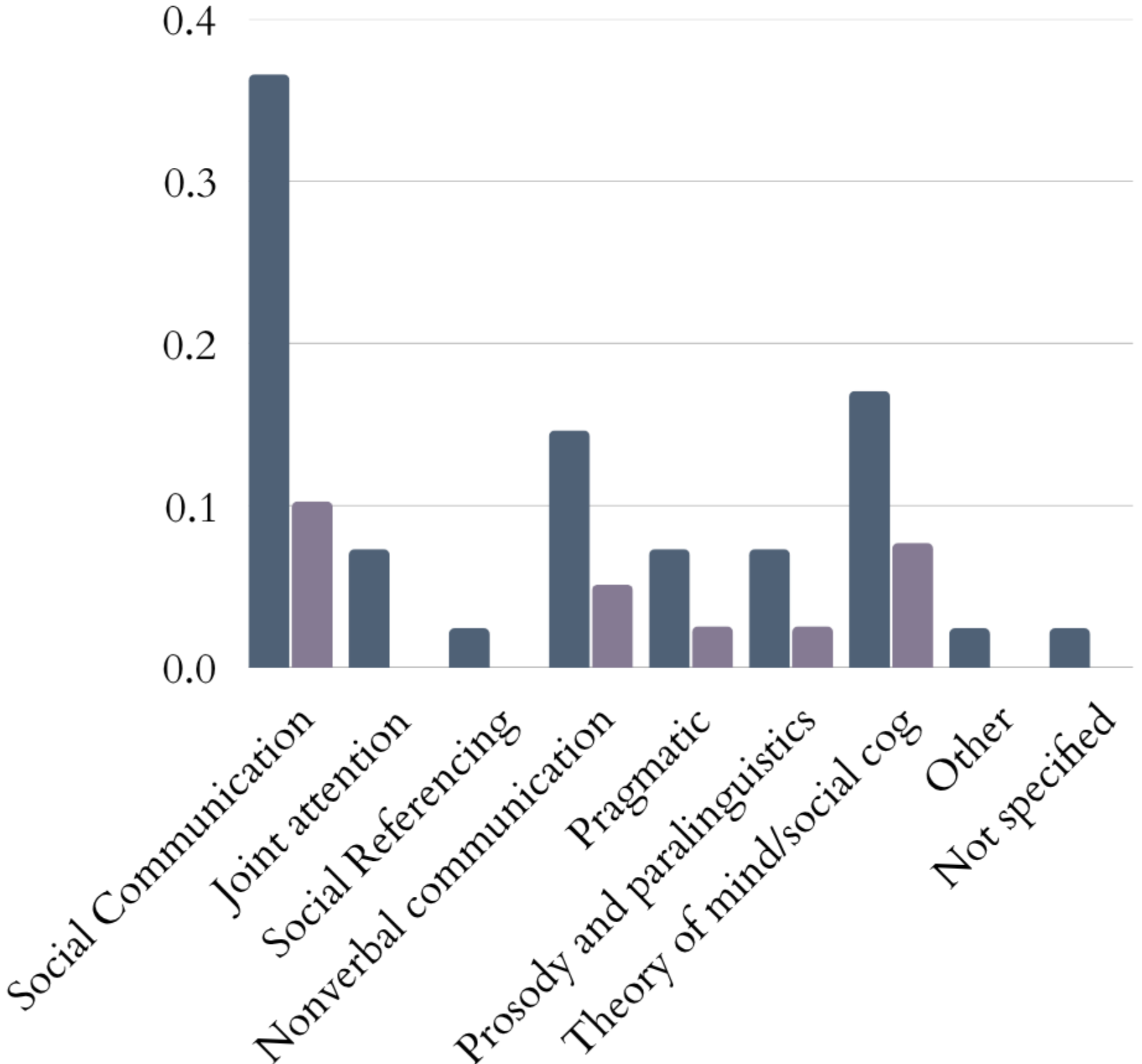


● ASD ● FASD

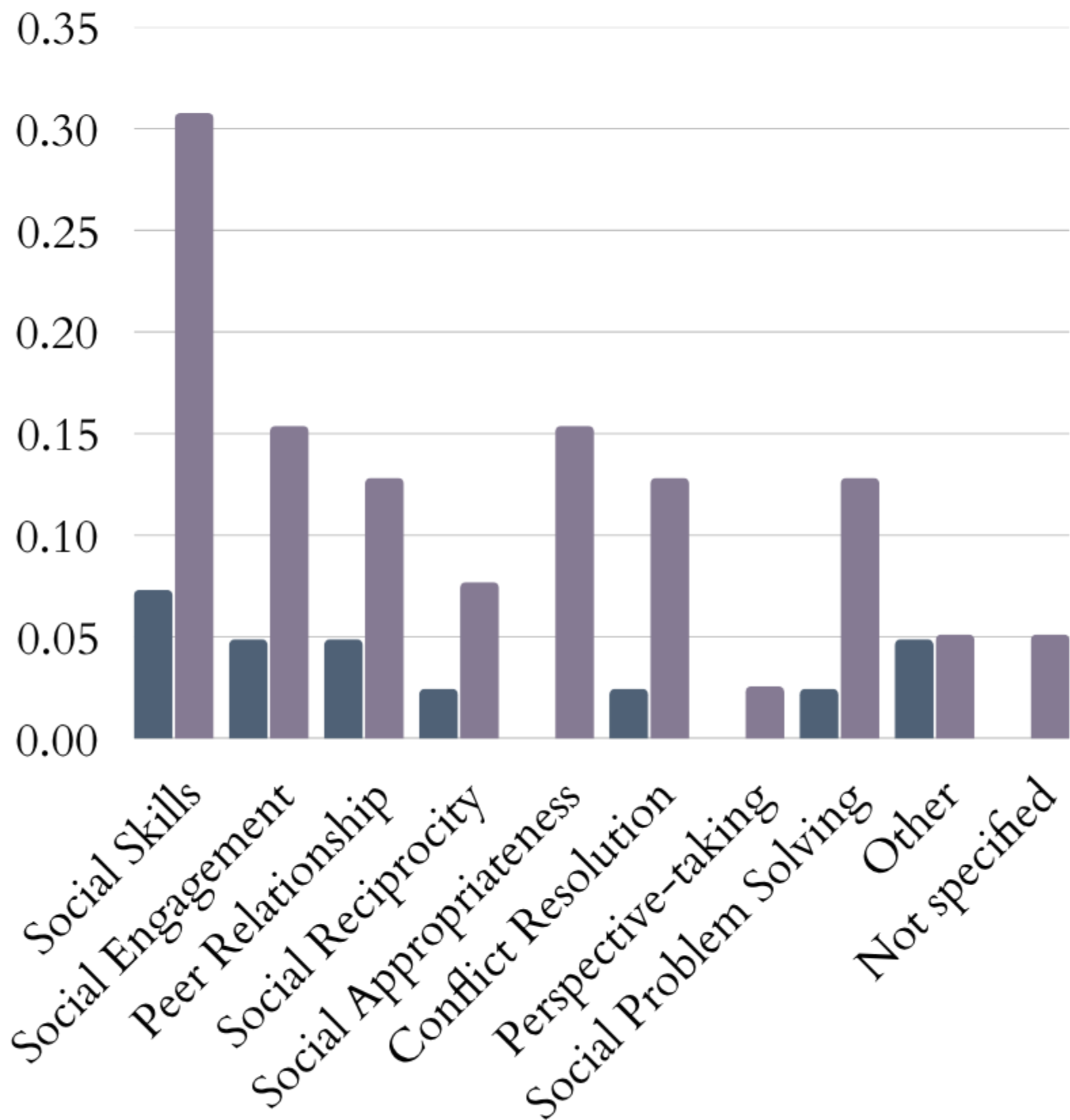
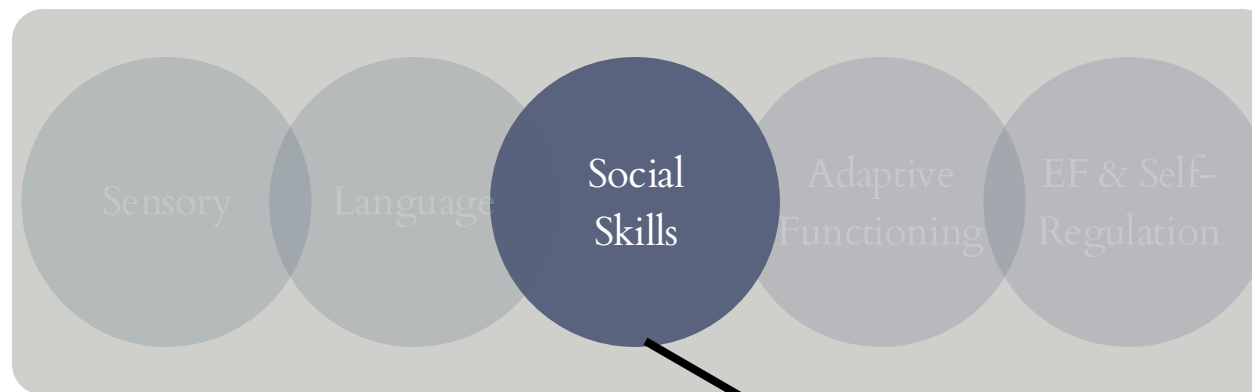
Social Communication

