

# SPARED VS. IMPAIRED SOCIAL BEHAVIOR IN INFANTS LATER DIAGNOSED WITH ASD



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**Marian Sigman, Ph.D.**  
(1941-2012)



# The proposal

Sir Michael Rutter



Simon Baron-Cohen





# Study the Prodrome

- Challenge: Average age of diagnosis is 5
- Incentive: Parents report signs by the first birthday
- Clinical science
  - Early detection
  - Early intervention
- Basic science
  - Processes affected first
  - Earliest signs may help in search for biological markers





# BSRC

2014 ANNUAL REPORT



## Baby Siblings Research Consortium

University of Alberta (Zwaigenbaum)

Boston University (Tager-Flusberg)

British Autism Study of Infant Siblings (Charman)

University of Calgary (Curtin)

University of California Davis (Hertz-Piccioto, Ozonoff, Rogers)

University of California Los Angeles (Hutman)

University of California San Diego (Carver, Dobkins)

Children's Hospital of Boston & Harvard University (Nelson)

University of Connecticut (Fein)

Dalhousie University (Bryson)

Emory University, Marcus Autism Center (Klin)

Hebrew University (Yirmiya)

Institute of Basic Research, NY (Gardner)

Kennedy Krieger Institute (Landa)

University of Massachusetts, Boston (Carter)

University of Miami (Messinger)

University of North Carolina, Infant Brain Imaging Study (Piven)

University of Pittsburgh (Iverson, Strauss)

University of Washington (Stone, Webb)

Yale University (Chawarska)



# Research Design: High-Risk Infants





# Research Design



High-Risk Typical (46%)

High-Risk Atypical (35%)



High-Risk with ASD (19%)





# Social Behavioral Markers of ASD at 12 months

Social Behavior	Citation	Social Behavior	Citation
Showing	1	Gaze to face (person)	5-7
Pointing	1	Response to Name	2
Requesting	1	Social Smiling	2, 6
Response to Pointing	1	Social vocalizations	6
Expressive and Receptive Language	1, 2	Engagement with researcher	7
Response to Distress	3, 4	Imitation	2, 8

(1) Rozga et al., 2011; (2) Zwaigenbaum et al., 2005; (3) Hutman et al, 2010;  
(4) McDonald et al., 2011; (5) Hutman et al., 2012; (6) Ozonoff et al., 2010;  
(7) Macari et al., 2011; (8) Young et al., 2012



# Decreased Spontaneous Attention to Social Scenes in 6-Month-Old Infants Later Diagnosed with Autism Spectrum Disorders

Katarzyna Chawarska, Suzanne Macari, and Frederick Shic





# Decreased Attention to Social Scene - 6 months

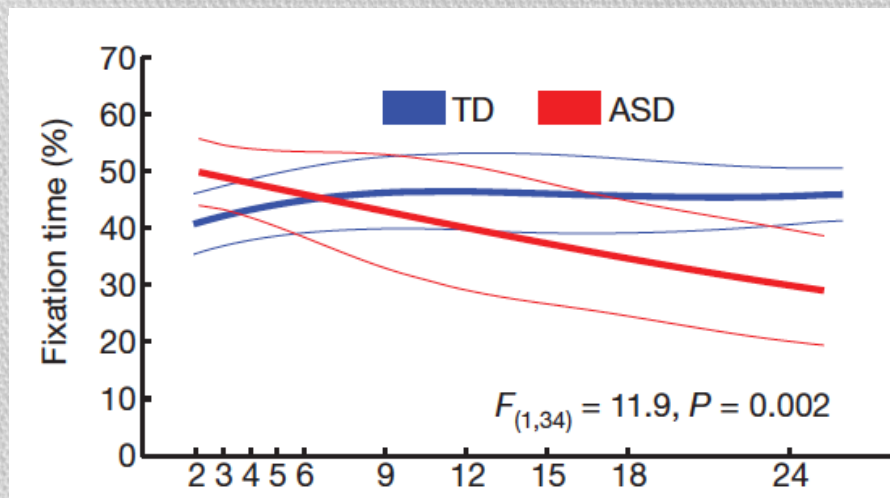
- Observed in
  - Chawarska, Macari & Shic, 2013
- Effect evaluated but not observed in
  - Elsabbagh et al., 2012
  - Jones & Klin, 2013
  - Ozonoff et al., 2010
  - Rozga et al., 2011
  - Young et al., 2009
  - Zwaigenbaum et al., 2005



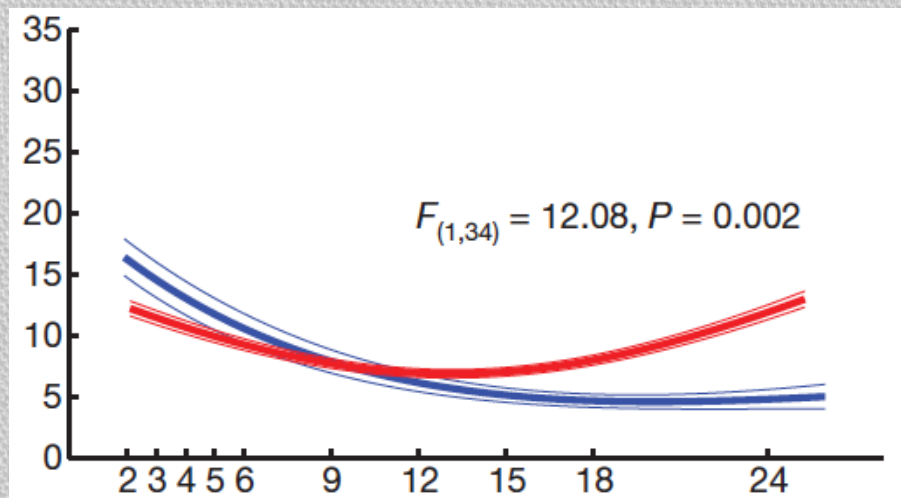


# Repeated Measures Visual Fixation on Dynamic Social Scene from 2-24 months

Fixation on actress' eyes



Fixation on objects





# Opportunity for treatment

“predispositions that are initially intact suggest a neural foundation that may be built upon, offering far more positive possibilities than if that foundation were absent from the outset.”

