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A Novel Teacher Implemented Protocol to Assess Early Social Communication and Play Skills in Preschool Children with Autism

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A Novel Teacher Implemented Protocol to Assess Early Social Communication and Play Skills in Preschool Children with Autism

A dissertation submitted in partial satisfaction of the requirements for the degree of Doctor of Philosophy in Education

by

Stephanie Yoshiko Shire

2013

ABSTRACT OF THE DISSERTATION

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Doctor of Philosophy in Education

University of California, Los Angeles, 2013

Professor Connie Kasari, Chair

Community practitioners have limited access to validated tools to assess foundational early social communication and play skills in order to select developmentally appropriate skill targets. The purpose of the current study is to assess the feasibility and validity of a novel teacher implemented brief assessment designed to capture the presence of preschool children's nonverbal social communication and play skills in classroom settings and facilitate teachers' selection of developmentally appropriate target skills for students. Three assessments were administered with 68 preschool students with autism including two well-established research protocols: the Early Social Communication Scale (ESCS: Mundy et al., 2003) and Structured Play Assessment (SPA: Ungerer & Sigman, 1981). Eight teaching professionals then administered a novel assessment protocol with their students. In addition students received two

established research protocols one addressing early social communication skills and one targeting play. On average, teachers delivered the novel assessment with 86.57% fidelity (*SD*= 8.15%). Logistic regression was applied to examine the probability of agreement on children's skill targets from the brief assessment between teachers and the researcher. The probability of target agreement between each of the eight teachers and the researcher varied by skill domain including: JA (0.40-1.00), BR (0.30-1.00), and play skills (0.40-0.60). Agreement on JA and BR targets was not significantly different from expected proportions of 70% agreement and 30% disagreement (JA: p=0.22; BR: p=0.92) while play was significantly different and below expected proportions for agreement (χ^2 (1)= 17.04, p<0.01). Further, agreement between researcher selected JA target skills from the brief assessment and targets obtained from the ESCS was not significantly different from expected proportions 70/30 (p=0.30) while agreement on BR targets was significantly different and below expected proportions (χ^2 (1)= 1.07 p<0.01). Finally, agreement between the researcher selected play target and the target obtained from the SPA was not significantly different from the expected proportion of 70/30 (p=0.96) Further, findings indicate teachers learned to administer the assessment and often select accurate JA and BR target skills yet low agreement was found for play. Further training regarding developmental play levels may enhance teachers' accurate identification of play targets.

The dissertation of Stephanie Yoshiko Shire is approved.

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Early nonverbal social communication skills include gaze and gestures to share (joint attention skills) as well as to ask for something (behaviour regulation skills). For children with autism spectrum disorder (ASD), these skills often emerge later and in a different developmental sequence when compared to their typically developing peers (Paparella, Goods, Freeman, & Kasari, 2011). In addition, children with ASD often demonstrate fewer and simpler play acts than typically developing children (Lifter, Sulzer-Azaroff, Anderson, & Cowdery, 1993). Due to these differences in the emergence of early communication skills and play skills, these domains are often measured in studies examining this unique population. Established tools are available to assess joint attention and behaviour regulation skills (Early Social Communication Scale: Mundy et al., 2003) as well as play skills (Structured Play Assessment: Ungerer & Sigman, 1981). However, these tools require time consuming implementation by trained assessors which may contribute to the limited of use of these protocols in everyday settings by community-based professionals. Yet, it is necessary for community practitioners to have valid and reliable tools that capture the presence of early nonverbal social communication skills as well as play skills, information that can then be used to set appropriate targets for intervention programming. The purpose of the current study is to assess the feasibility and validity of a novel teacher implemented brief assessment measure designed to capture the presence of children's nonverbal social communication and play skills in preschool classroom settings.

Typical Development of Joint Attention, Behaviour Regulation, and Play Skills

Joint Attention and Behaviour Regulation Skills. Joint attention skills require that children attend to both another person and a shared focus of attention (Mundy, Sigman, & Kasari, 1990). These nonverbal methods of communication serve three functions: (a) to demonstrate affiliation or manage a social interaction, (b) coordinate attention between oneself,

another person and an object/activity, and (c) regulate the behaviour of another by requesting for objects/activities (Mundy et al., 1987). These skills typically develop in the child's first two years of life beginning with coordination of gaze between another person and object as early as six months of age. This is followed by the emergence of nonverbal communicative gestures for the purpose of sharing as well as requesting (Mundy & Crowson, 1997). Such gestures include showing objects to share around 10 months of age, followed by giving and pointing gestures to request an item or to share attention with another person. Children have typically gained a full repertoire of nonverbal communication skills to request and share by approximately 20 months of age (Paparella et al., 2011). Mastery of these early communicative gestures has been linked to other fundamental skills including later language skills (e.g., Carpenter, Nagell, & Tomasello, 1998) indicating that these nonverbal gestures are critical building blocks in children's communicative development.