**FASD**

Struggle with interpretation of complex pragmatics (interpreting facial expressions)



● ASD ● FASD



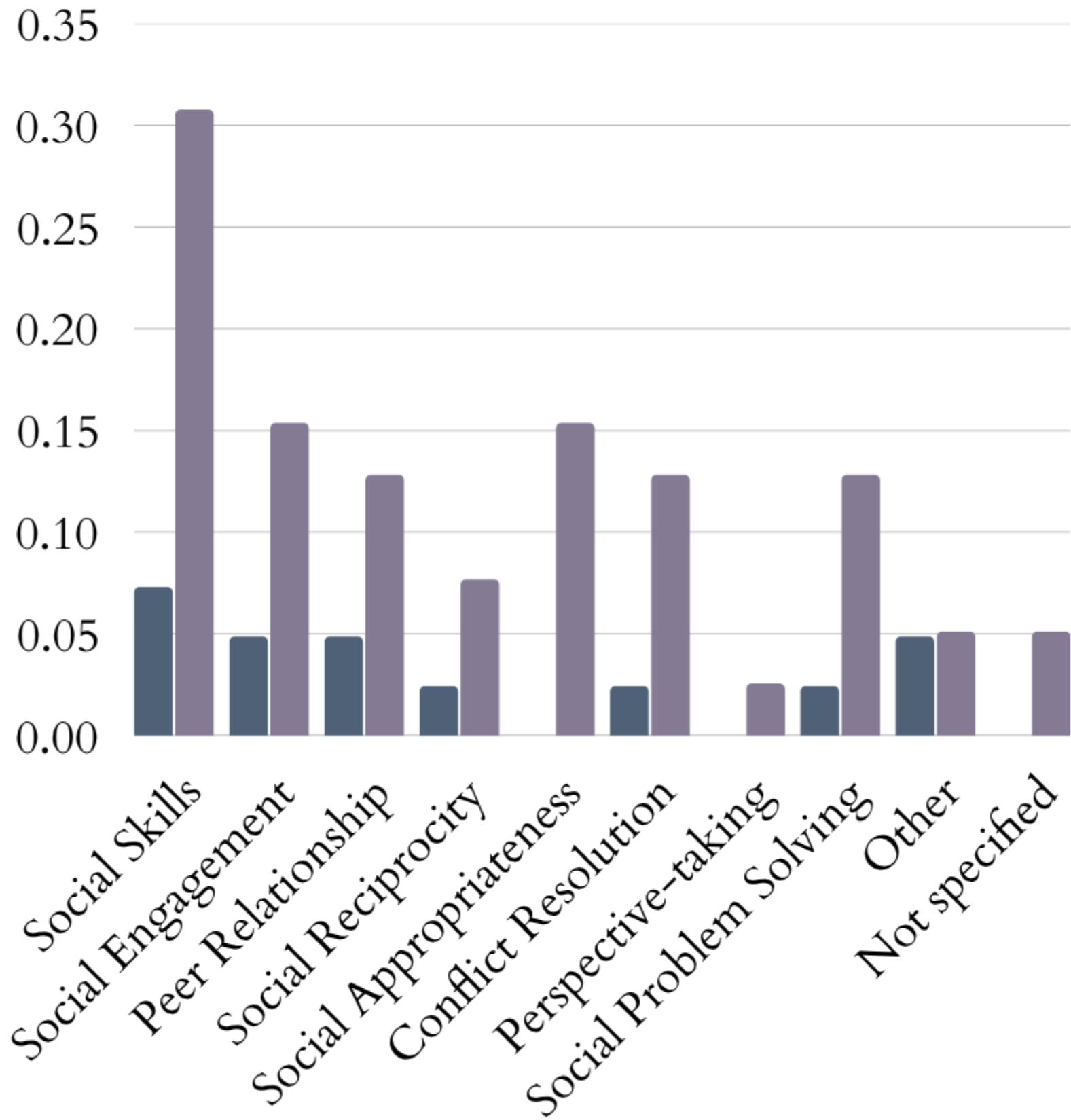
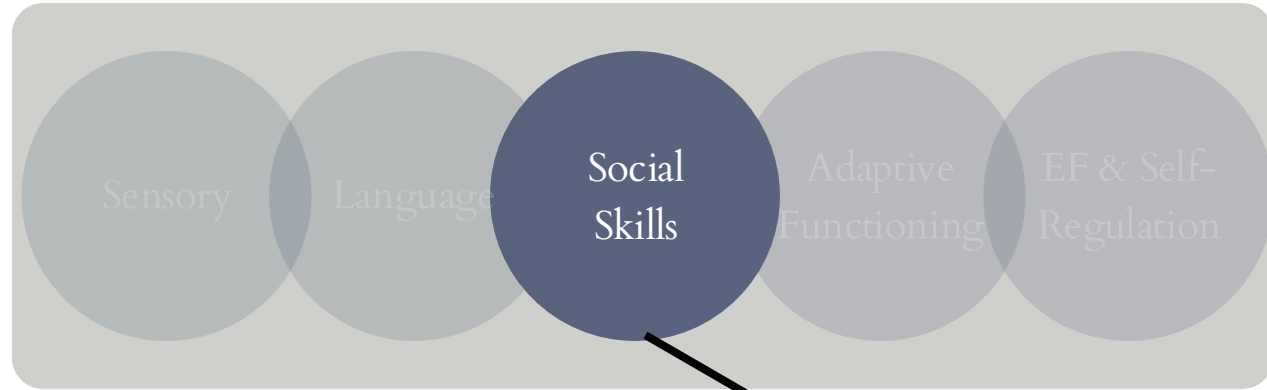
Social Skills

