

## ABSTRACT

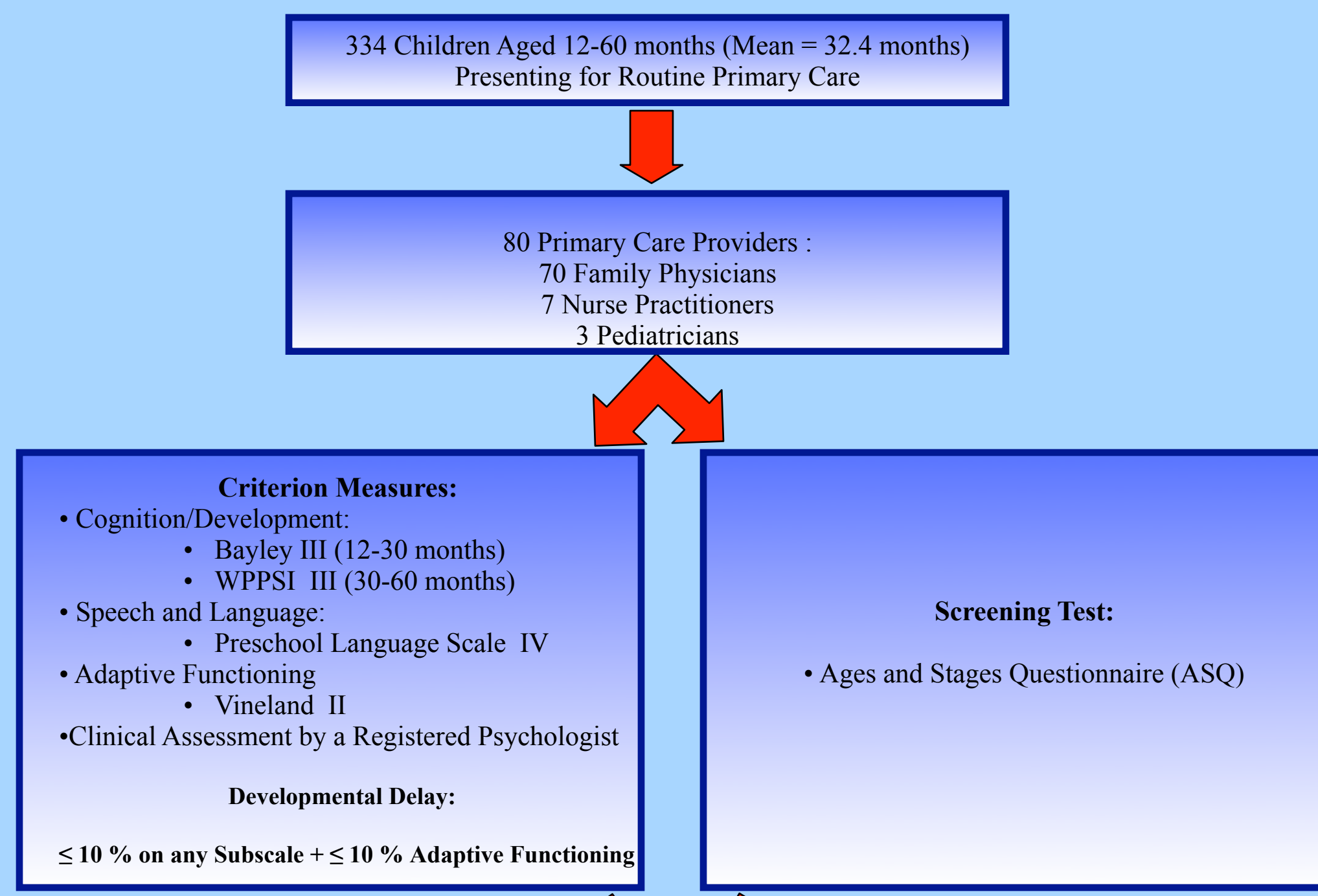
**Aims:** The Ages and Stages Questionnaire (ASQ) is a brief, parent-administered developmental screening tool that has been recommended for routine use in family practice. Although the measure has been validated in large standardization samples, little is known about its accuracy when used in primary care samples. The current study aims to determine the accuracy of the ASQ for developmental screening in primary care settings.

