Evaluating the Performance of Several Parent and Teacher Questionnaires for Autism Spectrum Disorders – Preliminary Findings

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BACKGROUND

The National Epidemiologic Database for the Study of Autism in Canada (NEDSAC) captures information on children under the age of 15 living in British Columbia, Calgary, Manitoba, Southeastern Ontario, Prince Edward Island and Newfoundland and Labrador who have been clinically diagnosed with an autism spectrum disorder (ASD).

Objectives

- To confirm the diagnosis of ASD in a random sample of children from Southeastern Ontario whose information has been entered into NEDSAC, using the ADI-R and the ADOS-G.
- To evaluate the performance of several parent- and teacher-completed questionnaires in distinguishing children with an ASD from clinical controls (children with intellectual disabilities, ADHD, etc.).

Rationale

The use of research gold-standard tools [Autism Diagnostic Interview-Revised (ADI-R); Autism Diagnostic Observation Schedule–Generic (ADOS-G)] to confirm an ASD diagnosis is not feasible in large epidemiologic studies, due to lack of availability of persons certified to administer these tools and because of high costs. Evaluating the performance of parent- and teacher-completed questionnaires will help to determine which instruments are most effective for confirming whether clinically diagnosed children meet research criteria for having an ASD.

METHODS

The ADI-R, Scales of Independent Behavior-Revised and the following tools were administered (see flow chart).

Parent- and Teacher-Completed Questionnaires

Social Communication Questionnaire (SCQ)
A 40-item, yes-or-no tool, completed by the primary caregiver. Scores of ≥15 are the most effective cutoff for distinguishing children with ASD from other diagnoses.
Berument SK, Rutter M, Lord C, Pickles A, Bailey A. Autism screening questionnaire: diagnostic validity. *Br J Psychiatry* 1999; 175:444-45

PDD Behavior Inventory (PDDBI)
Six subscales–consisting of 124 items (90 items for non-verbal children)–are completed by parents or teachers to provide an "autism score". Scores of ≥40 correctly identify 91% of children with autism.
Cohen IL, Sudhalter V. *The PDD Behavior Inventory.* Lutz, FL: Psychological Assessment Resources, Inc.; 2005

High Functioning Autism Spectrum Screening Questionnaire (ASSQ)
A 27-item screening tool for parents or teachers. Items reflect behaviors of Asperger disorder. Scores of ≥19 (parents) and ≥22 (teachers) provide the most reasonable trade-off between sensitivity and specificity.
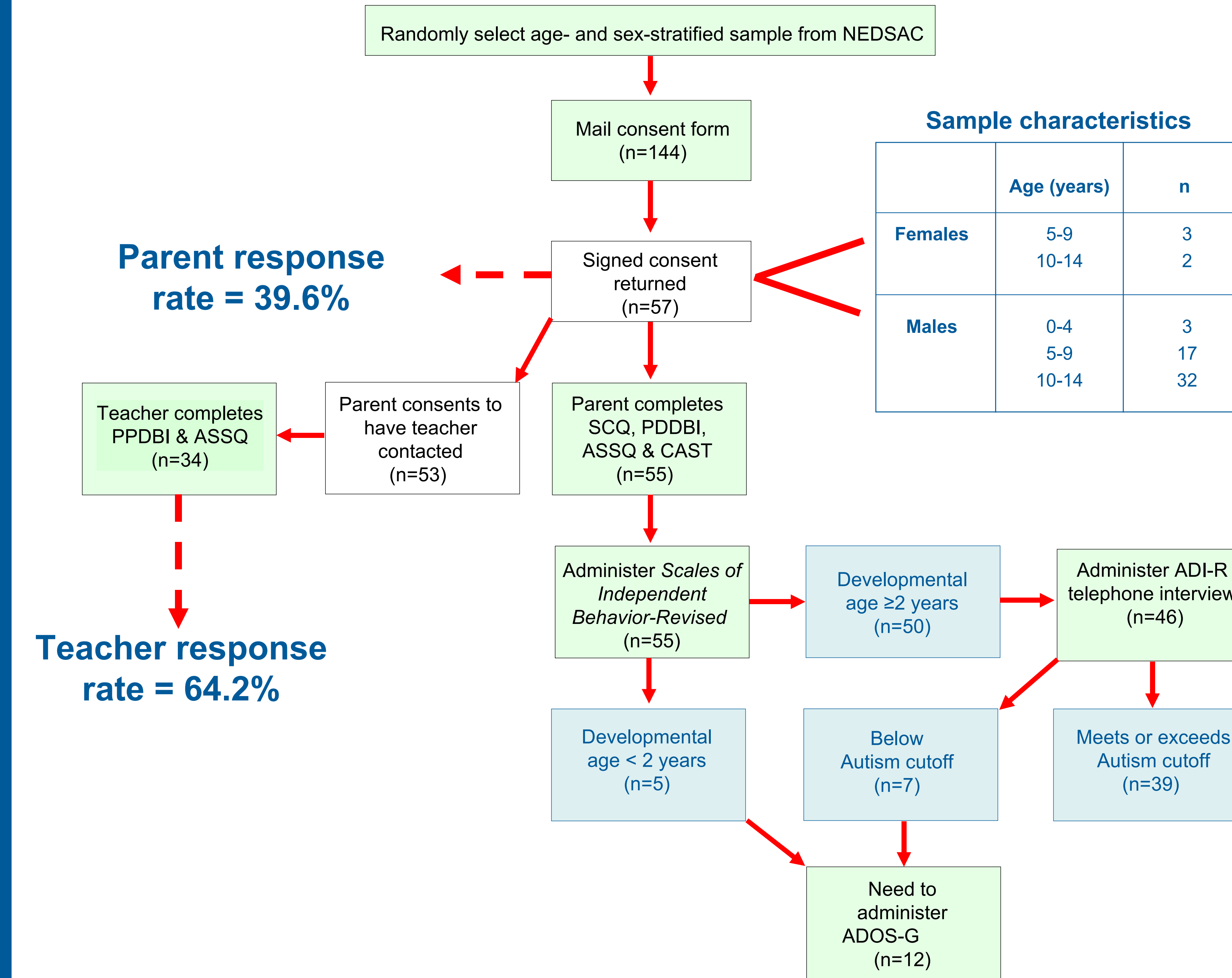Ehlers S, Gillberg C, Wing L. A screening questionnaire for Asperger syndrome and other high-functioning autism spectrum disorders in school age children. *J Autism Dev Disord* 1999; 29:129-141