## Autism

Differences in brain activation for both social and non-social rewards

Difficulties understanding and conforming to rules leads to peer rejection/challenges

● ASD ● FASD



Social Skills

FASD

Higher "negative attributions" in peer entry (assuming others are being mean)

Social interactions are impacted by executive functioning



# Adaptive

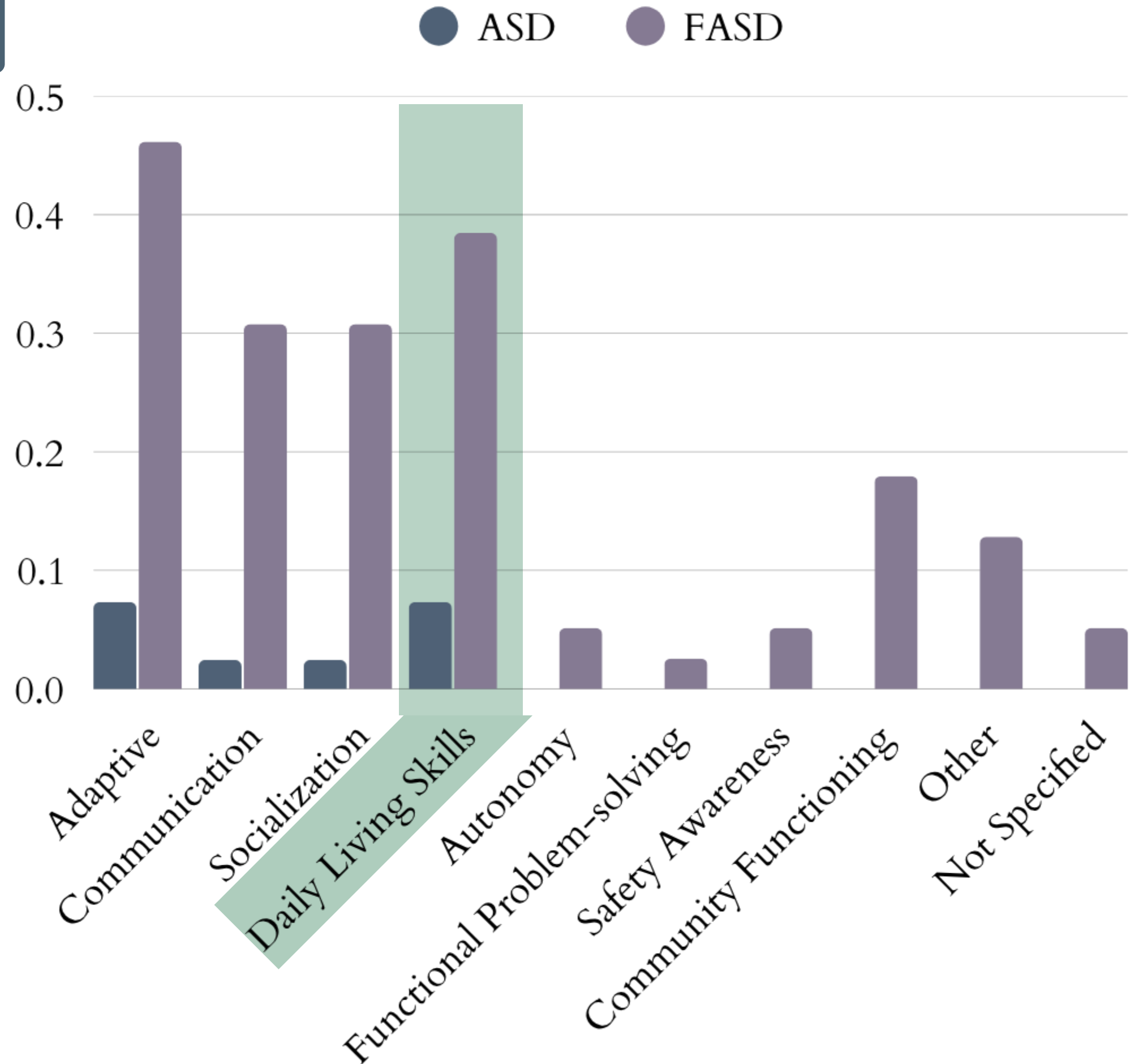
Functioning in everyday life relative  
to age and cultural expectations

