A Multi-Site Study of Noldus EthoVision XT Video Tracking of Children with and without Autism: Results from the ABC-CT

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Background

Parent-child interactions are a naturalistic method of measuring child behaviors and response to treatment. Manual coding of child behaviors is time-intensive and subjective. Video tracking (VT) offers an automated alternative to coding, yielding quantitative, objective measures of behaviors. This approach was recently applied to children with autism spectrum disorder (ASD) and a non-ASD group during a parent-child free play task (PCFP)[1]. Further research is needed to assess the validity and reliability of VT for school-aged children with ASD.

Objectives

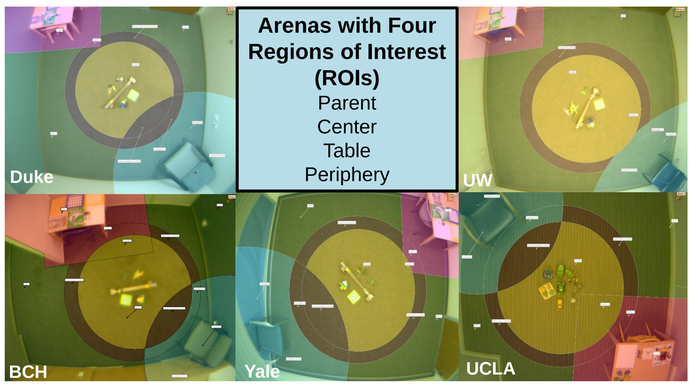
For a 6-minute, lab-based PCFP with VT of school-aged children with ASD and TD, we aim to:1) Determine relations among VT metrics across time points; 2) Examine correlations of VT metrics with child characteristics; 3) Assess longitudinal change, group differences, and covariate effects on VT metrics.

Methods

	Total Sample N=225	ASD N=161	TD N=64
Age Range=6.0-11.5 yrs	8.7 years	8.7 years	8.7 years
Gender	52 F 173 M	30 F 131 M	22 F 42 M
Full Scale IQ	**101.156** SD=19.483	**95.795** SD=18.913	**114.641** SD=13.526

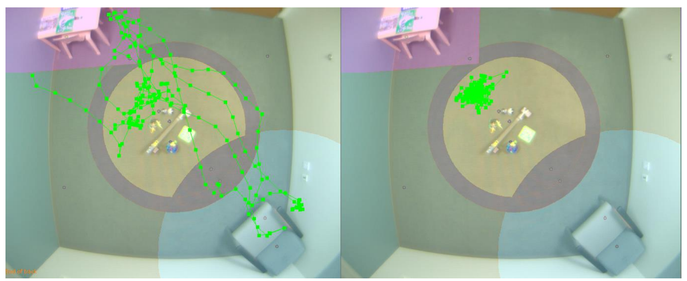
Participants were assessed at one of 5 sites at Baseline, 6 weeks, and 6 months. During a 6-minute PCFP, the child played with any of 8 standardized toys while the parent sat in a chair in the corner. The child wore a red shirt, which was tracked by Noldus EthoVision XT 11.5. Analyses include Pearson correlations and repeated measures models with covariates, including gender, age (high/low), and IQ (high/low for the ASD group).

Video Tracking Site-Specific Arenas



VT metrics included percent durations in each of 4 ROIs and mean distance to parent.

Sample of Child Movement Patterns



Correlations of VT Metrics Across Visits

Total Sample (N=201-202)	Mean Distance to Parent	Table Duration %	Parent Duration %	Periphery Duration %	Center Duration %
T1/T2	**0.473****	**0.497*****	**0.265*****	**0.257****	**0.355*****
T1/T3	**0.554*****	**0.486*****	**0.272*****	**0.280*****	**0.381*****
T2/T3	**0.486*****	**0.521*****	**0.253****	**0.182****	**0.404*****

** p<0.01, ***p<0.001

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References: [1] Cohen et al., 2014