**Materials & Methods:** Three hundred and four children aged 12 – 60 month were recruited from the offices of 80 primary care providers. Parents completed the ASQ, and all children concurrently underwent an evaluation by a clinical psychologist. This evaluation included a battery of standardized psychological measures including measures of: (1) Cognition/Development; (2) Speech/Language; (3) Adaptive Functioning; and (4) Behavioral Functioning.

**Results:** A total of 34 children were identified as having a developmental delay on the criterion measures. The presence of concerns on any one subscale of the ASQ had poor sensitivity but high specificity (communication – 47% and 91%, respectively; gross motor – 32% and 96%; fine motor – 48% and 93%; problem solving - 32% and 94%). However, the presence of any area of concern on the ASQ had a high sensitivity of 82.4% and a reasonable specificity of 77%.

**Conclusions:** The ASQ when used in its entirety shows good promise as a tool for screening for developmental delays in primary care settings. Benefits include ease of use (administration by the parent prior to the visit), and reasonably high sensitivity and specificity when concerns emerge in any subscales of the screening test. These findings support recent recommendations on developmental screening in family practice.

## METHODS



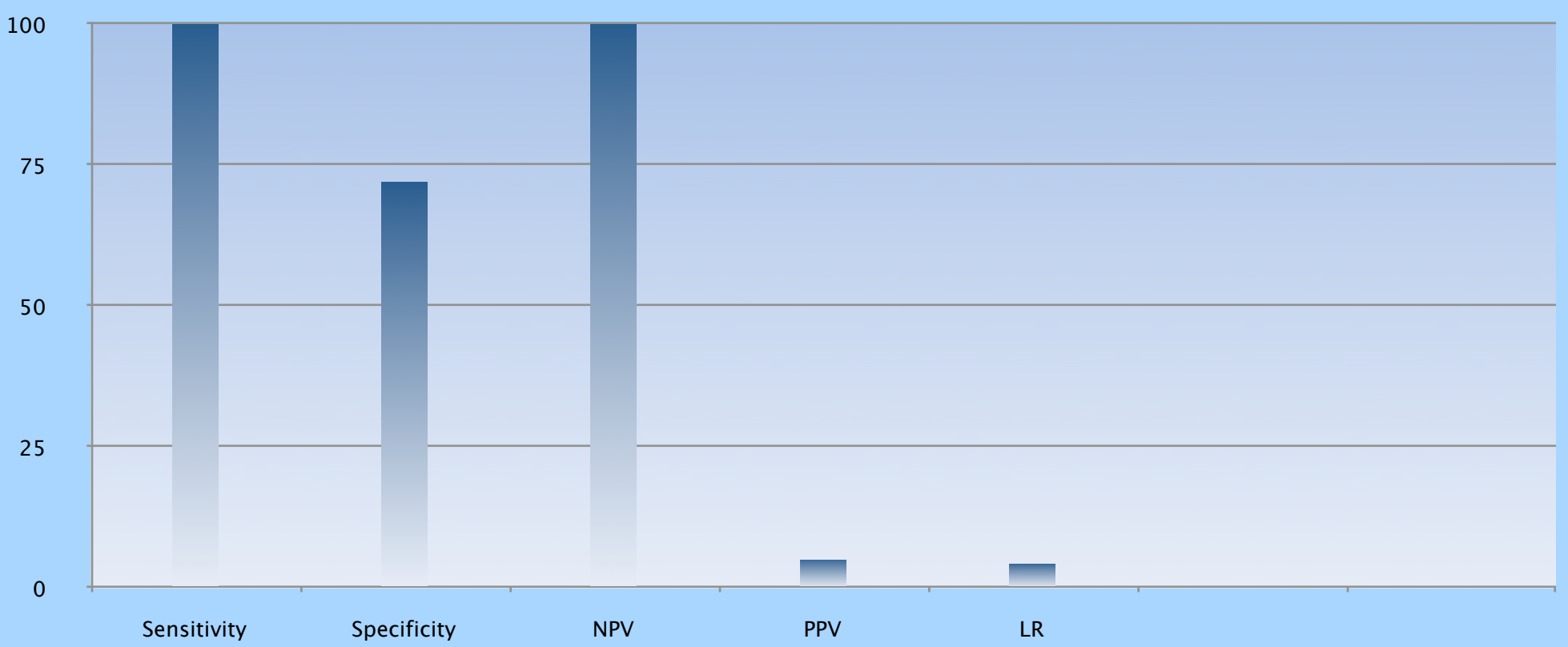
### Accuracy of the ASQ:

$$\text{Sensitivity} = \frac{TP}{TP+FN}$$

$$\text{Specificity} = \frac{TN}{TN+FP}$$

## RESULTS

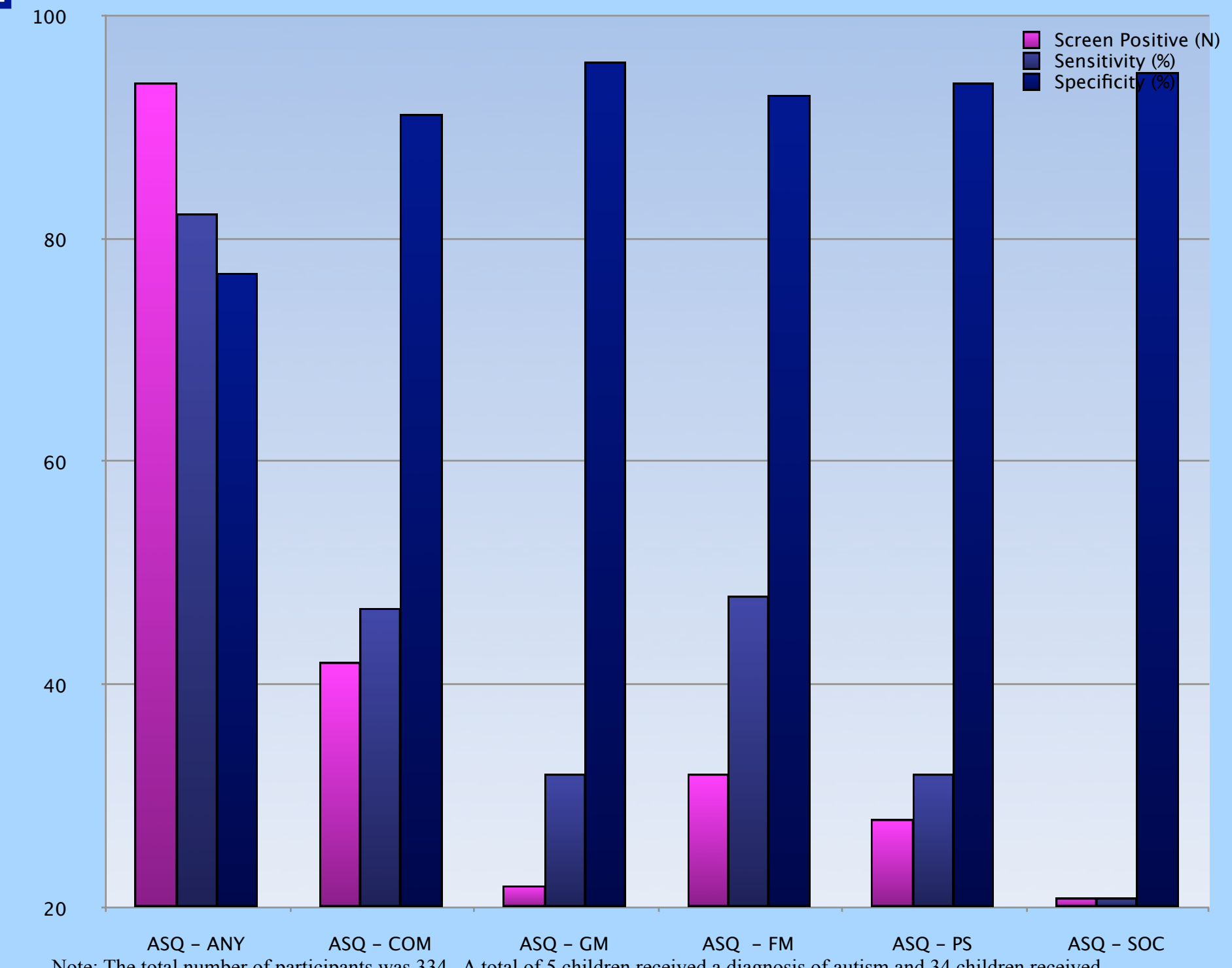
Figure 1. Sensitivity and Specificity of the ASQ in Detecting Autism in Children