# Adaptive Functioning

## Autism

Adaptive functioning heavily tied to IQ and symptom severity

Literature is mixed on whether Restricted/Repetitive Behaviors impact daily living skills

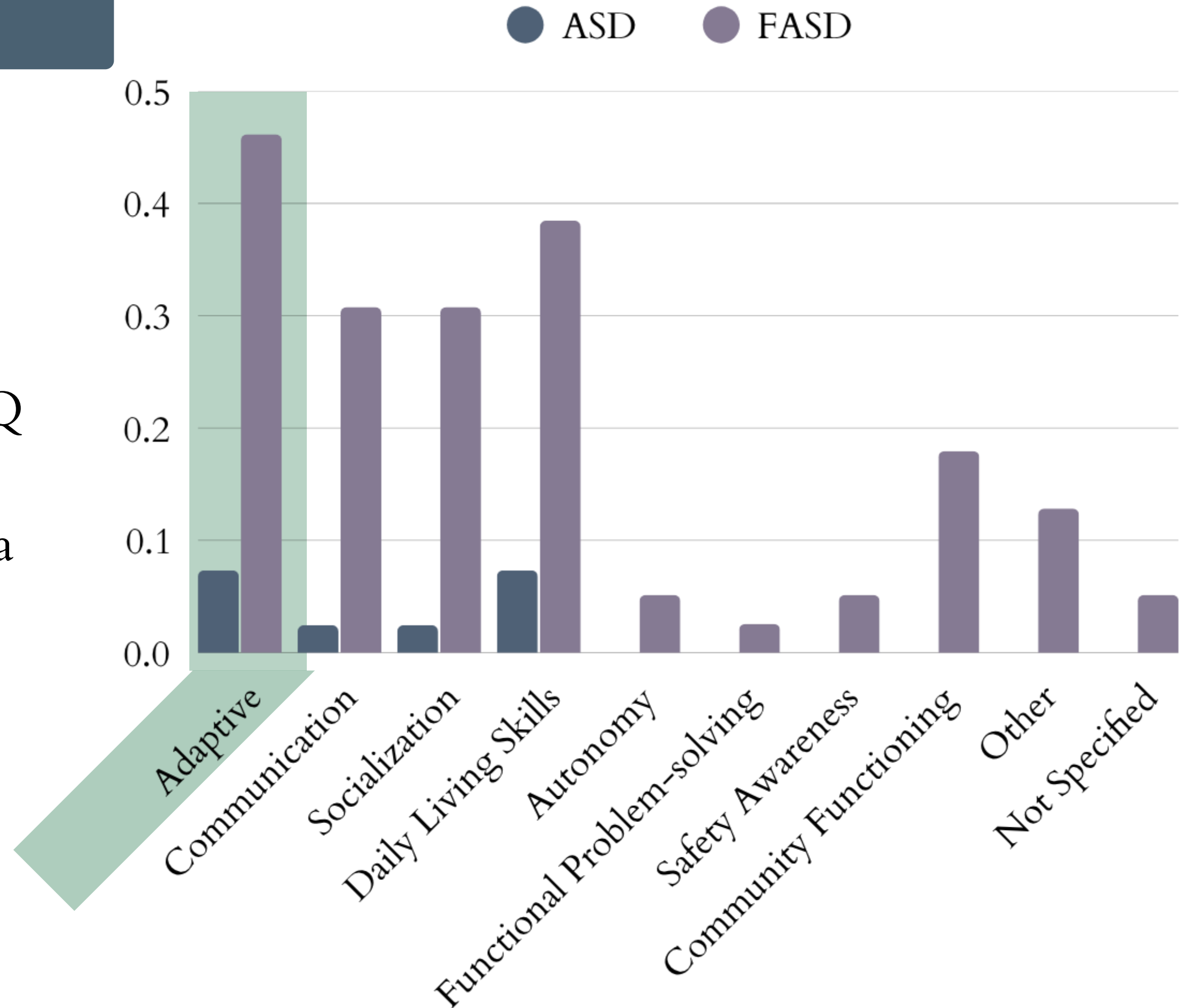


# Adaptive Functioning

## FASD

Adaptive skills are independent of IQ

Overall, adaptive functioning is area of significant challenge