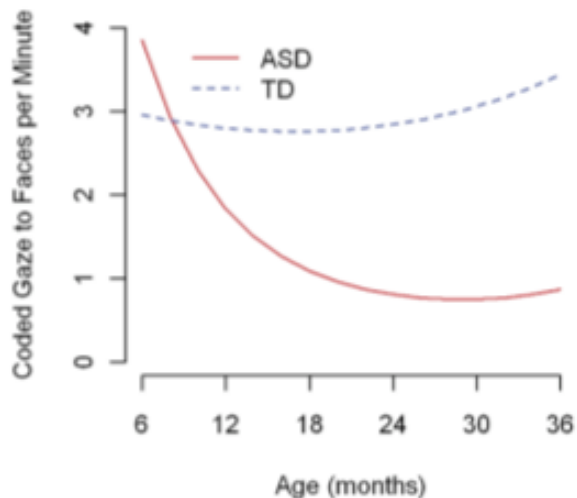
Jones & Klin, 2013, p. 430



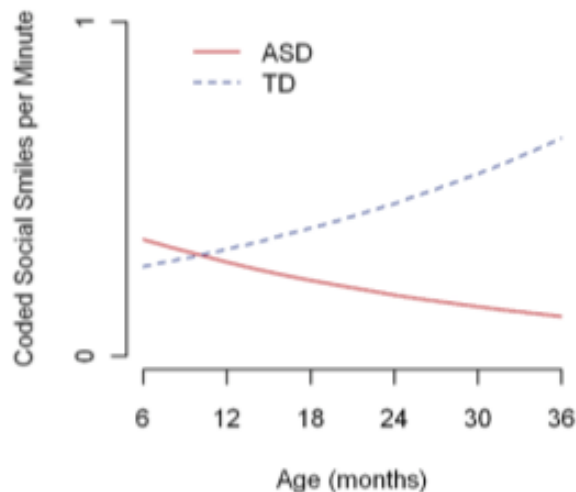
# A Prospective Study of the Emergence of Early Behavioral Signs of Autism

Sally Ozonoff, Ph.D., Ana-Maria Iosif, Ph.D., Fam Baguio, B.S., Ian C. Cook, Ph.D.,  
Monique Moore Hill, M.S., Ted Hutman, Ph.D., Sally J. Rogers, Ph.D.,  
Agata Rozga, Ph.D., Sarabjit Sangha, B.S., Marian Sigman, Ph.D.,  
Mary Beth Steinfeld, M.D., Gregory S. Young, Ph.D.

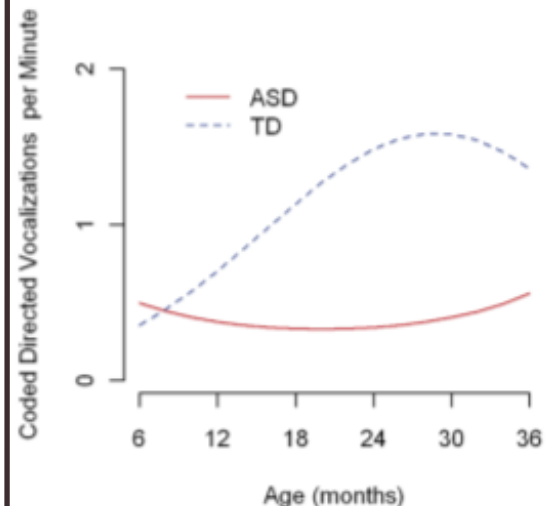
JOURNAL OF THE AMERICAN ACADEMY OF CHILD & ADOLESCENT PSYCHIATRY  
VOLUME 49 NUMBER 3 MARCH 2010



