Parent Early Detection and Intervention of ASD Signs in Infants At-Risk

Maurice Feldman, Rebecca Ward and Alicia Azzano
Dept. of Applied Disability Studies
Brock University
St. Catharines, ON
Contact: mfeldman@brocku.ca
rebeccaward@phoenixcentreniagara.ca
Other Co-Investigators

- Jeannette J. Holden, Queens University, Kingston, ON (deceased)
- Xudong Liu, Qingdao University, China
- Melissa Hudson, Queen’s University Genomics Laboratory at Ongwanada
- Calvin Sjaarda, Queens University, Kingston, ON
- Tricia Vause, Brock University
Brock University Student Contributors

- Alicia Azzano, MA
- Cassandra Cloet, M.ADS
- Amanda Hendry, MA
- Lindsay King, M.ADS
- Emily Mete, BA
- Shauna McCambridge, MA
- Kaleigh Regehr, MA
- Danielle Savona, MA
- Chloe Wang, MA
Funders

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- Brock University
Rationale/Purpose of Studies

• More studies detecting ASD symptoms in at-risk infants under 24 months are needed

• Low-cost, valid early screeners are needed

• More research is needed on looking at family history of medical, developmental and psychological problems and their relationship to ASD.

• More research needed on interventions before diagnosis.
Early Detection of ASD

• Level 1 – general screening of population

• Level 2 – screening of high-risk sample

• What children are at risk for ASD?

• Sibs of diagnosed children, children with developmental or language delays, premature/low-birth weight, children referred to Early Intervention programs
Level 2 Screening of At-Risk Infants
Why Study Infant Sibs?

• Increased risk (10-20%) for ASD Diagnosis or broader phenotype in siblings (Bolton et al., 1994; Landa et al., 2007)

• Concordance rates in MZ twins:
  - 60% for Autistic Disorder
  - 71% for ASD
  - 92% for social and communication deficits and stereotypies (Filipek et al., 1999, p.457).
Studies of Infant Siblings

- Retrospective studies

- Prospective studies
Developing a Parent Prospective Screener

• Most prospective studies of infant siblings have used standardized developmental tests and/or clinical observations

• Could we develop a tool that could be used more broadly and is more cost-effective?

• Could we empower parents to monitor their at-risk child’s development?
Why involve parents in screening?

- Parents generally are good at detecting early developmental problems (Glascoe, 2000).
- Parent report measures may provide opportunities for frequent, naturalistic observations at low cost.
- Instruments should cover both ASD core (e.g., social-communication, repetitive behaviours) and non-core behaviour problems (e.g., sleep, eating, mood, tolerance).
- Parent report measures with many items may help to identify specific behaviours that could be targets for specific interventions.
Parent Observation of Early Markers Scale (POEMS) Studies

- **Study 1**: Preliminary validation of the POEMS
- **Study 2**: Family history conditions predict POEMS scores
- **Study 3**: Parent-mediated pre-diagnostic intervention
POEMS Development

• Lead: Dr. Rebecca Ward
• Reviewed existing ASD instruments (e.g., ADI-R, ADOS, CARS)
• Research and clinical expertise to identify other behaviour problems often seen in young children with ASD
• 61 items covering problem areas that would be appropriate for children, aged 1 to 36 months
• Worded from parents’ perspective
POEMS Items

- Items relate to core deficits of ASDs
  - social-communication
  - restricted interests
  - ritualistic, repetitive non-functional behaviours.
POEMS Items

- Other POEMS items - behavioural and other problems commonly seen in young children with ASD - e.g.,
  - intolerance to transitions
  - waiting
  - new foods
  - loud noises
  - sleep
  - toileting
  - emotional regulation
  - mood
  - motor agility and movement.
POEMS Items

- Items grouped by topic – e.g., feeding, response to parent, response to environment, communication
- No subscales.
- Parents score based on severity, not frequency
POEMS Scoring

- Parents score each item based on the child’s behavior in the preceding week.
- The scoring system modeled after the CARS: each item is rated on a four-point severity scale; 1/2 scores allowed.
- Descriptions are provided for the 1 (typical) and 4 (severe) anchors.
- Encourage parents to observe and test their children.
POEMS Scoring

• Score “not applicable” (NA) if item too developmentally advanced for chronological age.