Childhood Asperger Syndrome Test (CAST)
A 37-item, yes-or-no questionnaire completed by parents. Cutoff score of 15 discriminates well between children with Asperger disorder and typically developing children.
Scott FJ, Baron-Cohen S, Bolton P, Brayne C. The CAST (Childhood Asperger Syndrome Test): Preliminary development of a UK screen for mainstream primary-school-age children. *Autism* 2002;6:9-31

Selection, Recruitment and Data Collection for NEDSAC Sample

Randomly select age- and sex-stratified sample from NEDSAC

Mail consent form (n=144)

Signed consent returned (n=57)

Parent response rate = 39.6%

Parent consents to have teacher contacted (n=53)

Parent completes SCQ, PDDBI, ASSQ & CAST (n=55)

Teacher completes PPDBI & ASSQ (n=34)

Teacher response rate = 64.2%

Administer *Scales of Independent Behavior-Revised* (n=55)

Developmental age ≥2 years (n=50)

Administer ADI-R telephone interview (n=46)

Developmental age < 2 years (n=5)

Below Autism cutoff (n=7)

Meets or exceeds Autism cutoff (n=39)

Need to administer ADOS-G (n=12)

Sample characteristics

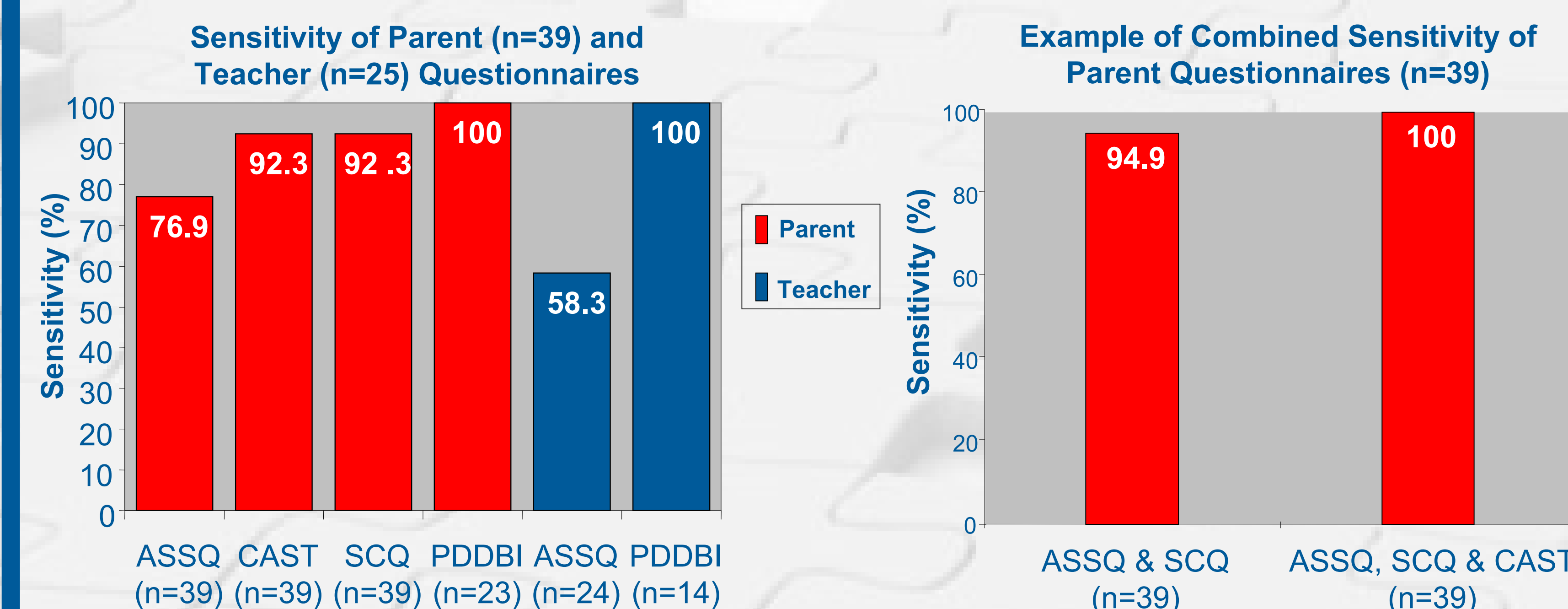|	Age (years)	n
Females	5-9	3
	10-14	2
Males	0-4	3
	5-9	17
	10-14	32

Numbers in brackets are for NEDSAC cases recruited to date in Southeastern Ontario.

ANALYSIS

We will compute 2x2 tables for individual questionnaires, and for all possible combinations of the 6 questionnaires. For the purposes of confirming the diagnosis, we want to find some combination of instruments that yields the highest sensitivity [TP/(TP+FN)] and positive predictive value [TP/(TP+FP)].

	Confirmed ASD	Non-ASD
Meets or exceeds ASD cutoff	True positive (TP)	False positive (FP)
Below ASD cutoff	False negative (FP)	True negative (TN)

RESULTS

Sensitivity of Parent (n=39) and Teacher (n=25) Questionnaires

Sensitivity (%)

ASSQ (n=39): 76.9 (Parent)
CAST (n=39): 92.3 (Parent)