Gaze to Face



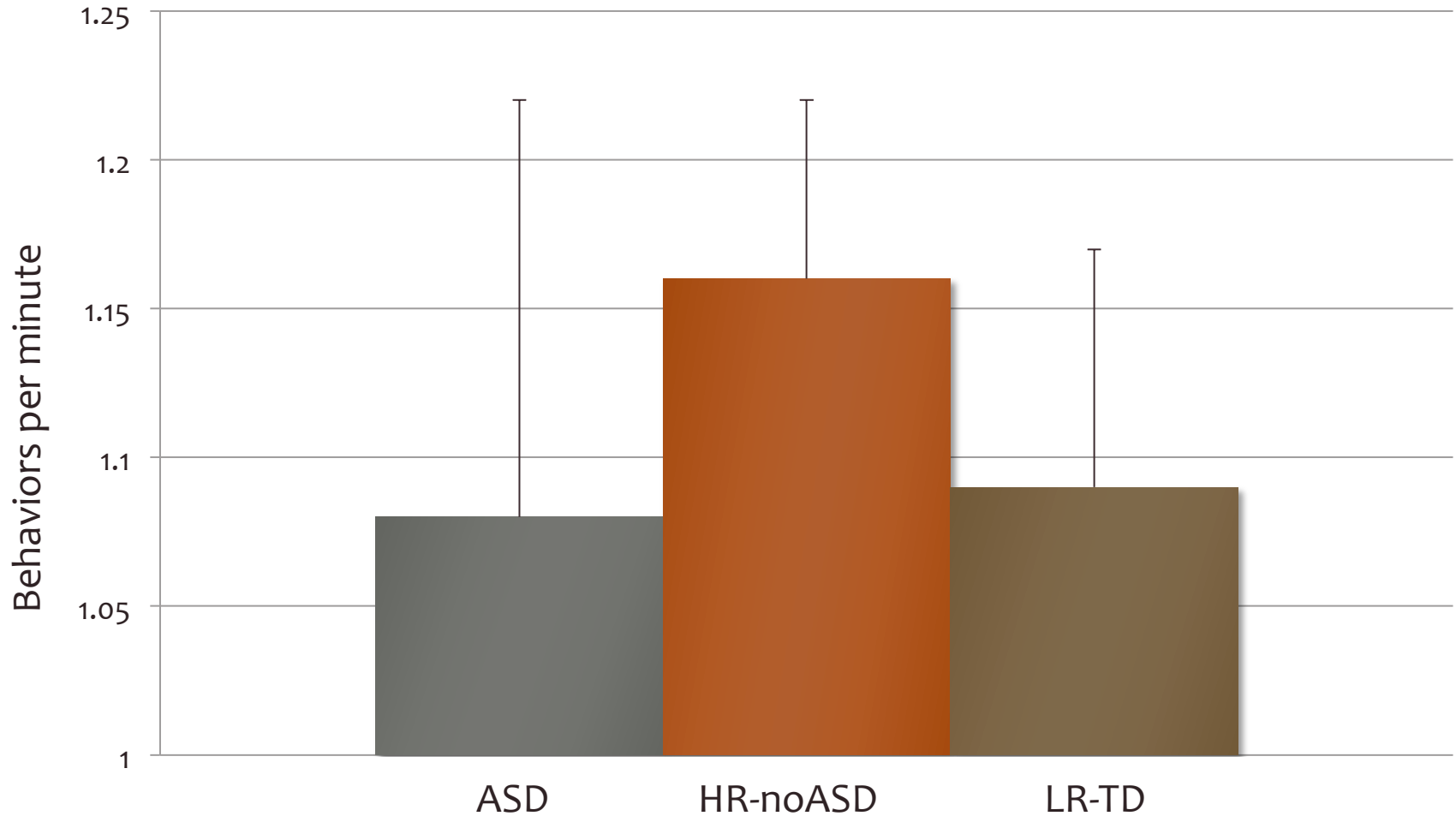
Social Smile



Directed Vocalization



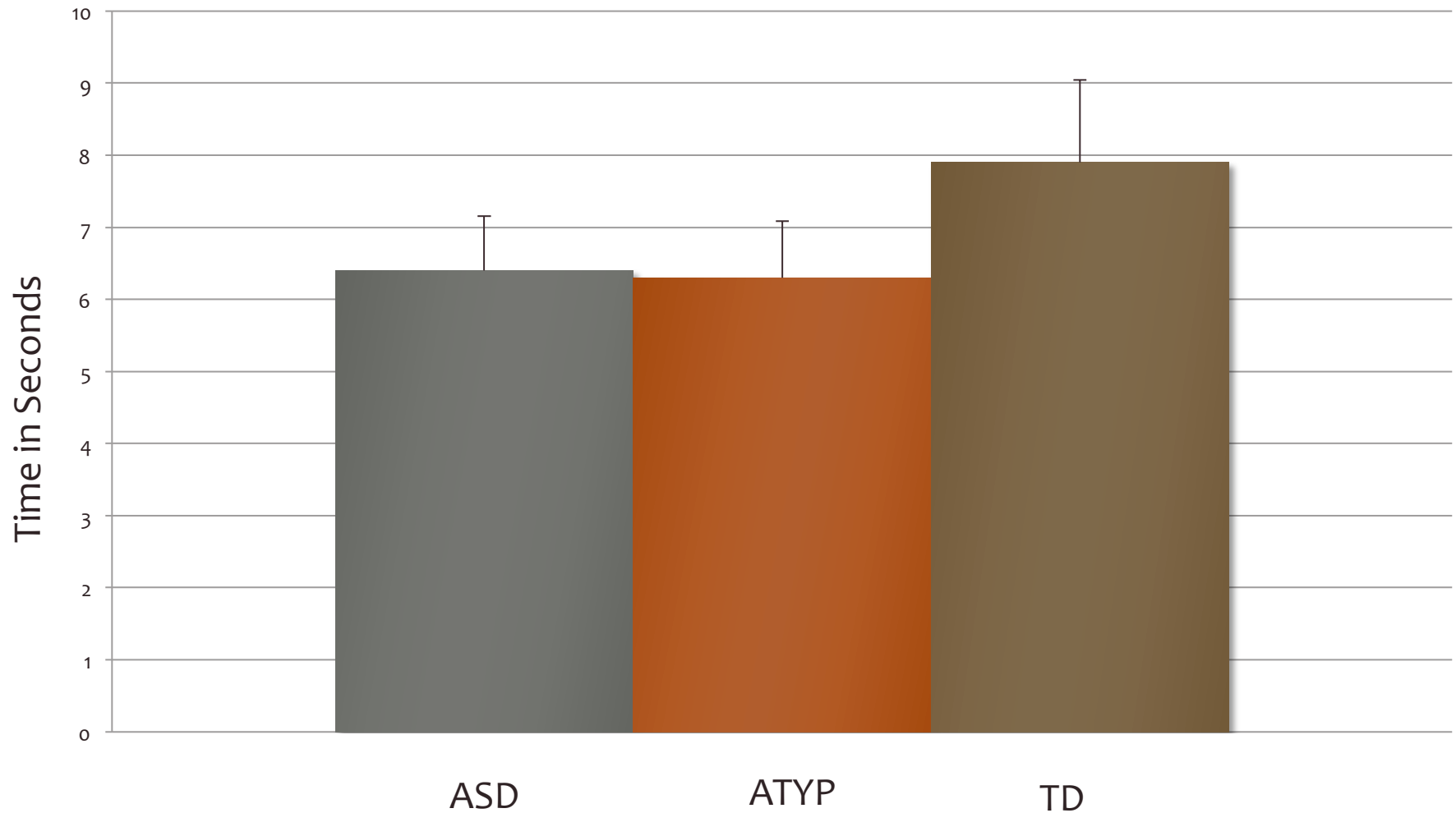
# Alternating Gaze to Initiate Joint Attention at 12 months



(Rozga et al., 2011)