• For analysis, we convert NAs (and any blank or unscorable items) to 1’s (no problem)

• Minimum POEMS score is 61 and maximum score is 244.
### POEMS (Sample Items)

<table>
<thead>
<tr>
<th>No evidence of difficulty</th>
<th>Mild problem</th>
<th>Moderate problem</th>
<th>Severe problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

**EYE CONTACT**
- Makes eye contact easily during feeding, bathing, etc.
- 1----1.5----2----2.5----3----3.5----4
- Never makes eye contact; avoids eye contact all the time

**APPROPRIATE TOY PLAY**
- Plays appropriately with toys; explores, uses toy as intended
- 1----1.5----2----2.5----3----3.5----4
- Plays inappropriately with toys; throws, destroys, plays with just one part not as intended; highly repetitive and stereotyped play
POEMS Procedure

• In research we used generic name, “Parent Observation Checklist” (POC)
• Respondent - usually the biological mother.
• Completed via email, snail mail or phone interview (parent choice)
• At least one month between administrations.
Study 1: POEMS Validation

Study 1: Participants

- Recruited through website, talks and flyers.
- Infant sibs 1-22 months old when starting (mean = 8.06m, SD = 5)
- N = 108 (103 families) participated
- 74 males/34 females
- No known biological, birth or medical conditions associated with potential developmental problems (e.g., Down syndrome, low birth weight, epilepsy).
- 9 children (6 males) –eventually received community diagnosis by 36 months
- 7 diagnosed with AD, 2 diagnosed with PDD-NOS
Study 1: No. POEMS

- Cumulative number of POEMS was:
  - 247 up to child age 9 months
  - 396 up to 12 months
  - 671 up to 18 months
  - 902 up to 24 months

- Mean = 8.35 POEMS per child up to 24 months.
Study 1 Results: POEMS Validation

- High/Acceptable:
  - Internal Consistency
  - Test-Retest
  - Construct Validity

  - Convergent Validity – POEMS scores significantly negatively correlated with Ages & Stages Questionnaire (ASQ) Social and Communication domain

  - Divergent Validity – POEMS not correlated with ASQ Gross Motor domain
### Study 1 Results: Mean POEMS Scores

<table>
<thead>
<tr>
<th></th>
<th>At-Risk dx (n = 9)</th>
<th>At-risk no dx (n = 99)</th>
</tr>
</thead>
<tbody>
<tr>
<td>POEMS mean total score (SD)</td>
<td>92.22 (28.82)</td>
<td>65.18 (3.74)</td>
</tr>
<tr>
<td>POEMS mean no. elevated items - score ≥3 (SD)</td>
<td>8.86 (10.12)</td>
<td>.78 (.81)</td>
</tr>
</tbody>
</table>
Study 1 Results: POEMS Predictive Validity

POEMS TOTAL SCORE - (Cross-Sectional)

p’s < .05, at 9, 12, 18, 24m
Study 1 Results: POEMS - Predictive Validity

POEMS NO. ELEVATED ITEMS - (Cross-Sectional)

- Mean No. Elevated POEMS Items
  - Not Diagnosed
  - Diagnosed

- p’s < .05, at 9, 12, 18, 24m
## Study 1 Results: Cumulative Elevated Items (9 and 12 months)

<table>
<thead>
<tr>
<th>Age (months)</th>
<th>POEMS item</th>
<th>Dx</th>
<th>No dx</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Interest in faces</td>
<td>45%</td>
<td>0%</td>
</tr>
<tr>
<td>9</td>
<td>Shifts attention to person</td>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>Mood</td>
<td>35</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>Response to name</td>
<td>35</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>Waiting</td>
<td>35</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>Interest in faces</td>
<td>33</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>Waiting</td>
<td>33</td>
<td>16</td>
</tr>
<tr>
<td>12</td>
<td>Shifts attention to person</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>Imitates sounds or words</td>
<td>27</td>
<td>0</td>
</tr>
</tbody>
</table>
## Study 1 Results: Cumulative Elevated Items (18 and 24 months)

