

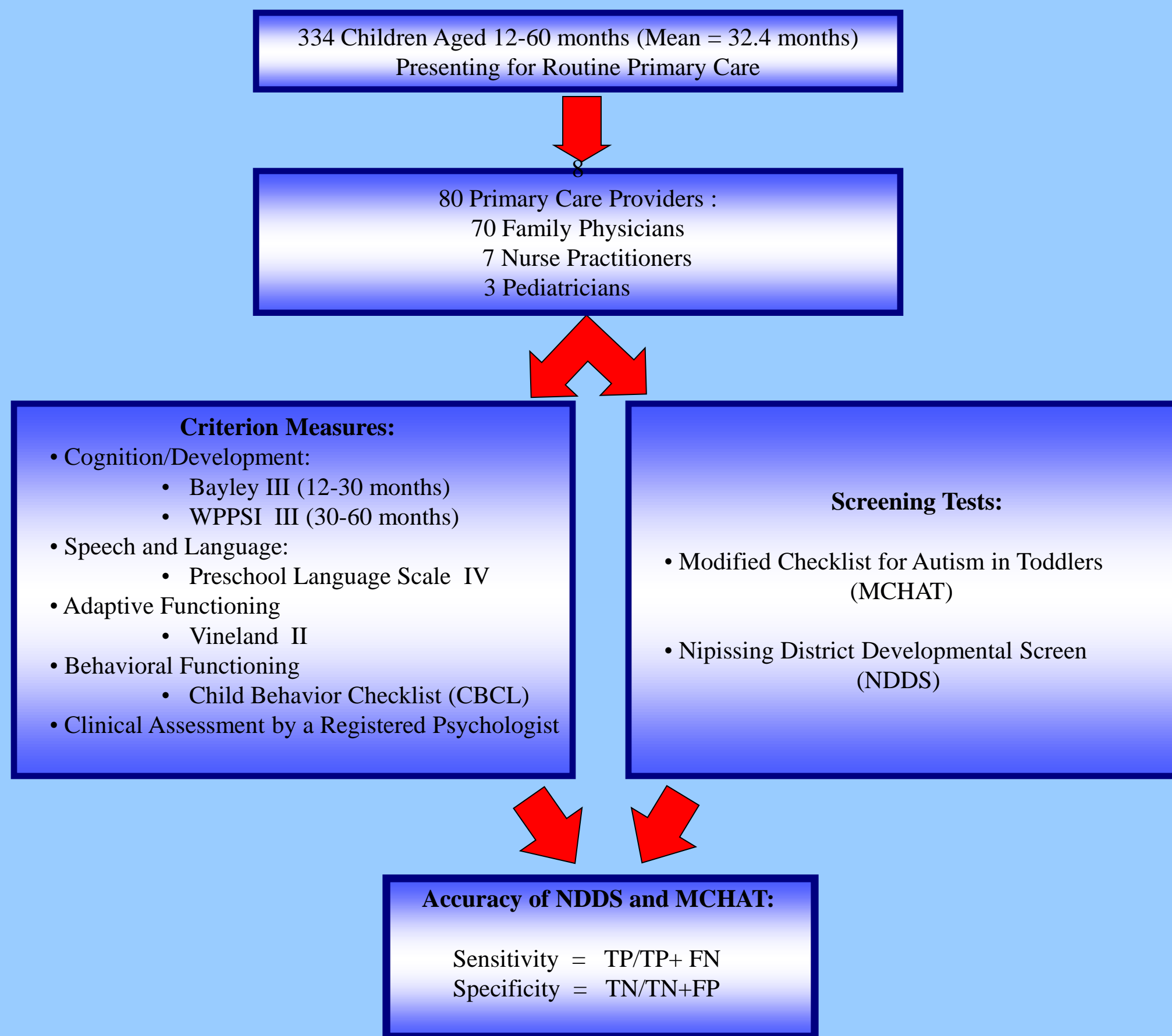
## ABSTRACT

The current study aims to evaluate the clinical utility of the Nipissing District Developmental Screen (NDDS) and the Modified Checklist for Autism in Toddlers (MCHAT) for preschool children presenting for routine primary care. **Methods:** 304 children aged 12 – 60 months were recruited from the offices of 80 primary care providers in Canada. Parents administered the NDDS and MCHAT and all children underwent an evaluation by a psychologist. This included a battery of psychological measures of: (1) Cognition; (2) Speech and Language; (3) Adaptive Functioning; and (4) Behavioral Functioning (CBCL). **Results:** Using the criterion measures, a total of 82 children met criteria for a developmental delay or behavior problem. Of these, cognitive delay was identified in 7.6%, speech language delay was identified in 14.8%, autism was identified in 1.6% and a behavior problem was identified in 12.8%. The specificity of the NDDS for identifying developmental problems was 88.8% with a sensitivity of only 46.7%. The NDDS had good specificity (>80%) for detecting behavior problems but poor sensitivity for overall behavior problems (57%). Consistent with previous studies, the MCHAT demonstrated very good sensitivity (80%) and specificity (87.3%). **Conclusions:** The