Play Skills. Play acts can be categorized into two groups including functional and symbolic play (e.g., Ungerer & Sigman, 1981). Functional play emerges first, between 12 and 24 months of age (Ungerer & Sigman, 1981) where children play with objects as they are intended to be used (e.g., push a car, put a cup on a saucer). Functional play can be broken into further discrete categories including simple play, combination play, and pre-symbolic play. Simple play represents the most basic cause and effect functional actions on objects (e.g., roll a ball). This is followed by combination play where children put together conventional associations (e.g., put cup on saucer), put objects together based on their presentation (e.g., pieces into a puzzle), and create general configurations of objects (e.g., put objects in bin, build blocks) (Lifter et al., 1993). Between 12 and 21 months children begin to engage in pre-symbolic play where they begin to direct play acts towards themselves (e.g., child puts phone to their ear) and then extend

these actions towards figures (e.g., feed the doll) (Lifter et al., 1993). Functional play is followed in the second year of life by the emergence of symbolic play where children pretend that an object is something that it is not (Libby, Powell, Messer, & Jordan, 1998). Imaginative and fantasy play including dramatic role play continue to emerge as symbolic play develops (Lifter et al., 1993). Altogether, the development of play skills has been linked to other forms of symbolic representation including the development of language (e.g., Lewis, Boucher, Lupton, & Watson, 2000; Vygotsky, 1967), thereby highlighting the significance of play to children's development.

Development of Joint Attention, Behaviour Regulation, and Play Skills: Children with ASD

Joint Attention and Behaviour Regulation Skills. Children with ASD often experience delays in the development of joint attention and behaviour regulation skills. Compared to typically developing children, children with ASD tend to master requesting skills prior to the development of joint attention skills rather than concurrently (Mundy & Sigman, 1989). Therefore, skills such as coordinating gaze (e.g., looking at a toy, glancing up at a person and then looking back to a toy) and using communicative gestures including pointing, giving, and showing to share are often delayed or absent from the communication profile of children with ASD. Further, when joint attention skills do emerge, the developmental sequence of these gestures appears to differ from that of typically developing children (Paparella et al., 2011). Where typically developing children demonstrate showing to share first, followed by pointing and giving to share, children with ASD often first demonstrate pointing to share followed by giving and showing gestures (Paparella et al., 2011). Although these differences exist in early communicative development, important links have been found between joint attention gestures and later language skills (e.g., Kasari, Gulsrud, Freeman, Paparella, & Hellemann, 2012) such that interventions have been designed to systematically target the development of communicative

gestures (e.g., Kasari, Freeman, & Paparella, 2006; Kasari, Freeman, Paparella, & Jahromi, 2008).

Play Skills. In general, children with ASD demonstrate fewer play acts with limited range and flexibility compared to their typically developing peers (e.g., Lifter et al., 1993). Much of the discussion of play for children with ASD focuses on the delay in the emergence and frequency of symbolic play acts (e.g., Rutherford et al., 2006). However, functional play skills have also been noted to lack the range and elaboration demonstrated by typically developing children (Williams, Reddy, & Costall, 2001). Yet, play skills have important developmental consequences for children with ASD. Play skills including both functional and symbolic play have been linked to children's later communication skills (e.g., Toth, Munson, Meltzoff, & Dawson, 2006).

The Current Study

Multiple methods can be used to assess children's early social communication and play skills including observation within a structured assessment context, key informant report and observation of natural interactions. Although assessments of joint attention, behaviour regulation, and play skills have been established within university based research protocols, these assessments are time intensive in both staff training and their implementation with children. Due to these limitations, there is a need to provide community professionals with efficient, and valid tools that can be used to capture the presence of these skills in real-world community settings with young children with ASD. Yet, movement of protocols developed in university based settings into community settings requires examination of the external validity of tools which may have reduced effects once removed from the controlled confines of university clinics and are influenced by the resources, and culture of the community context (Mandell et al., 2013).