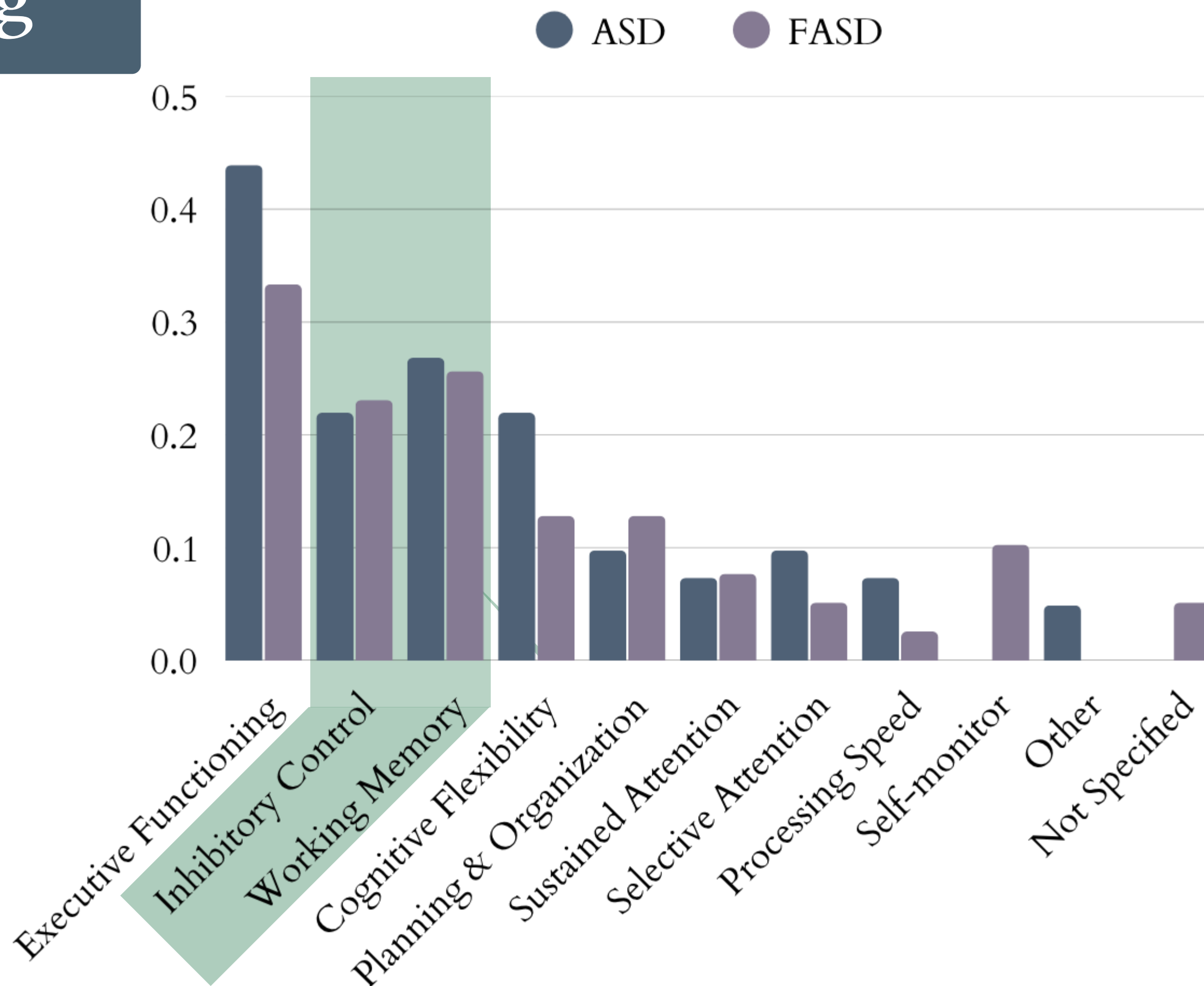
# Executive Functioning

Functioning in everyday life relative  
to age and cultural expectations

# Executive Functioning

## Both FASD & ASD

Reasoning and problem solving  
are areas of significant difficulty

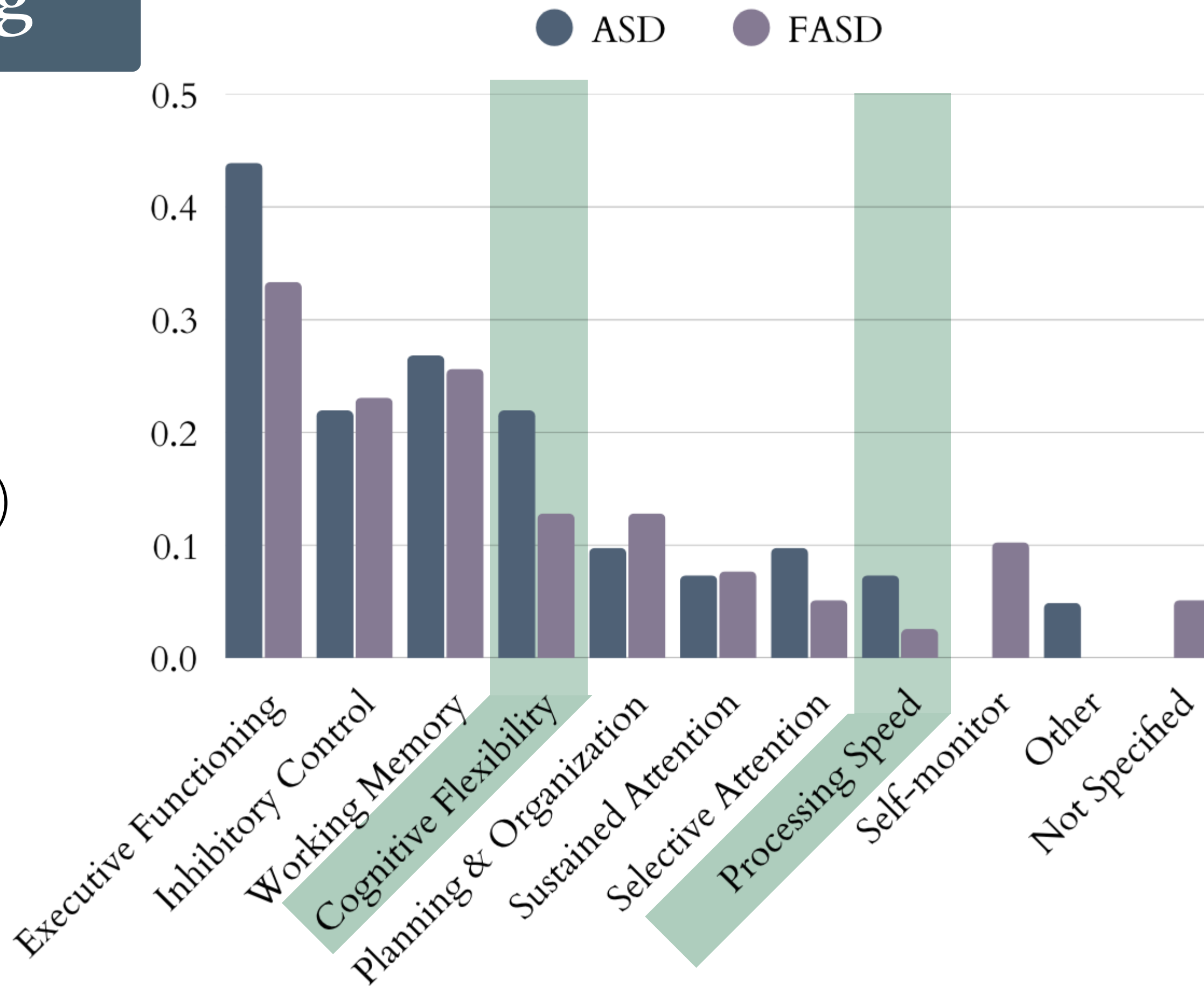


# Executive Functioning

## Autism

Specific challenges with:

- Initiation (time-based memory)
- Processing speed
- Cognitive flexibility

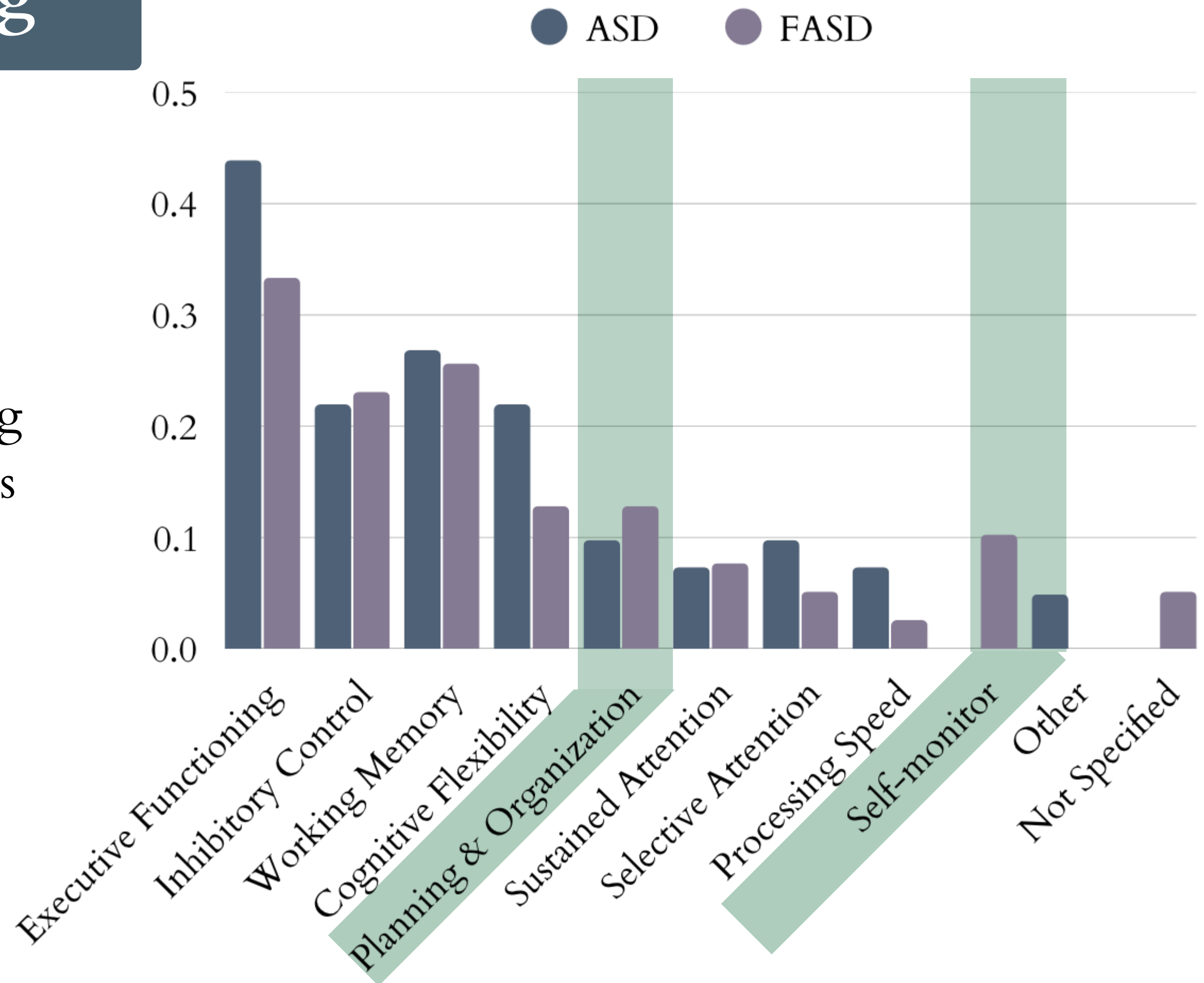


# Executive Functioning

## FASD

Cumulative executive functioning profile that is “global” across areas

More focus on planning, organization, and monitoring





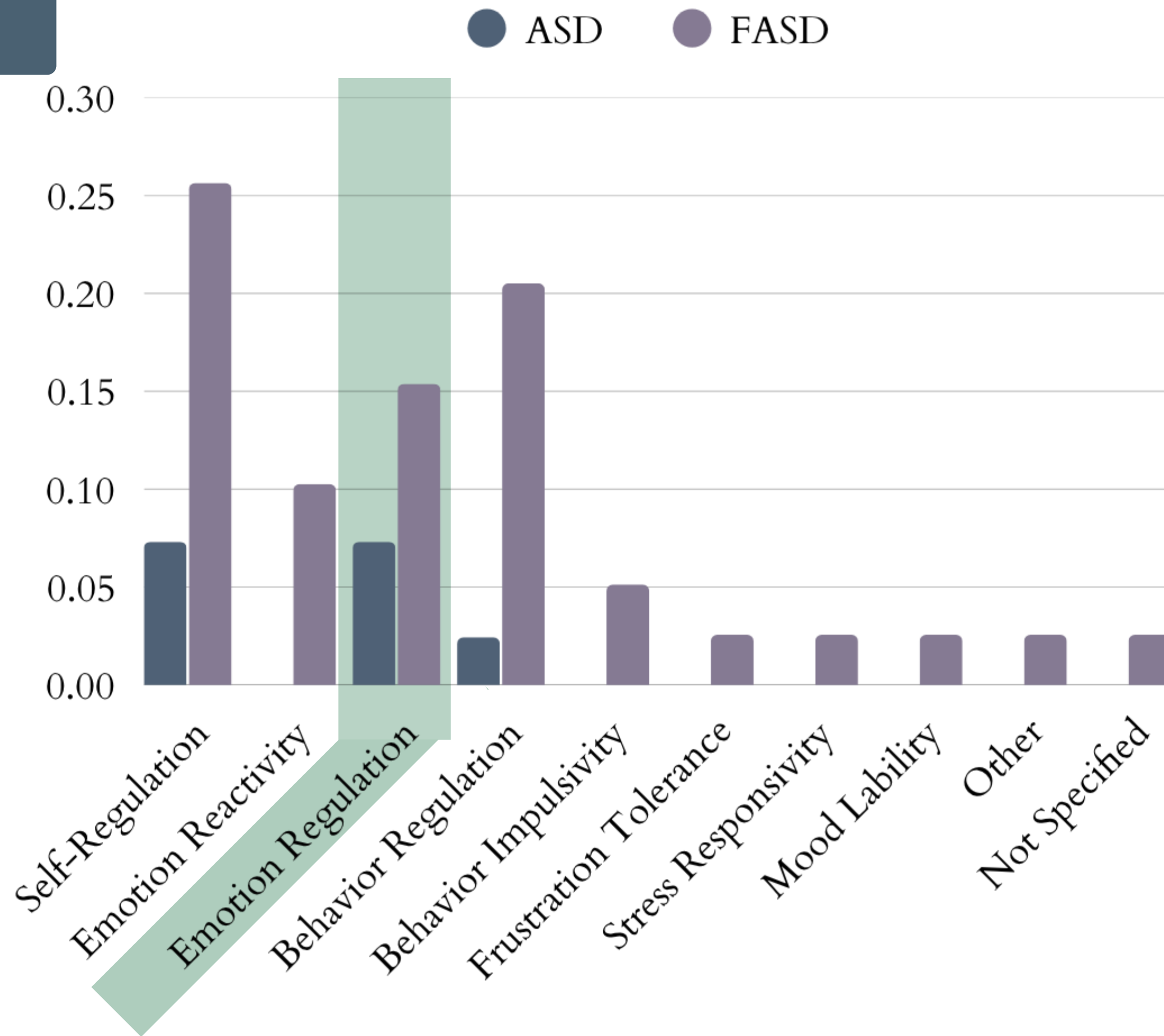
# Self-Regulation

Functioning in everyday life relative  
to age and cultural expectations

# Self-Regulation

## Autism

Focus on emotion regulation tied to Restricted and Repetitive Behaviors (RRBs) and difficulty with transitioning