SCQ (n=39): 92.3 (Parent)
PDDBI (n=23): 100 (Parent)
ASSQ (n=24): 58.3 (Teacher)
PDDBI (n=14): 100 (Teacher)

- Parent
- Teacher

Example of Combined Sensitivity of Parent Questionnaires (n=39)

Sensitivity (%)

ASSQ & SCQ (n=39): 94.9
ASSQ, SCQ & CAST (n=39): 100

DISCUSSION

Sensitivity

For the PDD Behavior Inventory, 15 of 39 (38.5%) parent questionnaires and 8 of 25 (32.0%) teacher questionnaires were excluded from the sensitivity analysis because the child was outside the PDDBI's standardization sample age range (1.5-12.4 years). Among the remaining cases, sensitivity was 100% for this questionnaire. Combining the other three parent questionnaires (SCQ, ASSQ, and CAST) also produced a sensitivity of 100% for all children in our sample.

Item Non-Response

The PDDBI Manual has a published algorithm that allows values to be imputed for missing items (provided a certain % of items have been completed); the other questionnaires do not. One parent-completed PDDBI, 3 teacher-completed PDDBIs, and 1 teacher-completed ASSQ could not be scored due to missing items, and therefore had to be excluded from the sensitivity analysis.

Teacher Questionnaires

Owing to the teacher response rate (64.2%), the effective sample size is greatly reduced if the teacher-completed PDDBI and ASSQ are included in the sensitivity analysis.

FUTURE DIRECTIONS

We are currently recruiting a control group in Southeastern Ontario. We have also received CIHR funding to extend this study to other regions where we are collecting information for NEDSAC. Our goal is to recruit 300 families from NEDSAC and 300 control families to confirm the diagnosis in the NEDSAC children using the ADI-R and/or ADOS-G, and to evaluate the sensitivity, specificity, positive predictive value and negative predictive value of the questionnaires in this larger sample.

ACKNOWLEDGEMENTS