Therefore, the current study first, explores the feasibility of the novel assessment by describing the type and duration of training required to help teachers achieve administration fidelity and reliably administer the assessment. It was hypothesized that teachers would require varied amounts and types of support in order to reach fidelity. Second, the study examines teachers' accuracy in identifying children's target skills or goals based on the joint attention, requesting, and play skills observed during their administration of the novel assessment. Agreement was assessed between the teachers' data and the researchers' coding of videotape of the same administration. It was hypothesized that the teachers may have not yet honed their sensitivity to the presence of communicative gestures and finer categories of play skills. This could lead to discrepancies between behaviours identified by teachers and those identified by the researchers based on the same teacher implemented assessment. Third, the study examines agreement between a novel teacher administered assessment and established research protocols on the presence of children's joint attention, behaviour regulation, and play skills to determine whether or not the same profile of skills is present in the novel assessment and the established assessments. It was hypothesized that agreement on the presence of the behaviours would be moderate to high, however, it is possible that the shortened duration of the novel assessment would reduce the number of opportunities available for children to demonstrate the same skills they would show during the lengthy research protocols. This shorted duration could lead to fewer skills captured within the novel assessment than are captured in the established assessments.

Methods

Participants

Teaching professionals. The current study includes six teachers who were participating in a larger intervention study deploying a social communication intervention to six public

preschool classrooms. In addition, two paraprofessionals were included in the study one in each of two classrooms where the teacher asked that the paraprofessional be trained in addition to him/herself. Both teacher and educational assistants will be referred to collectively as "teachers" from here onward.

Teaching professionals were primarily female (*n*=7) and self-reported as African American (*n*=2), Asian (*n*=1), Caucasian (*n*=2), Hispanic (*n*=2), and other (*n*=1). Mean age for seven professionals reporting age was 39.29 years (*SD*= 8.90 years). Both educational assistants reported having engaged in some college while all six classroom teachers had obtained master's degrees. Teaching professionals had been in their current positions for 1-7 years (*mean*= 3.43 year). Seven of eight professionals had previously held positions in special education for 2-15 years (*mean*=5.54 years).

Students with autism. Sixty-eight preschool students were included in this study. Children were primarily male (*n*=57) and on average 48.38 months of age (*SD*=6.15 months). Parents who reported children's ethnicity (*n*=60) included African American (*n*=8), Asian (*n*=10), Caucasian (*n*=20), Hispanic (*n*=13), and other/mixed race (*n*=12). Nearly all parents reported outside diagnoses of autism (*n*=64) or pervasive developmental disorder not otherwise specified (PDD-NOS: *n*=1) which the exception of three students where parents reported diagnoses of developmental delays (*n*=1) or speech impairment (*n*=2). A research reliable assessor completed the Autism Diagnostic Observation Schedule-2 (ADOS-2: Lord et al., 2012) with all students where 62 students met the benchmark for autism and six students met the benchmark for ASD.

Classrooms

Six specialized public preschool classrooms for children with autism were included in this study. Classrooms were located within public elementary schools serving a variety of geographic regions throughout a large US public school district. All classrooms had four staff members including the classroom teacher, an educational assistant, a speech language pathology assistant (SLPA), and an outside agency behavioural aide. These four adults supported up to eight students per class with two, 2.5 hour classes per day.

All six classrooms were working with the same curriculum, daily classroom structure, and routine. The students' day was organized into 15-minute centre based rotations. The centers were divided by instructional themes (e.g., play, independent work, communication) and were staffed by one adult who worked with 1-3 students at a time. It was during these centre-based rotations where the classroom teacher or the educational assistant delivered the assessment one on one with the students.

Design

Teachers and students included in this study were concurrently enrolled in a larger intervention study using a randomized wait list control design. As part of the larger assessment battery, teachers administered the novel assessment protocol at baseline before children in the immediate treatment group began the intervention.

Teacher Training

Teachers were introduced to the assessment materials through handouts and discussion of the protocol in addition to discussion regarding the joint attention, behaviour regulation, and play skills they would be observing. Teachers watched a video of the assessment being delivered with a child where the researcher highlighted key points related to the administration of the items and the child's initiation of target behaviours. The researcher was also present to videotape the first

three to eight administrations of the assessment by each teacher with their students to provide feedback and answer questions after each administration.

Measures

Early Social Communication Scale (ESCS: Mundy et al., 2003). This 20-minute assessment is designed to capture the presence of joint attention (JA) and behaviour regulation (BR) skills. The ESCS includes a variety of objects including wind up toys, a ball, comb, hat, book and pictures posted on the walls around the room in order to provide systematic opportunities for children to demonstrate joint attention gestures (point, show or give to share), coordinated joint looks (e.g., gaze shifts from the adult to a toy and back to an adult to share), and commenting language (e.g., "it's a dog!" to share excitement about the toy dog with the examiner) as well as requesting gestures (point or give to ask for an item or to ask for help). This protocol was delivered with high fidelity (*mean*= 88.40%) based on a random selection of 35% of administrations. Coding of the assessment allows for determination of both: (a) initiations of joint attention (IJA) and initiations of behaviour regulation (IBR) as well as (b) response to joint attention (RJA). Construct validity has been reported (e.g., Mundy et al., 2003) as well as the high reliability of the coding schema with typically developing young children and children with ASD (e.g., Lawton & Kasari, 2012; Mundy et al., 1988; Paparella et al., 2011).