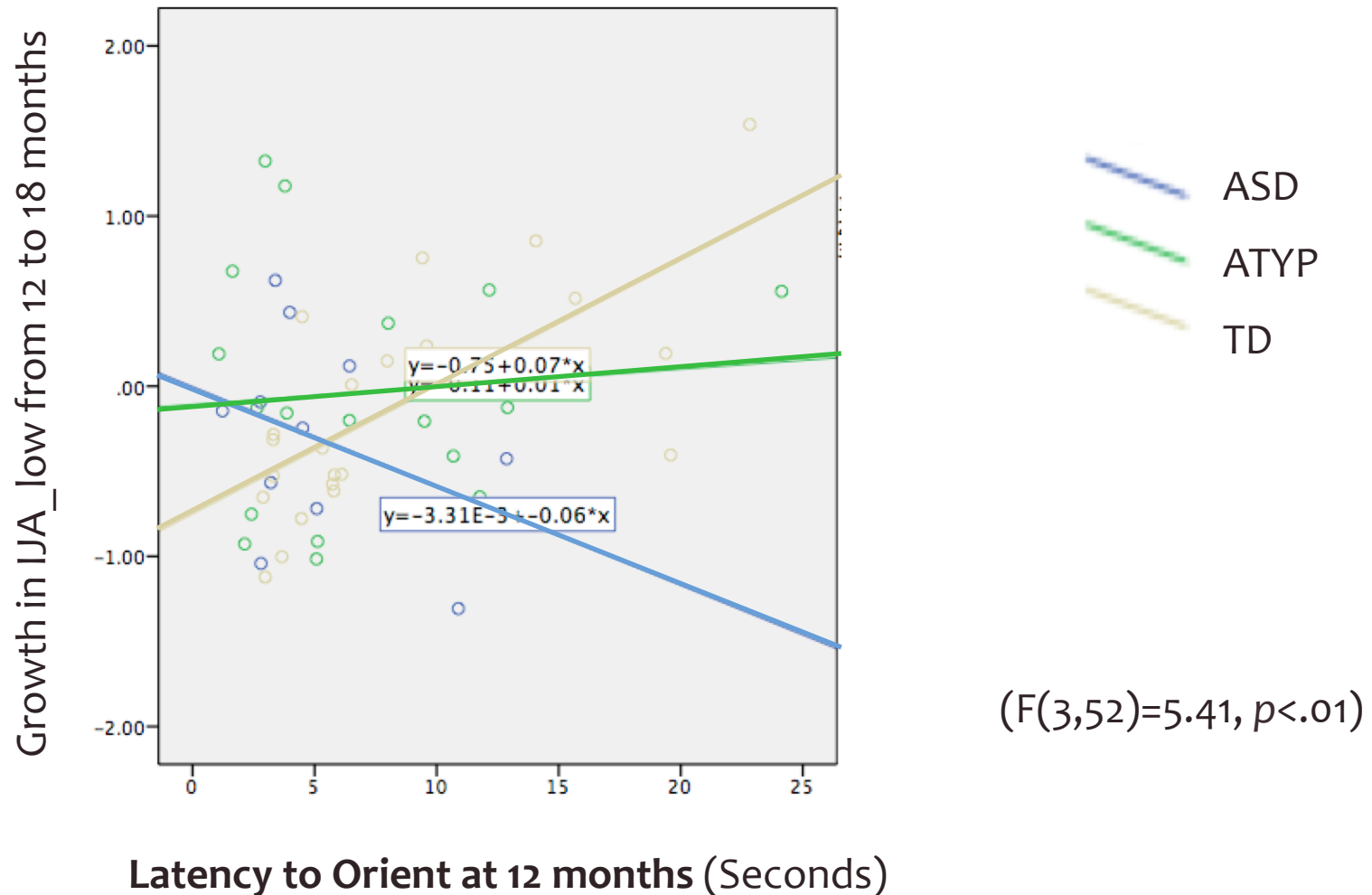
# Latency to Shift Attention from Toy to Examiner



(Ponting, Dull & Hutman, in preparation)