study results indicate that the MCHAT is a suitable screening tool for use in primary care settings. The findings on the screening characteristics of the NDDS brings into question recent guidelines recommending its routine use in primary care settings.

## INTRODUCTION

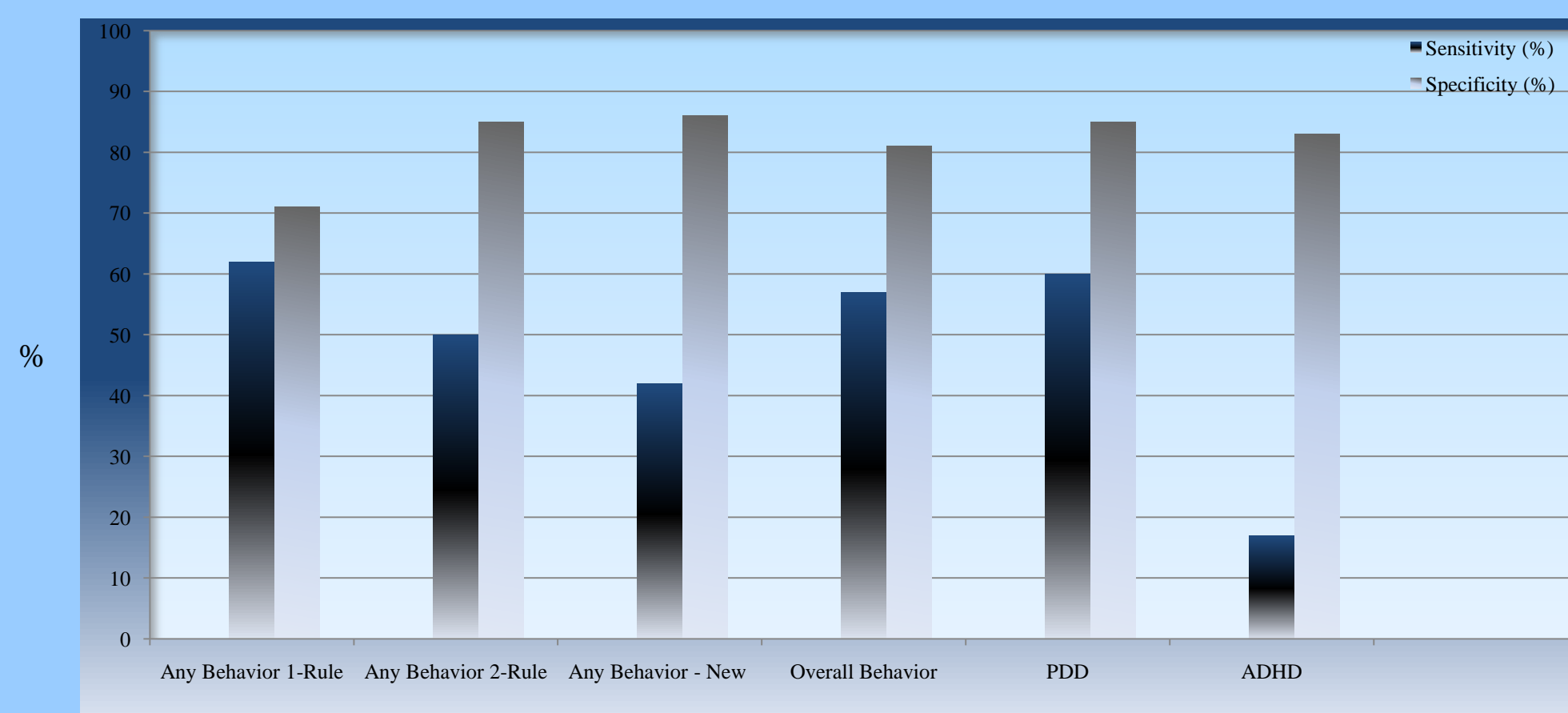
- Primary care physicians provide health care services to young children on a regular basis and may be ideally suited to screen for developmental and behavioral problems.
- There is mounting evidence that early intervention improves outcomes for children and their families in terms of behavioral, social and cognitive competence.
- The NDDS and MCHAT are brief, parent or clinician- administered measures that are widely available in North America, and have been recommended for routine use for screening in primary care by some authorities.
- To date, however, there is a paucity of research on the accuracy of these measures when used in primary care settings.
- The purpose of this study was to :
  - Evaluate the clinical utility of brief parent or clinician administered screening tools in primary care settings.
  - Determine the accuracy of the NDDS in detecting developmental and behavioral problems in children.
  - Determine the accuracy of the MCHAT in detecting autism spectrum disorders in children.

