Applied Assignment: Early Identification & Screening in ASD

Adamson, L. B., Bakeman, R., Deckner, D. F., & Romski, M. (2009). Joint engagement
and the emergence of language in children with autism and Down syndrome.
Journal of Autism and Developmental Disorders, 39, 84-96.

DISCUSS: The purpose of this longitudinal study was to determine how the development of joint attention over time varies among typically developing children, children with autism, and children with Down syndrome as well as how joint attention affects receptive and expressive language outcomes. Participants included 23 children with autism and 29 children with Down syndrome. 56 typically developing toddlers from a previous study were used for comparison. Participants were video-recorded and specific behaviors were coded according to their interactions with their parents. Results indicated specific aspects of joint attention were especially problematic for the children with autism, such as coordinated joint engagement, which was a stable finding over time.

INTERPRET: The authors suggest the "unique" challenge children with autism experience with coordinated joint engagement may be a characterizing behavior of autism—helping to differentially diagnosis from other developmental delays. As well as a defining feature for early identification, this finding may be beneficial when developing intervention goals as it provides a specific focus when targeting various aspects of joint attention.

EVALUATE: This study included a relatively small sample size within each diagnostic category. Additionally, the authors were unable to control for external variables such as clinical services received (e.g., speech therapy). These external variables may have impacted the participants' joint attention or language abilities over time. The authors did not mention whether or not the coders were aware of the diagnostic category to which the participants belonged.

Bryson, S.E., Zwaigenbaum, L., McDermott, C., Rombough, V., Brian, J. (2008). The Autism
Observation Scale for Infants: Scale development and reliability data. *Journal of Autism
& Developmental Disorders, 38,* 731-738.

DISCUSS: This study examines the use of the *Autism Observation Scale for Infants* (AOSI) to detect and monitor early signs of autism in high-risk infants aged 6-18 months, all of which have an older sibling with an autistic spectrum disorder (ASD). The AOSI is an 18-item direct observational measure with established reliability at 6, 12 and 18 months for the number of items and total scores, although reliability was not as strong for individual items, particularly in 6-month-olds.

INTERPRET: The findings of this study suggest that the AOSI can be a beneficial and reliable assessment when used for assessing ASD in high-risk in infants. The tool is especially beneficial since it is designed to detect ASD traits and qualities very early in development so that these infants can receive follow up assessment and interventions.

EVALUATE: To use this assessment tool, the infant must have a sibling that is diagnosed with ASD. The authors did not examine the validity the tool for assessing ASD if a infant's sibling had developmental delay

other than autism.

Chawarska, K., Paul, R., Klin, A., Hannigen, S., Dichtel, L. E., & Volkmar, F. (2007).
Parental recognition of developmental problems in toddlers with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 37,* 62-72.

DISCUSS: The purpose of this cohort study was to examine the parental age of recognition of early differences, the association between age of recognition and diagnosis, and the levels of functioning at age 2 and age 4 in toddlers with ASD. It was part of a larger longitudinal study. 75 toddlers were evaluated at age 2 and diagnosed with ASD. The children were referred for early intervention and re-evaluated with the same assessment measures at age 4. Results were consistent with previous studies as half of the parents reported noticing some differences (primarily regarding social development and speech difficulties) in the first 18 months. Results suggested a strong relationship between the age of parental recognition and the clinical diagnosis two years later (autism vs. PDD-NOS).

INTERPRET: The results of this study could have important implications not only for early recognition of autism spectrum disorders, but for identifying the specific disorder based on differences in impairments. There is currently a strong emphasis to understand potential identifying behaviors associated with autism at a young age (infant/toddler). This study suggests that although some differences may be observed in children under the age of 2, there continues to be evidence indicating impairments in certain aspects of development associated with autism do not manifest until a child is about 2.

EVALUATE: This appears to be a study with strong statistical evidence. The authors accounted for differences or similarities with previous studies and described the possible reasons for differences in findings. The participant sample lacked ethnic diversity, however, the authors reported birth order, developmental problems observed in siblings, parental educational levels, maternal age at the time of child's birth, gestational age and onset of major developmental milestones.