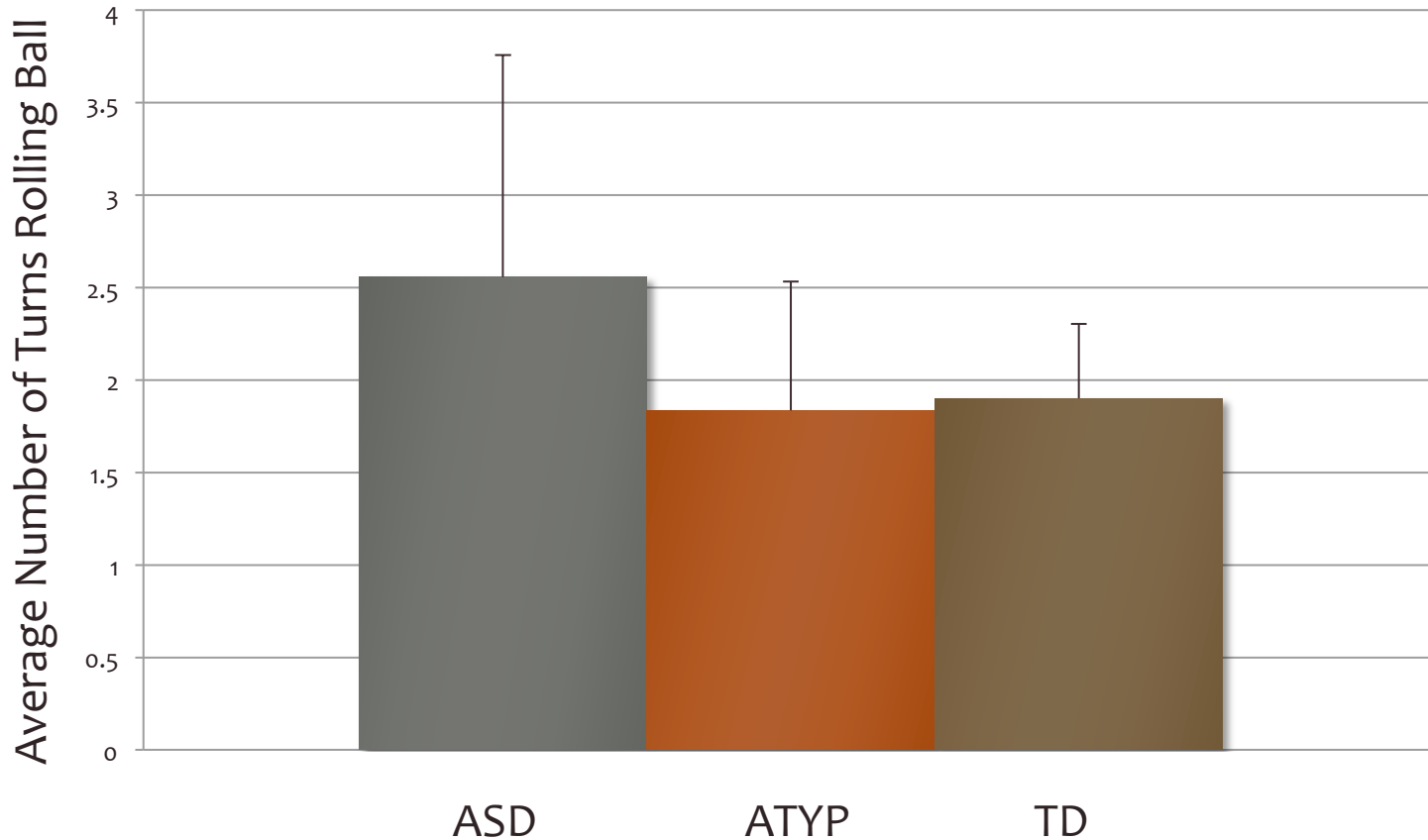


# Diagnostic Classification moderates relation between Latency and Growth in IJA





# Dyadic Interaction: Turn-taking with Ball



(Nguyen, Guevara & Hutman, in preparation)



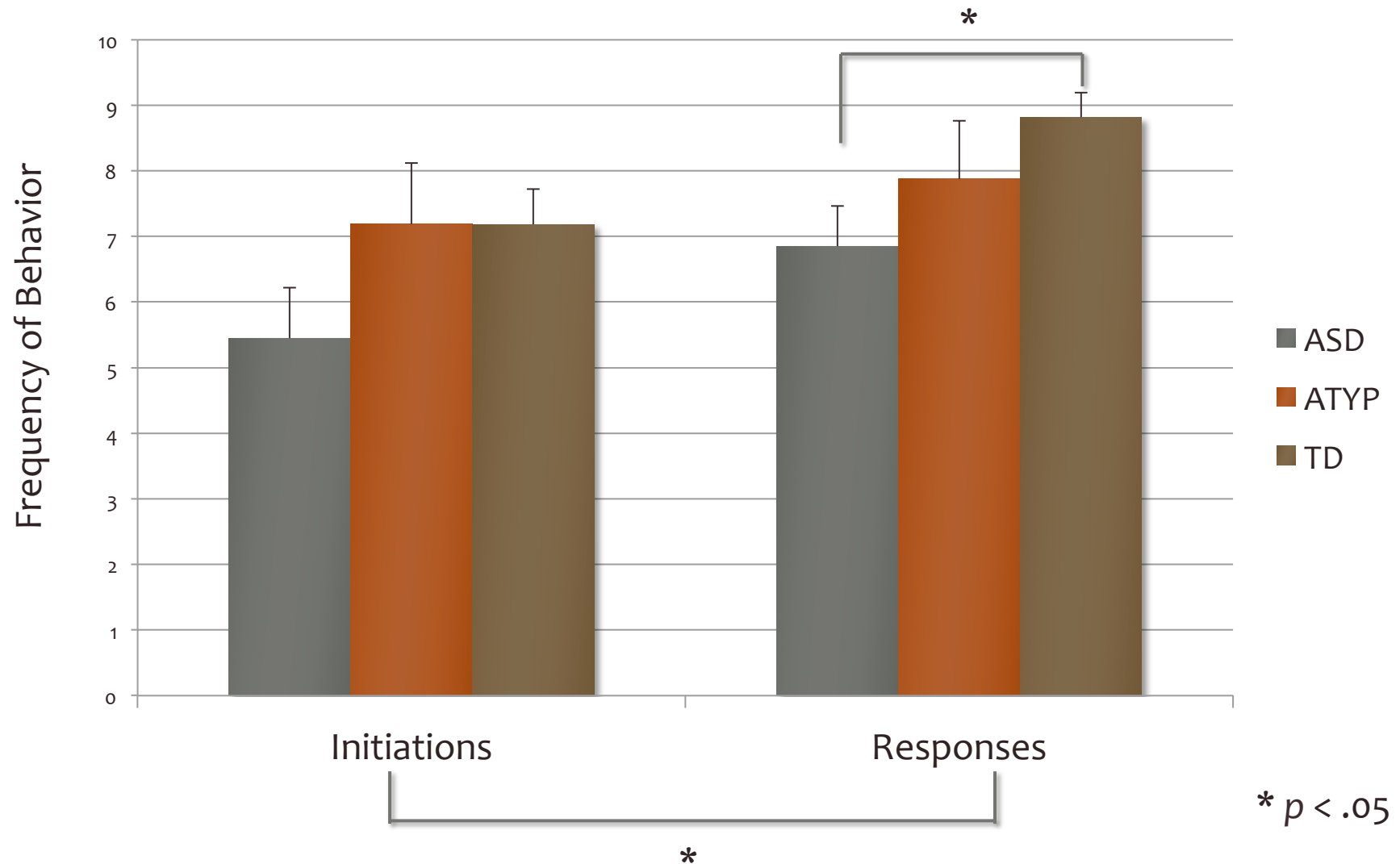
# Social overlay during ball rolling task