## METHODS



## RESULTS

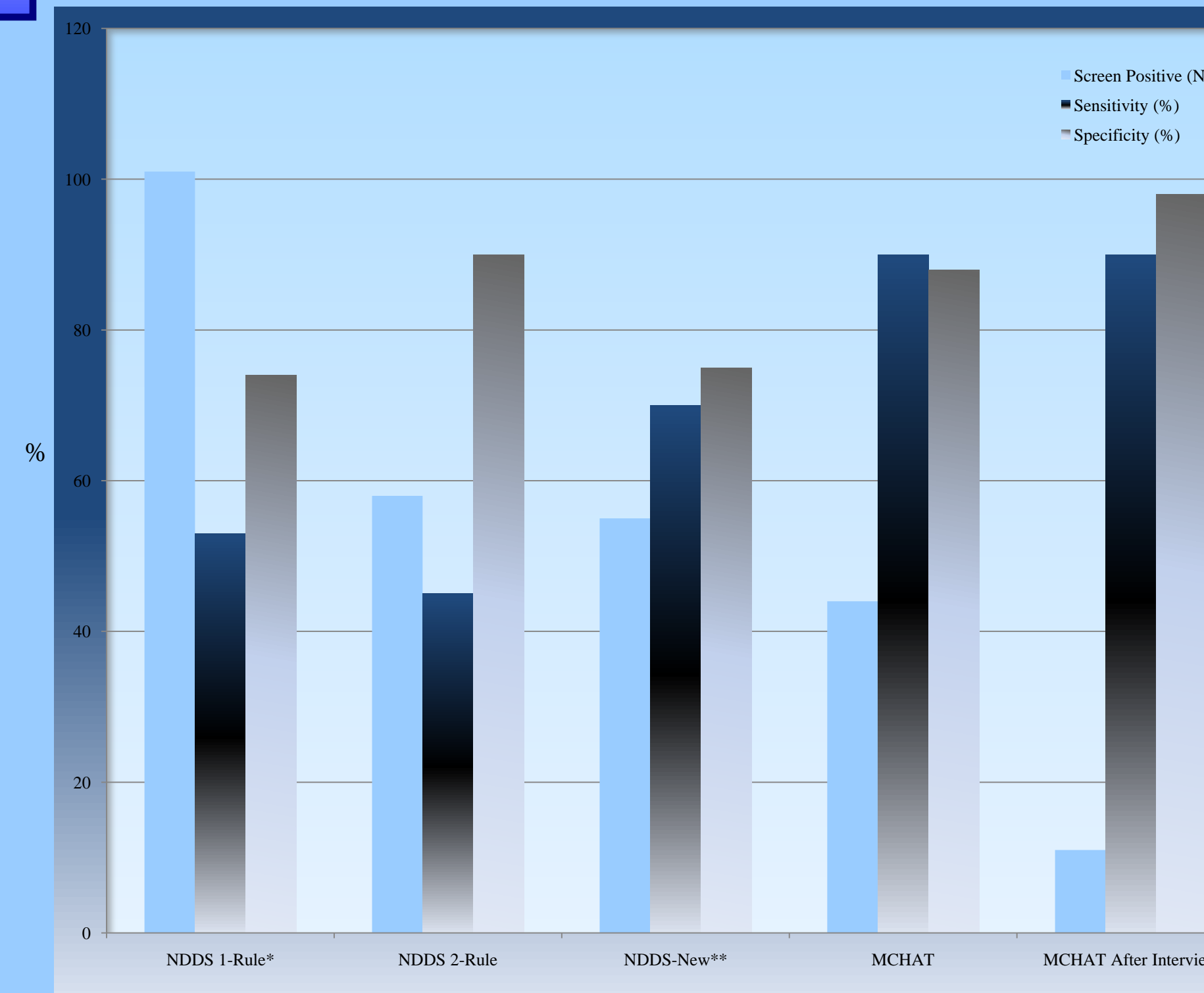
Figure 1. Sensitivity and Specificity of the NDDS in Detecting Significant Behavior Problems in Children (N=334)