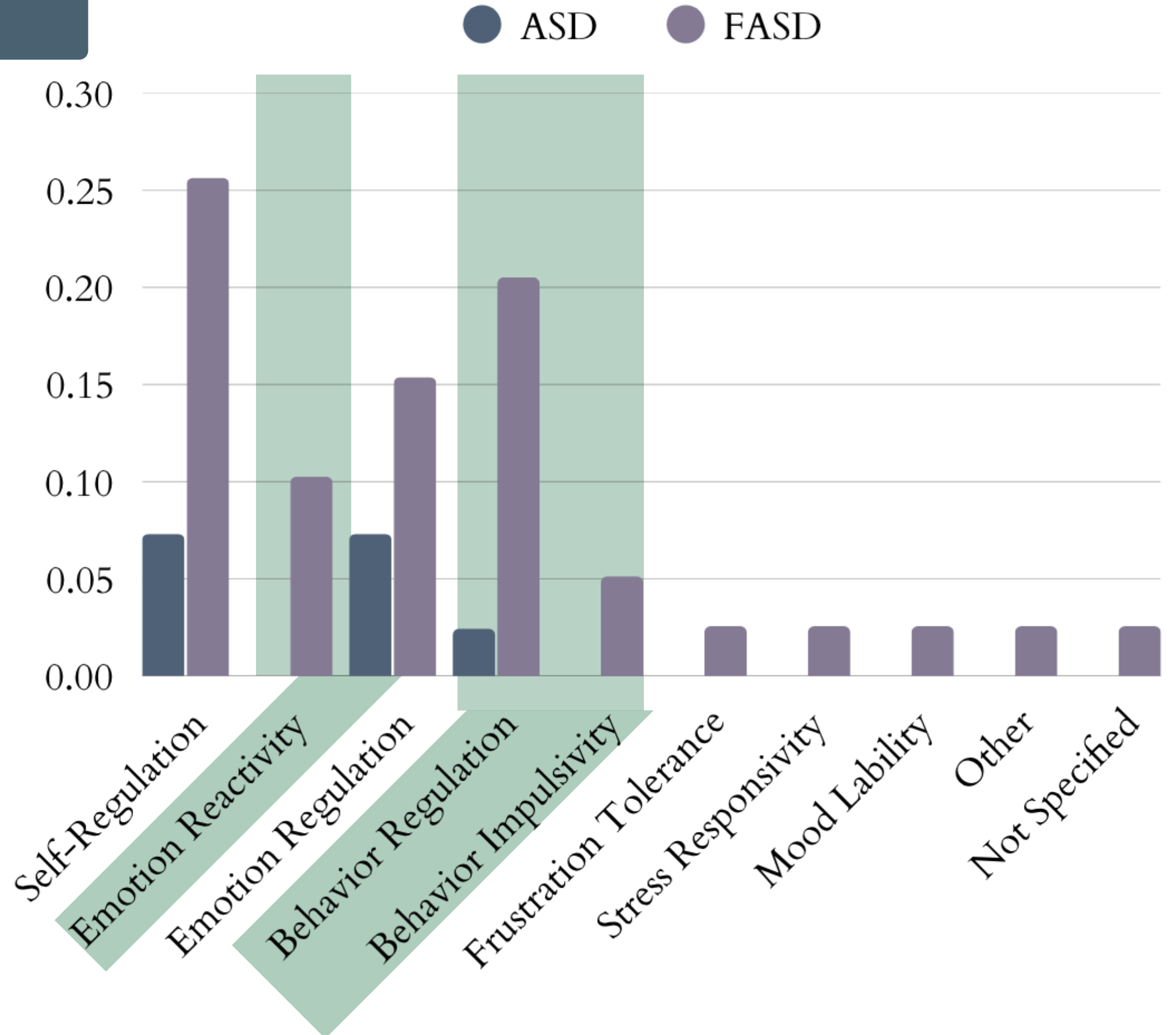


# Self-Regulation

## FASD

Focuses on long-term outcomes  
(e.g., legal problems, substance  
misuse, school disruption)

Focus on Impulse Control and  
Affect Regulation



# Next Steps

Bridging research  
& clinical application

# Understanding the State of the Literature

Consistent evidence  
in literature

**AND**

With multiple  
methods

(e.g. questionnaires **AND**  
direct assessment)

Mixed evidence  
in literature

**OR**

Small amount  
of literature

**OR**

Limited methods  
(e.g. **ONLY** questionnaires)