- Groups did not differ on
  - Frequency or magnitude of smiles
  - Duration of looks to the examiner
  - Combination of smiles and looks to the examiner
- Duration of looks to the examiner during ball task
  - Concurrently related to alternating gaze to coordinate interaction
    - $r = .38, p < .001$
  - Predicts same alternating gaze at 18 months
    - $r = .22, p < .05$
  - Predicts autism symptom severity at 24 months, but not 36 months
    - $r = -.26, p < .01$

(Beatty, La-Vu, Epps & Hutman, in preparation)

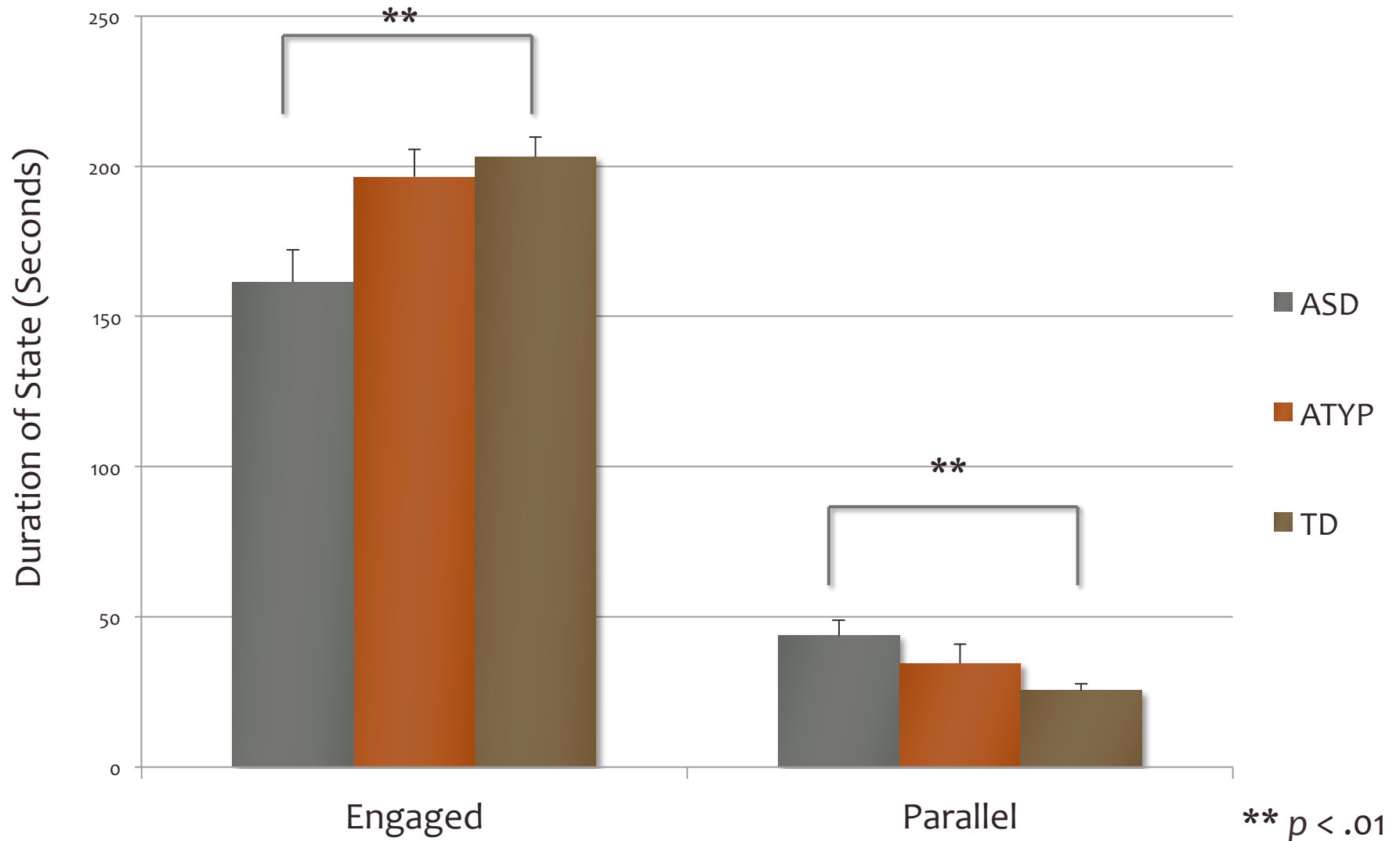


# Play Acts by Type and Diagnostic Group

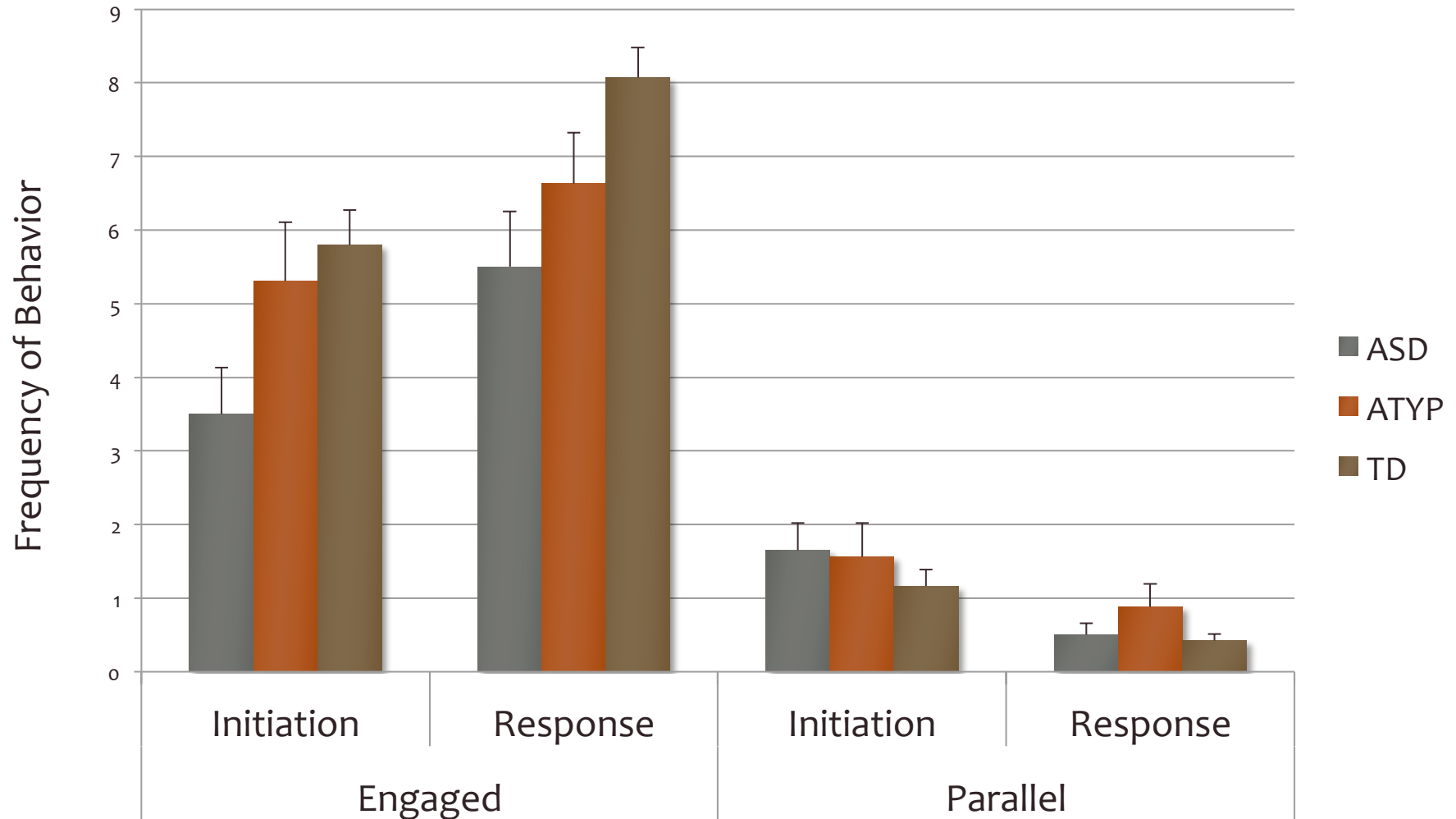




# Duration of social engagement states by group

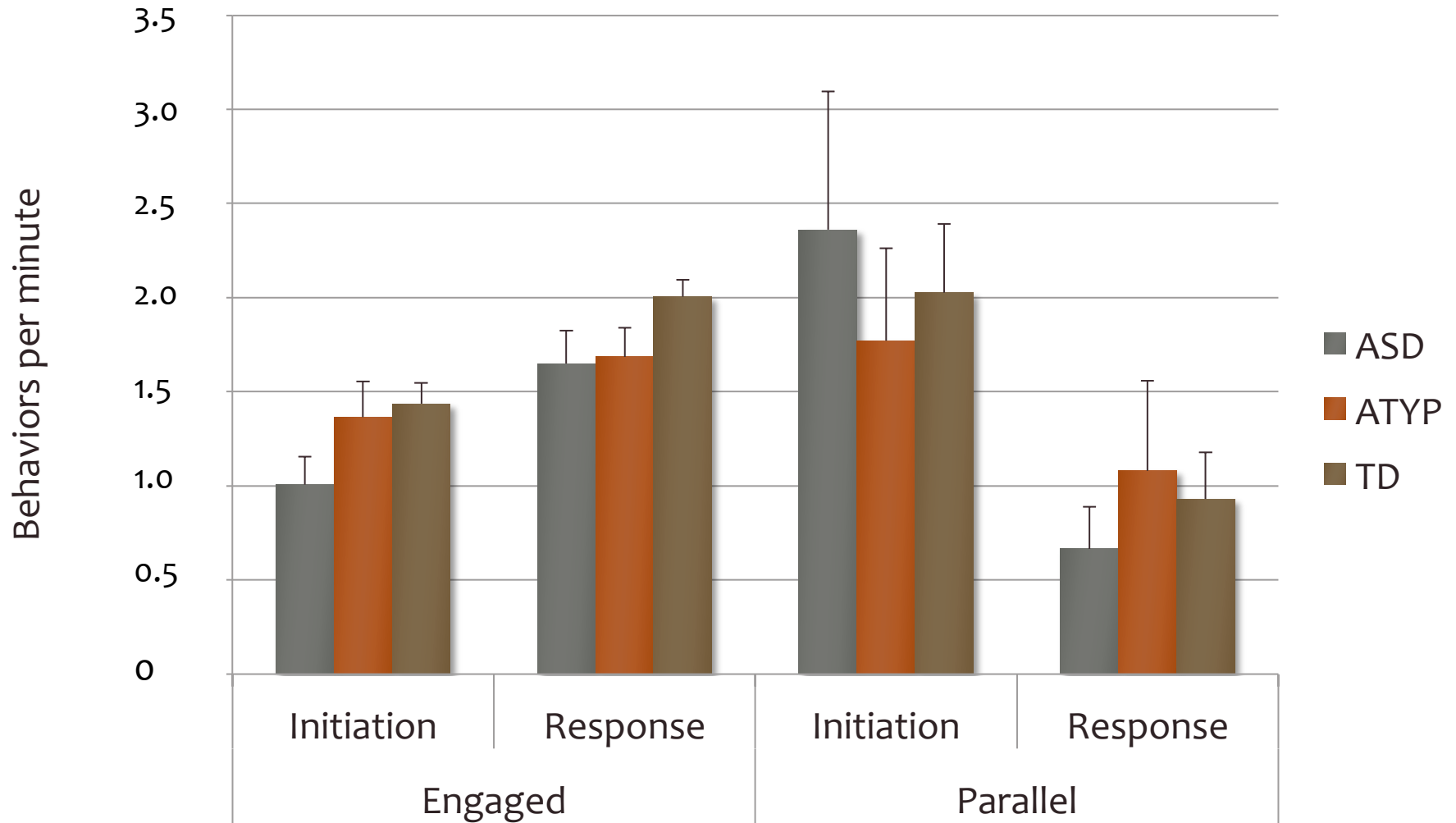


# Play Acts by Social Engagement Condition and Diagnostic Outcome Classification





# Rates per minute by condition, play act, and diagnostic group



# Summary

- Examined spared social behaviors in infants later diagnosed with Autism Spectrum Disorder in the domains of
  - Triadic interaction – alternating gaze to coordinate interaction
  - Dyadic interaction – back and forth game with ball
  - Toy play
- Measures/constructs of interest include
  - Time to convert private enjoyment into shared enjoyment
  - Attention to face and positive affect during play with an object
  - Initiations and Responses in the context of joint engagement with toys vs. parallel play