Chiang, C., Soong, W., Lin, T., & Rogers, S. J. (2008). Nonverbal communication skills
in young children with autism. *Journal of Autism and Developmental Disorders, 38*(10), 1898-1906.

DISCUSS: The purpose of this cross-sectional study was to improve understanding of early social-communication skills in infants and toddlers with ASD. It was part of a larger longitudinal study. There were a total of 104 participants across four groups (autism, developmental delay, 2 different age groups of typically developing children).   An ANOVA was completed to compare differences in ratings of initiating joint attention, responding joint attention, initiating requesting, initiating social interaction, and responding to social interaction. Results indicated toddlers diagnosed with autism demonstrate primary deficits in initiating joint attention when compared to typically developing children (matching chronological or mental age) and developmentally delayed children.

INTERPRET: The authors suggest specific impaired patterns in nonverbal communication (pointing and showing) as well as the severity of impaired joint attention skills could be important indicators when screening for ASD in toddlers. The results also suggest joint attention skills are an important component of intervention when working with children with ASD as the skills were consistently impaired even when participants were matched with others of the same cognitive age.

EVALUATE: The authors placed a strong emphasis on the children's mental ages which may not be especially valid when evaluating such a young age group. The study was conducted in China; therefore, there may be a question of extrapolating results from participants from such a different cultural background. The results were generally consistent with those of previous studies; however, they also suggest impaired joint attention skills in young children are a predictor of autism (regardless of one's cultural background).

Eaves, L. C., Ho, H. H. (2004). The very early identification of autism: Outcome to age 4½-5. *Journal of Autism and Developmental Disorders, 34*(4), 367-378.

DISCUSS: The primary purpose of the study was to evaluate the stability of the diagnosis of ASD from 2 ½ - 4 ½ years of age. A total of 49 participants were evaluated at two different points in time (roughly around the ages of 2 ½ and 4 ½). Participants were primarily referred through various programs in British Columbia who identified the children as demonstrating social and communicative behaviors possibly indicative of ASD. Results suggested early diagnosis of autism was stable (79%). The diagnostic severity changed for 10% of the participants. 1 child was no longer identified with ASD at 4 ½.

INTERPRET: The findings suggest early diagnosis of ASD is reliable, and that few children will demonstrate an improvement in skills significant enough to no longer meet the diagnostic criteria. Diagnoses of PDD-NOS were less stable over time. The authors attribute this instability to limited knowledge regarding "autistic features" in the presence of language disorders.

EVALUATE: Generalizability of this study is relatively limited given the small sample size and the lack of external validation of the various diagnoses at both points in time. The sample primarily included children identified as "lower functioning" thus it was not a true representative sample of the broad spectrum of autism.

Kleinman, J. M., Robins, D. L., Ventola, P. E., Pandey, J., Boorstein, H. C., Esser, E. L., et al. (2008). The modified checklist for autism in toddlers: A follow-up study investigating the early detection of autism spectrum disorders. *Journal of Autism and Developmental Disorders, 38,* 827-839.

DISCUSS: The purpose of this replication study was primarily to evaluate the Positive Predictive Value (PPV) of the M-CHAT in detecting autism and to evaluate the validity of the screening tool. Participants for Study 1 (the replication) included 3,793 children (age 16-30 months) screened at well-child care visits or during intake with early intervention service providers. In Study 2, 1,416 participants were re-screened at 42-54 months of age. The participants were pooled from Massachusetts, Rhode Island, and Connecticut. Primary results indicated Positive Predictive Value was highest for both low and high risk participants when the follow-up telephone interview was considered.

INTERPRET: The results of the study indicate the telephone interview is a very important step when administering the M-CHAT. The Positive Predictive Value increased dramatically when the telephone interview was included, especially when screening the low-risk participants. The M-CHAT a relatively valid screening measure for autism, however, clinicians should be cautious when interpreting findings if the

telephone interview was not a part of the screening. Clinicians must understand that there is an increased risk of falsely identifying a child with ASD if they do not take the time to review the results and complete the telephone interview.