Notes: The gold standard for the clinical diagnosis of autism was the assessment of the clinical psychologist. However, all children diagnosed with autism also met criteria for a developmental delay (i.e.  $\leq 10^{\text{th}}$  percentile on either the cognitive or speech language criterion measures AND  $\leq 10^{\text{th}}$  percentile on the measure of adaptive functioning). NPV = Negative Predictive Value; PPV = Positive Predictive Value; LR = Likelihood Ratio (3.7 on this graph)

	Total Sample	Developmental Disability	Screen Positive ASQ
<b>Participants</b>	334		
Total - N(%)		34 (10%)	94 (28%)
<b>Type of Developmental Delay</b>		34 (10%)	
Any		18 (5%)	
Cognitive Delay		13 (4%)	
Speech/Language Delay		3 (1%)	
Motor Delay		5 (1.5%)	
Autism			
<b>Demographic Characteristics</b>			
<b>Gender - Female</b>	147 (44%)		
<b>Ethnic Background</b>	284 (85%)		
White	49 (15%)		
Franco-Ontarian	42 (13%)		
Aboriginal	8 (2%)		
Other			
<b>Languages Spoken</b>	196 (58%)		
English	68 (20%)		
French	38 (11%)		
Bilingual	36 (11%)		
N/A			
<b>Setting</b>			
Urban Clinic	47 (59%)		
Rural Clinic	33 (41%)		

Figure 2. Sensitivity and Specificity of the ASQ for Detection of Developmental Delays



Note: The total number of participants was 334. A total of 5 children received a diagnosis of autism and 34 children received a diagnosis of a developmental delay using the criterion measures. Children were said to have a developmental delay if they obtained scores  $\leq 10^{\text{th}}$  percentile on the cognitive or language measures in addition to the adaptive function measures. ASQ - ANY = ANY subscale of the ASQ; ASQ - COM = Communication Subscale; ASQ - GM = Gross Motor subscale; ASQ - FM = Fine Motor Subscale; ASQ - PS = Problem Solving subscale; ASQ - SOC = Personal Social Subscale.

## DISCUSSION

- Approximately 10% of individuals presenting for routine primary care were identified as having developmental problems.
- The ASQ had high sensitivity (82.4%) and reasonable specificity (77%) in detecting developmental concerns overall.
- The ASQ had 100% sensitivity and 73% specificity for the detection of autism spectrum disorder.

## CONCLUSIONS

- The frequency of developmental problems detected in this unselected primary care sample highlights the need for early identification.
- The ASQ is a suitable screening tool for developmental delays in primary care settings as evidenced by its reasonably high sensitivity and specificity when concerns are raised in any subscale of the screening tool.
- Furthermore, the ease of administration of the ASQ, as well as its role in stimulating discussion about a child's development may be other benefits of the ASQ.
- These findings support recent recommendations for routine use of the ASQ as a screening tool 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 ASQ is a brief, parent-administered measure that is widely available in North America, and has been recommended for routine use for screening in primary care by the American Academy of Pediatrics.
- 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 this brief parent-administered screening tool in primary care settings.
  - Determine the accuracy of the ASQ in detecting developmental problems and autism in children.