Notes: "Any Behavior" refers to clinically significant behavior problem (T>65) on any CBCL subscale (N=46). Two cut off points were used to determine a positive screen on the NDDS: 1 or more abnormal items (1-Rule) or 2 or more abnormal items (2-Rule). Only 152 participants completed the new version of the NDDS; results of the 2-rule are reported for the new NDDS.

	Total Sample	Developmental Disability, Autism or Behavior Problem (Criterion Measure)	Screen Positive NDDS ≥1/≥2 Abnormal	Screen Positive MCHAT	Screen Positive MCHAT After Follow-Up Interview
<b>Participants</b>					
Total - N(%)	334	84 (25%)	101 (30%) / 58 (17%)	44 (13%)	11 (3%)
<b>Type of Developmental Delay</b>					
Any (Excluding CBCL)		84 (25%)			
Cognitive Delay		42 (13%)			
Speech /Language Delay		33 (10%)			
Motor Delay		4 (1%)			
Autism		5 (1.5%)			
Behavior /Social/Emotional					
CBCL		46 (14%)			
Clinical Diagnosis		5 (1.5%)			
<b>Demographic Characteristics</b>					
<b>Gender - Female</b>	147 (44%)				
<b>Ethnic Background</b>					
White	284 (85%)				
Franco-Ontarian	49 (15%)				
Aboriginal	42 (13%)				
Other	8 (2%)				
<b>Languages Spoken</b>					
English	196 (58%)				
French	68 (20%)				
Bilingual	38 (11%)				
N/A	36 (11%)				
<b>Setting</b>					
Urban Clinic	47 (59%)				
Rural Clinic	33 (41%)				

Figure 2. Sensitivity and Specificity of the NDDS and MCHAT for Detection of Developmental Delays and Autism



Note: The total number of participants was 334. A total of 5 children received a diagnosis of autism and 84 children received a diagnosis of a developmental delay using the criterion measures.

\*Two cut-off points were used to determine a positive screen on the NDDS: 1 or more abnormal items (1-Rule) or 2 or more abnormal items (2-Rule).

\*\*Only 152 participants completed the new version of the NDDS; results of the 2-rule are reported for the new NDDS.

## DISCUSSION

- There was a high frequency of developmental (25%) and behavior problems (14%) in this sample of children presenting for routine primary care.
- The MCHAT demonstrated excellent sensitivity (90%) and specificity (88%) for detection of autism.
- The NDDS had good specificity for detecting developmental (90%) and behavioral problems (70-85%).
- The NDDS lacked sensitivity in detecting developmental (45%) and behavior (50-62%) problems.

## CONCLUSIONS

- The high frequency of developmental problems highlights the need for early identification.
- The MCHAT is a suitable screening tool for autism in primary care settings as indicated by its high sensitivity and specificity.
- The reasonable specificity of the NDDS indicates that it has some clinical utility. The majority of children identified by this measure will indeed have a developmental delay.
- Furthermore, the ease of administration and its role in stimulating discussion about a child's development may be other benefits of the NDDS.
- However, the NDDS lacks sensitivity in detecting developmental and behavioral problems, meaning that a negative result on screening cannot rule out the presence of a developmental delay.
- Further investigation into the psychometrics, risks and benefits of the NDDS are required, bringing into question recent recommendations on the routine use of this measure.