<table>
<thead>
<tr>
<th>Age (months)</th>
<th>POEMS item</th>
<th>Dx</th>
<th>No dx</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Waiting</td>
<td>43%</td>
<td>7%</td>
</tr>
<tr>
<td>18</td>
<td>Imitates sounds or words</td>
<td>36</td>
<td>5</td>
</tr>
<tr>
<td>18</td>
<td>Coordinates point and gaze</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>24</td>
<td>Imitates sounds or words</td>
<td>41</td>
<td>3</td>
</tr>
<tr>
<td>24</td>
<td>Waiting</td>
<td>41</td>
<td>6</td>
</tr>
<tr>
<td>24</td>
<td>Imitates actions</td>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td>24</td>
<td>Coordinates point and gaze</td>
<td>29</td>
<td>0</td>
</tr>
<tr>
<td>24</td>
<td>Points in response to questions</td>
<td>29</td>
<td>0</td>
</tr>
</tbody>
</table>
Study 1 Results: Sensitivity and Specificity

- Cut-off POEMS score = 70 (about midway between the means in the full sample at each age examined).
- Overall SE = .74.
- Overall SP = .73.
- Similar to clinician administered specific ASD screeners
- Scores influenced by disproportionate number of non-diagnosed \((n = 99)\) to subsequently diagnosed children \((n = 9)\).
Study 1: Discussion

- POEMS has acceptable psychometric properties.
- Parents able to differentiate at-risk infants who will be diagnosed as early as 9 months.
- Interest in faces differentiated the diagnosed and undiagnosed groups as early as 9 months supports Ozonoff et al.’s (2010) contention that this behavior is “most sensitive to emerging signs of autism” (p. 265).
- POEMS picking up noncore ASD features – intolerance, irritability – not seen in most other studies of at-risk infants.
- Limitations – relatively small sample size; only 10% diagnosed.
Subsequent POEMS studies


Comparison study showed that at-risk infants had higher POEMS scores and elevated items than low-risk infants.


Follow-up study showed maintenance of POEMS acceptable predictive validity up to 13 years old and lost diagnosis children had POEMS scores in between diagnosed and undiagnosed at-risk infants.
Canadians shocked by POEMS findings!!!
Study 2 - Relationship of Family History Conditions and Early Signs of Autism Spectrum Disorder in Low and High-Risk Infants

Rational

• ASD is strongly inherited
• Several conditions may share genetic and epigenetic mechanisms with ASD
• Early identification and understanding of Autism Spectrum Disorder (ASD) could be facilitated by knowledge of family history of medical, developmental and psychiatric conditions associated with showing early signs of ASD.
Genetics

- Both rare and common genetic variants play important roles in ASD etiology
- 100’s ASD-susceptible loci and genes have been identified
- Suggests highly heterogeneous underlying genetic architecture
- Consistent with phenotypic variations seen in ASD
Epigenetics

- Epigenetic mechanisms are non-permanent heritable changes, often due to intrauterine and environmental conditions and experiences.
- Environmental influences on gene expression
- Epigenetic factors that may be associated with ASD:
  - maternal infections and accompanying immune system activation
  - oral contraceptive use
  - maternal concentrations of organochlorine compounds found in pesticides
  - alcohol-use that alters fathers’ sperm cells methylation status
Family History and ASD

- Maternal history of epilepsy (Sundelin et al., 2016).
- Autoimmune disorders - e.g., Type 1 diabetes, rheumatoid arthritis, lupus (Chen et al., 2016).
- Maternal depression, regardless of antidepressant use in pregnancy (Hagberg, Robijn, & Jick, 2018).
- Schizophrenia (Brimacombe et al, 2007).
- Bipolar disorder (Brimacombe et al, 2007).
- ASD and the broader ASD phenotype (Losh et al., 2017).
Current Study

• First study to relate family history conditions to scores on an ASD screener in both high and low risk infants.
• Infants with more family history concerns related to ASD and higher screener scores may be more likely to be diagnosed than infants scoring lower in one or both measures.
• Knowing the family history conditions of the infant and their behavioral developmental profile based on elevated screener items may reveal shared inherited and epigenetic mechanisms that may impact on not only ASD itself but the broader phenotype
Hypotheses

• Given the genetic loading seen in ASD, families that already have a child with ASD would show more family history problems that may be associated with ASD.