EVALUATE: This study consisted of a larger sample size than what is often observed in research relating to ASD, which further supports the validity of the M-CHAT. It also demonstrated internal consistency. The authors suggest a limitation included the inability to keep the evaluators "blind" during participant re-evaluation as the caregivers frequently discussed previous performance. Future research should compare the effectiveness of multiple ASD screening tools for different at-risk age groups.

Luyster, R. J., Kadlec, M. B., Carter, A., & Tager-Flusberg, H. (2008). Language assessment
     and development in toddlers with autism spectrum disorders. *Journal of Autism and Developmental
     Disorders, 38,* 1426-1438.

DISCUSS: The purpose of this population-based (cohort) study was to identify early markers of ASD for both receptive and expressive language. The participants included 164 toddlers with autism from Massachusetts. Multiple assessments were administered to confirm a diagnosis of ASD and to document various social language behaviors (*ADOS-G, Mullen Scales of Early Learning, Imitation Battery, Early Social Communication Scales, ADI-R, Vineland Adaptive Behavior Scales, and the MacArthur-Bates Communicative Development Inventories*). Results indicated close agreement among all assessment measures (direct assessment, parent questionnaire and parent interviews). Additionally, gesture use and non-verbal cognitive ability were the strongest predictors of receptive and expressive language skills.

INTERPRET: These results indicate parent reports of their children's language skills are reliable and valid measures to include in the diagnostic/screening process when evaluating at-risk toddlers. The study also confirms findings from previous studies regarding gestural communication and non-verbal cognitive ability and the prediction of receptive and expressive language skills. This supports the need to gain an increased understanding of pre-verbal early identifiers of autism, and emphasizes the importance of considering "non-verbal" aspects of communication when screening for ASD in at-risk toddlers. It also indicates treatment should follow a developmental sequence (when targeting language) as social-cognitive skills may be linked to language acquisition.

EVALUATE: The diversity of the study's participants was somewhat lacking as they were pooled from the state of Massachusetts only. They were also recruited through early intervention providers, suggesting many (or all) of the participants may have been receiving various services. The participants were between the ages of 18-33 months. Depending on the age of diagnosis, it is possible intervention may have affected the participants' performance. The inclusion of a typically developing group for comparison or a group of newly identified children with autism could have supported the validity of the results.

Posserud, M., Lundervold, A. J., & Gillberg, C. (2009). Validation of the autism spectrum
     screening questionnaire in a total population sample. *Journal of Autism and Developmental*

Disorders, 39, 126-134.

DISCUSS: The purpose of the study was to evaluate the validity of the Autism Spectrum Screening Questionnaire (ASSQ) as a screen for ASD. It was conducted as part of a larger longitudinal study in Norway. A total of 9,430 participants were screened (a questionnaire including the ASSQ was sent to parents and teachers of all 7-9 year old children in Bergen). The next sample was composed of participants from whom parent and teacher questionnaires were returned. Next, a cut-off score was established and 212 children were identified as ASSQ screen positive. The Development and Well-Being Assessment parent interview was administered to those parents who were willing to participate. Children with a positive ASSQ screen as well as children with a negative ASSQ screen were included in the validation (diagnostic/assessment) sample. Results indicate the ASSQ is a good screening tool for ASD in a total population sample. The inclusion of both parent and teacher ASSQ scores provided the highest sensitivity ratings.

INTERPRET: Results indicate the ASSQ may be a valid total-population screening tool for ASD in children ages 7-9. It is unclear whether or not it would be effective for additional age groups. It is most sensitive when the parent and teacher scores are considered (.91). Specificity is also highest when multiple scores/informants are considered (.86). It is possible that this screening tool could be used to evaluate the general population for ASD (for example, during annual kindergarten screenings). This could potentially be a method to catch any students who may have been mistakenly identified as developmentally delayed. However, scoring multiple informant questionnaires for every child entering kindergarten is probably not the most efficient method to screen for autism.

EVALUATE: The authors provide multiple limitations to consider. A significant limitation is the design of the study itself as it is very complicated. It may be challenging for future researchers to replicate (an important validation process when considering study results). The children with a negative ASSQ screen in the assessment sample were not randomly selected. Additionally, a large number of children with mental health problems were included in the sample (not a true representation of the general population). The study needs to be replicated in the United States to support generalizability. There is no mention of whether or not any of the children had already received a diagnosis of autism (which is likely given the older age range of the sample). There is also no mention of whether or not the individuals assessing for autism were blind to the ASSQ results.