Gap  
in literature

Subdomain		ASD	FASD	Comparison
Social Communication	Joint attention	Green	White	Green
	Nonverbal communication	Green	Yellow	Green
	Theory of mind	Green	White	Yellow
	Pragmatic language	Yellow	Yellow	Yellow
	Social reciprocity	Green	Yellow	Yellow
Social Skills	Peer Relationships	Green	Green	Yellow
	Social Skills	Green	Green	Yellow
Executive Functioning	Inhibitory control	Green	Green	White
	Attention	White	Green	White
	Cognitive flexibility	Yellow	Green	White
	Working memory	Yellow	Green	Yellow
Self-Reg	Self-regulation	Green	Green	Yellow
	Behavioral impulsivity	White	Green	White
Lang.	Narrative language	Yellow	Green	Yellow
	Receptive/expressive	Green	Yellow	White
	Vocabulary	Green	Yellow	White
Sensory	Sensory processing	Green	Green	White
	Sensory modulation	Green	Green	White
Adaptive	Adaptive functioning	White	Green	White
	Daily living skills	Yellow	Green	White
	Safety awareness	White	Yellow	White
	Functional problem-solving	White	Yellow	White

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	Safety awareness			
	Functional problem-solving			

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Social Communication	Joint attention	Dark Green		Light Green
	Nonverbal communication	Dark Green	Yellow	Light Green
	Theory of mind	Dark Green		Yellow
	Pragmatic language	Yellow	Yellow	Yellow
	Social reciprocity	Dark Green	Yellow	Yellow
Social Skills	Peer Relationships	Dark Green	Light Green	Yellow
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	Attention		Light Green	
	Cognitive flexibility	Yellow	Light Green	
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	Safety awareness		Yellow	
	Functional problem-solving		Yellow	

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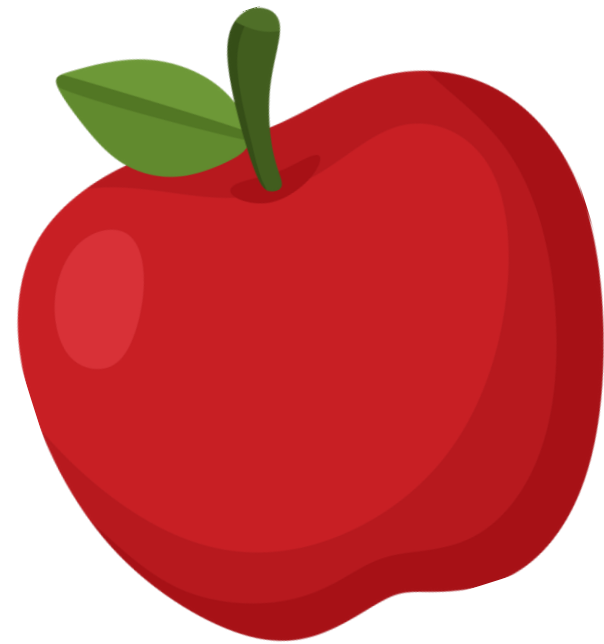
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	Functional problem-solving			

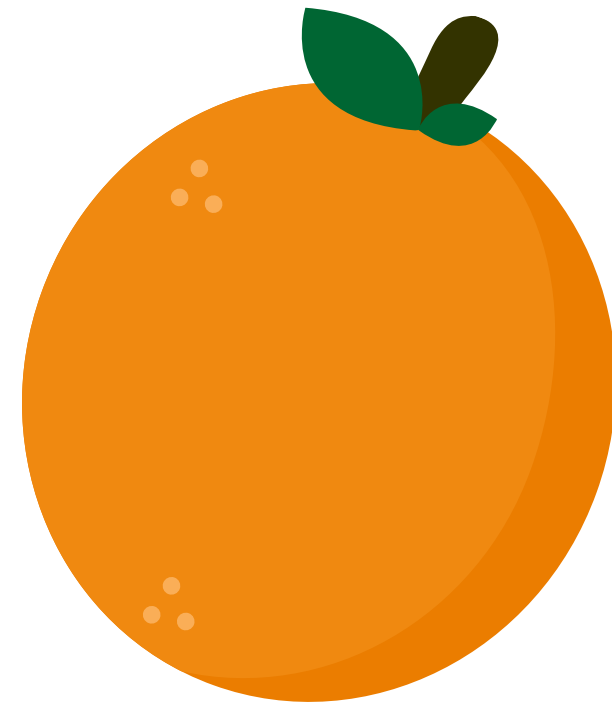
Subdomain		ASD	FASD	Comparison
Social Communication	Joint attention			
	Nonverbal communication			
	Theory of mind			
	Pragmatic language			
	Social reciprocity			
Social Skills	Peer Relationships			
	Social Skills			
Executive Functioning	Inhibitory control			
	Attention			
	Cognitive flexibility			
	Working memory			
Self-Reg	Self-regulation			
	Behavioral impulsivity			
Lang.	Narrative language			
	Receptive/expressive			
	Vocabulary			
Sensory	Sensory processing			
	Sensory modulation			
Adaptive	Adaptive functioning			
	Daily living skills			
	Safety awareness			
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# FASD & ASD



??



# Now What?



Interpret current  
findings in literature\*



Create trainings  
& toolkits



More comparative  
research in gap areas

*\*publication in preparation*

# Data Screening and Extraction Team



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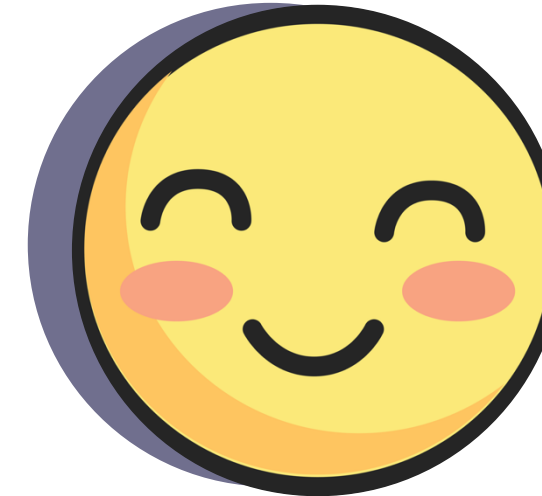
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Marina Pang



Neurodiversity  
Community

Questions?