• A positive correlation between the number of family history problems and scores on the ASD screener.
Additional Research Questions

• Which family history condition categories – medical, developmental and psychiatric – are correlated with ASD screener scores?
• Which specific conditions (e.g., language disorders, depression) within the categories are associated with ASD screener scores?
<table>
<thead>
<tr>
<th>Variables</th>
<th>High-risk (n = 69)</th>
<th>Low-risk (n = 108)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD) child age (months)**</td>
<td>23.61 (7.13)</td>
<td>18.32 (9.36)</td>
</tr>
<tr>
<td>Percentage male children</td>
<td>67%</td>
<td>54%</td>
</tr>
<tr>
<td>Mean (SD) mothers age in years*</td>
<td>36.29 (4.24)</td>
<td>33.62 (4.44)</td>
</tr>
<tr>
<td>Percentage of mothers with college/university education</td>
<td>85%</td>
<td>91%</td>
</tr>
<tr>
<td>Percentage of mothers employed, other than or in addition to, homemaker *</td>
<td>62%</td>
<td>82%</td>
</tr>
<tr>
<td>Mean (SD) fathers age in years *</td>
<td>38.79 (5.01)</td>
<td>35.33 (4.76)</td>
</tr>
<tr>
<td>Percentage of fathers with college/university education</td>
<td>72%</td>
<td>67%</td>
</tr>
<tr>
<td>Percentages of fathers employed, other than or in addition to, homemaker</td>
<td>100%</td>
<td>96%</td>
</tr>
<tr>
<td>Mean (SD) annual family income (CDN$) *</td>
<td>$72178 (22465)</td>
<td>$84175 (21886)</td>
</tr>
<tr>
<td>Mean POEMS(^a) total scores (SD)*</td>
<td>73.38 (19.84)</td>
<td>68.87 (9.36)</td>
</tr>
<tr>
<td>Mean POEMS no. elevated items (SD)*</td>
<td>2.66 (5.36)</td>
<td>1.03 (2.29)</td>
</tr>
</tbody>
</table>
Family History Questionnaire (FHQ)

- Locally-developed
- Asked parents to indicate family history conditions from both the maternal and paternal sides of each family.
- Multidisciplinary research team generated list of conditions based on available research and proposed common etiological mechanisms
- Up to 29 conditions (plus write-ins) divided into medical, developmental and psychiatric categories
- Two versions, but high and low risk group overlapped on 10 common conditions
Listed conditions in both versions of the FHQ and other conditions specified by parents under the three family history categories.

<table>
<thead>
<tr>
<th>Medical</th>
<th>Developmental</th>
<th>Psychiatric</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10 Common Listed Conditions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Epilepsy/seizures</td>
<td></td>
<td></td>
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<tr>
<td><strong>Other Conditions Specified by Parents</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Allergies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Alzheimer disease/early-onset dementia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Anemia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Arthritis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Asthma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Cancer (early onset - less than 50 years old)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Cerebral palsy</td>
<td></td>
<td></td>
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<tr>
<td>- Diabetes (Type 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Eating disorders (Anorexia/Bulimia)</td>
<td></td>
<td></td>
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<tr>
<td>- Ehlers Danlos syndrome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Fibromyalgia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Gastrointestinal/bowel problems</td>
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<tr>
<td>- Attention deficit hyperactive disorder (ADHD)/attention deficit disorder (ADD)</td>
<td></td>
<td></td>
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<tr>
<td>- Autism/Autism spectrum disorders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Developmental disabilities/Intellectual disabilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Language disorders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Learning disabilities/Academic problems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Anxiety disorder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Bipolar disorder (&quot;manic depression&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Depression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Schizophrenia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Hearing impairment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Lupus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Miscarriages (recurrent, spontaneous)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Multiple sclerosis (MS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Neurofibromatosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Phenylketonuria (PKU)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Skin disorders (e.g., eczema, psoriasis)</td>
<td></td>
<td></td>
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<tr>
<td>- Thyroid problems</td>
<td></td>
<td></td>
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<tr>
<td>- Tourette syndrome/tic disorder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Tuberous sclerosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Vision Impairment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Developmental coordination disorder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Down syndrome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Fragile X syndrome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Social problems (e.g., awkward, cold, withdrawn)</td>
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<td></td>
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<tr>
<td>- Addiction/Substance abuse</td>
<td></td>
<td></td>
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<tr>
<td>- Obsessive-compulsive disorder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Personality disorders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Phobias</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Procedures

• Parents were told that the study was about the development of second born or later children with different family histories.