Ozonoff, S., Young, G. S., Goldring, S., Greiss-Hess, L., Herrera, A. M., Steele, J., et al.
    (2008). Gross motor development, movement abnormalities, and early identification of autism.
    Journal of Autism and Developmental Disorders, 38. 644-656.

DISCUSS: The purpose of this study was to determine whether or not motor behavior differences can serve as early identifiers of autism. Motor movements were coded and evaluated by individuals watching home videos of participants (infants and toddlers) at various points in time (post hoc analysis). Participants were separated into three groups, including autistic disorder, non-autistic developmental delays of mixed etiology, and typical development. The coders were unaware of the diagnostic category to which each participant belonged. Results indicated abnormal or delayed motor movements were not significantly different from the motor delays observed in children with developmental delays.

INTERPRET: The results suggest motor behavior analysis is not a reliable early indicator of autism. There were also no consistent motor signs of future regression in skills. However, motor assessment screenings are

important when evaluating young children as they may be indicative of some form of developmental delay. It may serve as a validating measure when considered in conjunction with additional assessments.

EVALUATE: The authors recognized the lack of statistically significant differences in motor behaviors between the ASD and developmentally delayed groups, and subsequently refuted the results of previous research studies.

Sullivan, M., Finelli, J., Marvin, A., Garrett-Mayer, E., Bauman, M., & Landa, R. (2007).
     Response to joint attention in toddlers at risk for autism spectrum disorder: A prospective study.
     Journal of Autism and Developmental Disorders, 37(1), 37-48.

DISCUSS: The primary purpose of this longitudinal study was to determine whether response to joint attention (RJA) at 14 months (in at-risk children of ASD) predicted an outcome diagnosis of ASD (at age 3 years). The 26 participants were younger siblings of children with autism (at high risk of ASD). Results indicated response to joint attention was impaired as early as 14 months in the children who later received an ASD diagnosis or broader autism phenotype (BAP – language and/or social delays but did not receive a diagnosis of ASD). The reverse was also true; infant responsiveness to RJA cues at 14 months was associated with a non-ASD or non-BAP outcome diagnosis. At 24 months, toddlers who later received an outcome diagnosis of ASD were more distinguishable from the BAP group as they typically continued to be unresponsive to any RJA cues (while the BAP group demonstrated some improvement). Children who received a diagnosis of ASD demonstrated little improvement in RJA between 14 and 24 months while improvements were observed for the BAP and non-BAP groups. RJA performance was also a predictor of future receptive and expressive language abilities.

INTERPRET: The results of this study contribute to our current understanding of the "hallmark" ASD deficit in joint attention. It appears as though infants with ASD are not entirely distinguishable from those with developmental delays at 14 months (when screening joint attentional skills alone). This finding is consistent with other studies in both joint attention and motor skills. As children reach 2 years of age, deficits in joint attention become more pronounced when compared to developmentally delayed or typically developing children. This is important for clinicians to be aware of when screening young children for autism… impairment in joint attention alone at < 2 years may not be indicative of ASD. However, deficits in joint attention at 14 months (specifically the lack of responses to any RJA cues) may be reason enough to refer a child for early intervention for careful monitoring of a developmental delay or ASD.

EVALUATE: This study included information regarding exclusion criteria, though the participant sample size was small (51) and lacked ethnic diversity. Consistent with other studies, statistically significant group differences were only notable for gender (as there was a higher ratio of boys who received an ASD diagnosis). ASD diagnoses in the older siblings of the participants were confirmed, and inter-observer reliability scores were reported for joint attention trial/task ratings.

Twyman, K. A., Maxim, R. A., Leet, T. L., & Ultmann, M. H. (2009). Parents'
     developmental concerns and age variance at diagnosis of children with autism spectrum disorder.
     Research in Autism Spectrum Disorders, 3(2), 489-495.