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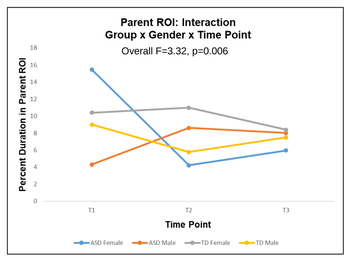
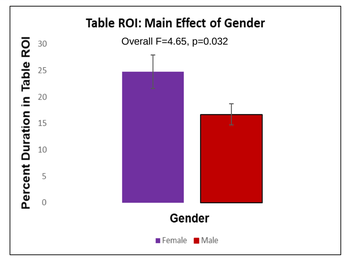
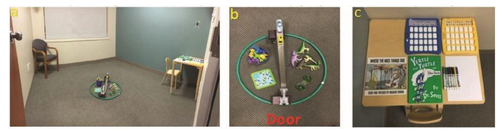
Effects of Gender on Time Spent in ROIs

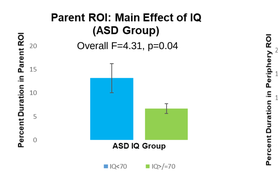


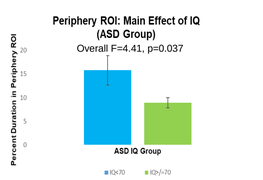


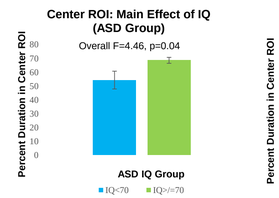
Example of Standardized Toy Kit and Room Set Up

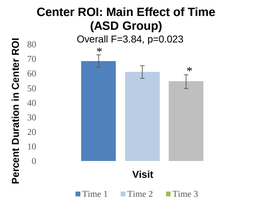


ASD Group: Effects of IQ/Time









Correlations of VT Metrics with Child Characteristics

ASD Group

T1
- **Better Social Approach and Rec/Expr Comm (PDDBI)**
  - **Less time in Periphery ROI** (r=-0.18[b], p=.026; r=-0.19[b], p=.023)

T2
- **Greater Social Pragmatic Problems (PDDBI)**
  - **More time in Center ROI** (r=0.31[a], p=.0001)
  - **Less time in Parent ROI** (r=-0.21[b], p=.008) and **Table ROI** (r=-0.25[b], p=.002)
- **Greater Inattention (CASI)**
  - **More time in Center ROI** (r=0.21[b], p=.01)
  - **Less time in Parent ROI** (r=-0.26[b], p=0.001)

T3
- **Lower Verbal IQ (DAS-II)/Lower Rec/Expr Comm (PDDBI)**
  - **More time in Parent ROI** (r= -0.17[b], p=.041)
  - **Less time in Center ROI:** (DAS-II: r=0.19[b], p=.019; PDDBI: r=0.19[b], p=.022)

TD Group

T1
- No significant correlations.

T2
- **Better Social Skills (VABS)/Less Social Impairment (SRS)**
  - **More time in Parent ROI** (VABS: r=0.27[b], p=.037; SRS: r= -0.26[b], p=.046)
- **Greater Hyperactive/Impulsive (CASI) →**
  - **More time in Center ROI** (r=0.27[b], p=.036)
- **Better Expressive/Receptive Language (PDDBI)**
  - **Less time in Periphery ROI (**r= -0.29[b], p=.027)

T3
- **Better Expressive/Receptive Language (PDDBI)**
  - **More time in Parent ROI** (r= 0.26[b], p=.047)
- **Better Social Approach (PDDBI)**
  - **Less time in Periphery ROI** (r= -0.26[b], p=.027)

NOTE: FDR adjustment: [a] Remained significant [b] Did not remain significant

Conclusions

- Patterns of child location during a parent-child free play are moderately associated across three visits.
- Correlations between VT metrics and child clinical measures (social, communication, inattention) varied across time points.
- Effects of gender emerged with ASD females spending more time in the Parent ROI at T1 relative to T2/T3 and ASD males showing the opposite pattern. Overall, females spent more time engaged in activities at the table.
- No age (high/low) effects were found, but some trends of relations of age with VT metrics were evident.
- Within the ASD group, low IQ was associated with more time in the Parent ROI and less time in the Center ROI.
- Future analyses should examine site effects.
- Future studies should examine VT metrics of school-aged children with ASD during a play task with an unfamiliar peer.