• Parents completed POC, FHQ and Family Information Questionnaire (for demographics)

• Low- and high-risk group mothers completed 93% and 94% of the FHQ’s, respectively.

• 90% of respondents said they were very knowledgeable of the history of both sides of the family.
Results

• High-risk group had significantly more family history problems than low-risk group, adjusted $R^2 = .29$, for maternal and paternal problems combined

• Maternal and paternal problems, separately, also significantly higher in high-risk group

• Upheld despite group age differences and factoring out sibling and ASD history data.
Comparison of No. Family History Items

- Low-risk
- High-risk

Mean No. Family History Conditions

Maternal and Paternal Family History Conditions
Maternal Family History Conditions
Paternal Family History Conditions
## Correlations

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total POEMS Score</strong></td>
<td>.24**</td>
<td>.20**</td>
<td>.10</td>
</tr>
<tr>
<td><strong>Total POEMS Elevated Items</strong></td>
<td>.32**</td>
<td>.31**</td>
<td>.14*</td>
</tr>
</tbody>
</table>

\[**p < .01; *p < .05\]
Significant specific condition correlations with POEMS scores

- Medical – none
- Developmental – ASD, ADHD, language disorders
- Psychiatric – depression, bipolar, anxiety
- Significant specific condition correlations seem for combined and/or maternal family, but not paternal.
Limitations

• Correction for multiple tests to reduce Type II error threat not done given the relatively small high-risk sample size.

• Although low versus high-risk group demographic and POEMS scores differences were expected (Feldman et al., 2015), their influence on the family history measures and analyses is not clear.

• Whereas this study (as well as other family history studies) suggests certain promising mechanisms, this study did not include genetic testing and epigenetic evidence of family members to trace possible etiologic pathways to explain the relationships between a history of certain conditions and the POEMS scores.

• Families in the high-risk group already had a child with ASD and the longer list of items in the high-risk FHQ could have elicited more research and recollection of family conditions than in the low-risk group.
Family History Study - Implications

• First study to find relationships between family history and scores on a validated ASD screener in low and high-risk infants.

• Results may help to identify common etiological pathways between ASD and medical, developmental and psychiatric conditions.

• Combination of early screening and family history may yield stronger diagnostic predictions than early screening alone.
Study 3: Parent-Mediated Targeted Intervention for Young Children At-Risk for Autism Spectrum Disorder

Why is intervention needed?

- Detecting early signs of ASD allows for early intervention
- Some infants are at higher risk of developing ASD
- Early behavioural intervention is effective
- Only recently are researchers exploring very early parent mediated intervention for pre-diagnostic young children
What does our study add to the literature?

- Only 5 published studies providing pre-diagnostic intervention
- All use a standardized curriculum
- We focus on a targeted intervention on young, pre-diagnosed children who are showing developmental concerns
- Continual video data collection of direct observations versus pre and post intervention indirect measures
- Using POEMS to identify possible treatment targets and track ASD symptoms throughout the study
- Families of diverse ethnic backgrounds
- Parent training in the naturalistic home setting using Behavioural Skills Training
- Monitoring of relationship between parent teaching skills and child behaviour
Purpose

• To determine the effectiveness of individualized, targeted parent-administered intervention of Applied Behavior Analysis (ABA) strategies for young children at-risk for ASD.

• To determine the utility of the POEMS to identify possible treatment targets and monitor symptoms throughout the study.
## Participants

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Total POEMS</th>
<th>Total Elevated Items</th>
<th>Targeted Behaviours</th>
</tr>
</thead>
</table>
| Carl | 19 months old | 95 (70 is cutoff) | 10 | 1) Vocal Imitation  
2) Manding |
| Amir | 26 months old | 130.5 | 28 | 1) Responding to Name  
2) Pointing to Request  
3) Following Simple Instructions  
4) Manding |
| Pablo | 23 months old | 141 | 30 | 1) Responding to Name  
2) Motor imitation  
3) Pointing to Request  
4) Following Simple Instructions  
5) Vocal Imitation |
Measures

POEMS - Detects and monitors early symptoms of ASD

Baseline, Intervention and Follow-Up Observations of Parent and Child Behaviours

Parent Teaching Skills Checklist - Track parent teaching fidelity

Parent Sense of Competence Scale (PSCS) - Measures parenting self-esteem

Consumer Satisfaction Feedback - Social validity measure

Autism Diagnostic Observation Schedule -2 (ADOS-2) - Monitoring symptoms for diagnosis
Data Collection