DISCUSS: This cross-sectional study divided participants into two groups based on their age of diagnosis of ASD. The purpose of the study was to compare the age of recognition of differences with age of

diagnosis. Participants were from the Midwest and had all been evaluated and diagnosed with ASD at the same developmental center. Results indicated 93% of parents had concerns about their child before age 2. More social behavioral concerns were expressed by parents of children who received earlier diagnoses (12-36 months). An additional finding indicated early diagnosis was more likely when a child was enrolled in early intervention.

INTERPRET: Results are consistent with previous studies' findings regarding differences in social behaviors at an early age. The authors also suggest parents should be encouraged to report concerns to their child's pediatrician. This would allow for appropriate screening measures in case there is a need for early intervention. The provision of resources for parents may be critical in supporting their decision to refer their child for further evaluation. Parents should also understand the process of referrals for early intervention services as pediatricians may not provide the referrals, or there may be a several month wait for developmental clinics.

EVALUATE: The authors identify study limitations, including the relatively small sample size, inconsistent coding of ASD at the developmental center, and the potential of recall bias from parent reports of age of initial concerns. Recall bias was likely the greatest limitation to the study. The authors indicated no statistically significant differences between many of the participant group SES backgrounds (gender, birth order, type of insurance, area of residence, parental employment, age, education, siblings identified with ASD).

Watt, N., Wetherby, A. M., Barber, A., & Morgan, L. (2008). Repetitive and stereotyped
        behaviors in children with autism spectrum disorders in the second year of life. *Journal of Autism and
        Developmental Disorders, 38,* 1518-1533.

DISCUSS: The study examined repetitive and stereotyped behaviors (RSB) in 18-24 month old toddlers who were later diagnosed with ASD. They were compared with matched groups of typically developing children and children with developmental delays. All participants were 2 years old. The study identified the following behaviors that were characteristic of the ASD group: repetitive banging or tapping of objects on a surface, rocking/flipping objects back and forth, swiping objects away repetitively, spinning, wobbling, or rolling objects, moving or placing objects in a stereotypical manner or place, and clutching objects longer than expected. Also, children in the ASD group were more likely to bang a part of their body on a table or surface, rub their body, and/or stiffen or posture hands and fingers.

INTERPRET: The authors suggest these repetitive or stereotypical behaviors may be early indicators of autism and should be noted when conducting observational screenings. Many of these behaviors were observed in typically developing children, however, with less frequency or duration. Further research should be conducted to determine the impact of socially inappropriate RSBs and how they impact the opportunity for social skill development as children get older.

EVALUATE: The authors suggest further research is needed to establish a reliable or valid "tool" to capture these behaviors accurately and efficiently. The authors also identified difficulty with coding sensory behaviors reliably, a potential limitation as it is unclear whether or not some of these RSB were sensory in nature. The participant sample size was also small (ASD = 50, DD = 25, TD = 50).

Wiggins, L. D., Bakeman, R., Adamson, L. B., & Robins, D. L. (2007). The utility of the

social communication questionnaire in screening for autism in children referred for early intervention. *Focus on Autism and Other Developmental Disabilities, 22*(1), 33-38.

DISCUSS: The purpose of this study was to evaluate the effectiveness of the Social Communication Questionnaire in distinguishing children with ASD from children with developmental delays (ages 17-45 months). Participants included 37 young children enrolled in an early intervention program in Atlanta, GA. Results confirmed previous findings that the SCQ lacks sensitivity and specificity when evaluating children under the age of 4. The authors indicate that the screening tool's sensitivity and specificity improve if the cut-off score is reduced. They also indicated the profile developed for the SCQ is specific to behaviors of older children, thus potentially impacting sensitivity when administered to children under 4.

INTERPRET: Results suggest the SCQ is a relatively valid measure for screening autism in older children, however, it is not the best screening tool for children under the age of 4. Should the authors of the tool develop a new version with age-appropriate profiles and lower cut-off scores, the SCQ may be a valid screening tool for autism with younger children as well.

EVALUATE: Although the study's results were consistent with previous studies reports of the SCQ as a valid measure of ASD for older children, a small sample size and SCQ administration after a known diagnoses of ASD or DD limit the findings.