# Implications of Alternating Gaze

- Indicating and sharing interest by pointing and showing are impaired by 12 months, but alternating gaze appears to be spared
  - Breakdown of motor planning or initiation inhibiting pointing, showing?
  - Reinforce intact skills with praise
  - Practice in the context of playful interactions
  - Expand into pointing and showing
  - Latency effects suggest that TD infants accomplish something during longer attention to objects.
  - Explore longer latencies in children with ASD for problem with “sticky” attention



# Implications of Ball Rolling Task

- Back-and-forth play with ball is performed at least as much by infants with ASD as by infants without ASD
  - Attention to social partner and enjoyment of the task are intact
  - Back-and-forth exchanges and face-to-interaction appear to be easier for infants with ASD than interactions involving an external object
  - Alternating back-and-forth exchanges with triadic interactions may give way to broader areas of skill and enjoyment

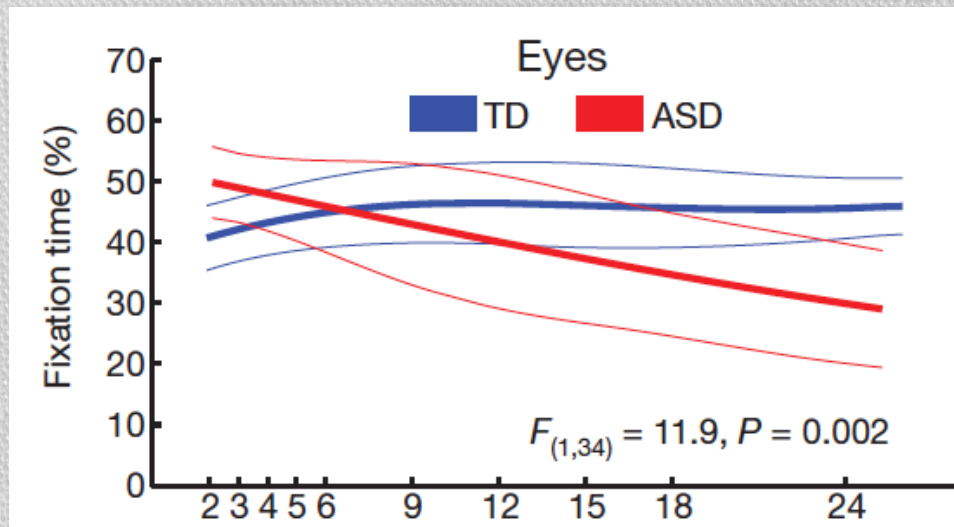


# Implications of Mother-Toddler Toy Play Study

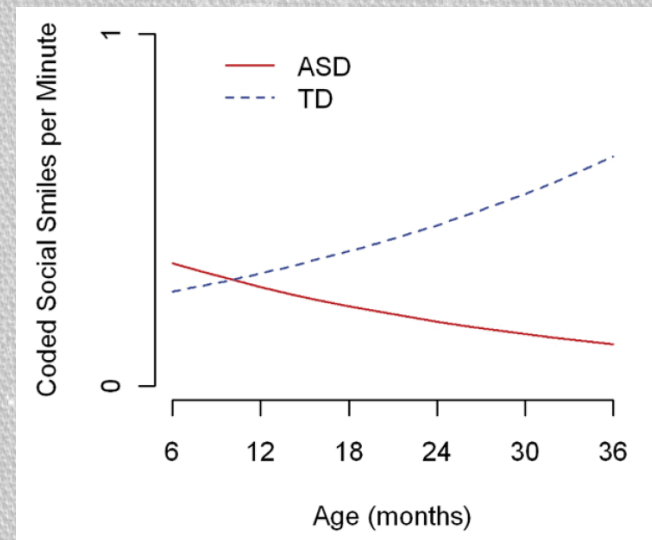
- Initiations and responses occur at comparable rates among toddlers with and without ASD
- Differences in frequency may be attributable to context of social engagement
- Treatments should focus on extend bouts of joint engagement
  - This depends both on the play partner and the toddler's ability to sustain attention to toys
  - Differences were observed in the frequency of responsive play acts whereas older children with ASD struggle with initiations
  - Therefore initiations should be strongly emphasized/reinforced before they lag in frequency relative to TD toddlers.



# Timing



Fixation on eyes



Social Smiles





# Acknowledgements



Thanks to all the families who have [participated](#) in this study.

## Investigators

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Brigid McCarthy  
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## Participating families will receive:

- ◆ \$30-50 for each visit to UCLA
- ◆ Developmental feedback
- ◆ A picture of your baby's brain
- ◆ Free intervention if eligible

*Eligible infants are under six weeks old and have either:*

- ◆ *More than one sibling with autism,*
- ◆ *One sibling with autism and an extended family history of the disorder, or*
- ◆ *No family history of autism or other developmental disorders*



**This study involves several visits to UCLA in your baby's first year and will include:**

- ◆ EEG, MRI, and Eye-tracking
- ◆ Developmental assessments



# Contact

- Infant Sibling Research Study
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