• All sessions were videotaped

• Parent teaching- % of correct implementation based upon the Parent Teaching Self-Checklist (see next slide)

• Child Behaviours- % of correct responses from contrived opportunities (other than manding for Carl which was scored as rate per session)
Parent Teaching Skills Checklist

1. *Parent sets up environment for success* (e.g., distractions minimized, television/computer off, toys put away)

2. *Parent creates natural opportunities for the child to exhibit target skill* (e.g., preferred activity the child enjoys doing with others)

3. *Parent attains child’s attention prior to delivery of request* (e.g., child looks in direction of parent, child responds to previous interaction). Exception – if attentional skills are being trained (e.g., eye contact, responding to name being called).

4. *Parent provides clear instruction, or natural cues, when required*

5. *Parent utilizes appropriate prompt when necessary* (e.g., least amount of prompting to produce a correct response such as a gesture; holding up an object)

6. *Parent provides natural reinforcement for correct response* (e.g., praise, item the child wants)

7. *Parent utilizes error correction used for incorrect, or no response* (e.g., gentle physical guidance)

8. *Parent provides appropriate time before delivery of next instruction* (e.g., 5-10 seconds)

9. *Parent fades prompts over trials, and/or introduces time delay between instruction/cue and prompts*

10. *Following no response, or an incorrect response, the parent adjusts cueing and prompting strategies to increase success in child’s response* (e.g., uses a more obvious cue)
Treatment Integrity and Interobserver Agreement

Treatment integrity
• Parent training using behavior skills training- 100% (15 videos)

Interobserver agreement
Parent Teaching (40% of videos):
1) Carl’s Mother- 83% (range 67-100)
2) Amir’s Mother- 89% (range 66-100)
3) Pablo’s Mother- 88% (range 64-100)

Child Target Skills (36% of videos):
1) Carl- 93 % (range 67-100)
2) Amir- 90% (range 56-100)
3) Pablo- 94% (range 75-100)
Intervention

1) Identify target behaviours using the POEMS
2) Collect baseline data for targeted behaviours
3) Behaviour Skills Training with parents
4) Follow-up
Results
<table>
<thead>
<tr>
<th>ADOS-2</th>
<th>PSOC</th>
<th>Consumer Satisfaction</th>
</tr>
</thead>
</table>
| • Overall Total Score = 4  
• Below cut off for ASD | • Not available | • Extremely satisfied with program  
• Learned a great deal  
• Felt her child greatly benefitted |
Amir
<table>
<thead>
<tr>
<th>ADOS-2</th>
<th>PSOC</th>
<th>Consumer Satisfaction</th>
</tr>
</thead>
</table>
| • Overall Total Score=20  
• Above cut off for ASD  
• Significant number of ASD related symptoms | • Pre-79  
• Post-70  
• Decrease in parent self-competency | • Extremely satisfied with program  
• Learned a great deal  
• Felt her child greatly benefitted |
Pablo
Pablo

**ADOS-2**
- Overall Total Score=21
- Above cut off for ASD
- Significant number of ASD related symptoms

**PSOC**
- Pre-68
- Post-85
- Increase in parent self-competency

**Consumer Satisfaction**
- Extremely satisfied with program
- Learned a great deal
- Felt her child greatly benefitted
POEMS TOTAL SCORES

POEMS ELEVATED ITEMS TOTAL SCORES
Overall Findings

- Improved child skill acquisition
- Decreased concern for many target behaviours
- Improved parent teaching fidelity
- Varying parent self-competency scores
- Consumer satisfaction
Limitations

- It was not possible to know exactly how often parents practiced the skills with their child each day.
- Language barrier.
- All children were already in their second or third year of life.
Identifying early signs of ASD can lead to beginning intervention before ASD diagnosis.

Parent mediated intervention of targeted, individualized behaviours may prevent or reduce severity of ASD diagnosis.
Future Research

- Expand use of POEMS for screening at-risk infants
- Expand use of POEMS to the general population
- Online POEMS administration
- POEMS app
- Replicate parent training intervention with infants at-risk (3-18 months)
- Improve generalization of parents’ teaching skills
- Telehealth parent training for at-risk young children
- RCT on parent-mediated interventions
Thank you!