Structured Play Assessment (SPA: Ungerer & Sigman, 1981). The SPA is a 15-minute assessment where the child is presented with five sets of toys. The toy sets are composed of: (a) puzzle, shape-sorter, and nesting cups, (b) dolls and a tea set, (c) dolls, phone, mirror, and comb, (d) dolls and furniture, and (e) barn, blocks, truck and animals. Children interact with the toy sets without explicit prompting from the assessor. The assessor may comment on the child's action but must refrain from language that directs or prompts the child's play. Children progress

through the sets at their own pace. When the child no longer continues to display novel play acts with a set of toys, the assessor removes the current toy set and presents the next set of toys. This protocol was administered at an average of 89.6% fidelity (*SD*= 15.41%) based on a random selection of 39% of administrations. The assessment is videotaped and then coded to capture the type and frequency of children's spontaneous play acts. Types of play acts are coded as one of 15 categories (Lifter et al., 1993) that are collapsed into four larger categories including simple play, combination play, pre-symbolic play, and symbolic play. Multiple demonstrations of high reliability of this coding have been published (e.g., Kasari et al., 2010; Ungerer & Sigman, 1981).

Short Play and Communication Evaluation (SPACE). This novel play based assessment was developed to provide teachers and community clinicians with an assessment tool to obtain a profile of a child's JA, BR, and play skills. This information is intended to inform the development of children's intervention goals related to early social communication and play. The assessment is conducted one on one, takes approximately 15 minutes to complete and is intended to include components of both the SPA and ESCS. Children are presented with: (a) balloons, (b) two sets of toys, (c) a ball, (d) distal points, and (e) an optional social game for children who are not engaged with the objects (see Appendix 1 for full protocol and list of materials). Within the presentation of the materials, opportunities are embedded for children to demonstrate a range of spontaneous initiations of JA, BR, and play skills. The assessor may comment on the child's actions and imitate play actions that the child has initiated independently however, he/she may not verbally or physically prompt communication or play skills.

Coding and Outcome Data

ESCS. Examination of behaviours from videotaped administrations of the ESCS allow for coding of initiations of JA (IJA), initiations of BR (IBR), and responding to JA (RJA). The frequency of a range of both verbal and nonverbal acts (e.g., eye contact, gestures) is coded within each of these domains. In addition, opportunities are presented to the child to capture responding to behavioural requests, initiating social interaction and responding to social interaction. Two independent reliable raters coded the ESCS. Intraclass correlations (ICCs) were calculated for each rater against a gold standard coder to determine coder reliability. ICCs were calculated for three categories of behaviours including: RJA (α= 0.98-1.0), IJA (α=0.87-.95), and IBR (α=0.98-0.99).

SPA. Videotaped administrations of the SPA are examined for discrete play behaviours. These behaviours are defined as one of a hierarchy of mutually exclusive play levels (Lifter et al., 1993). Each behaviour (play act- e.g., put cup to doll's mouth) is then categorized as spontaneous or prompted (via a model, verbal prompt or physical prompt). At each play level, the frequency of play acts and number of different play types can be obtained. For example, a child stacks three blocks and stacks three shapes. This child would received a frequency count of six play acts, and two different types of play (stacking in two different ways). Three independent and reliable raters coded the SPA for the number of different play types and frequency of play acts within each type. ICCs were calculated for each rater to examine reliability of identification of play types within each of the four major play levels including simple play types (α=0.87-0.96), combination play types (α=0.80-0.99), presymbolic play types (α=0.97-0.98), and symbolic play types (α=0.85-0.94). ICCs were also calculated for each rater for frequency of play acts including simple play acts (α=0.85-0.96), combination play acts (α=0.87-0.99), presymbolic play acts (α=0.95-0.97), and symbolic play acts (α=0.87-0.93).

SPACE. Teachers were provided with a code sheet to capture the presence of behaviours observed in vivo during the assessment. Behaviours were organized into developmental hierarchies in each of the three skill domains (code forms can be obtained from the first author). Teachers recorded the frequency of JA, BR, and play behaviours as "never", "once", or "more than twice". Teachers were then asked to select the target behaviour for each skill domain which was defined as the first skill in the hierarchy that was not observed "never" OR occurred only one time "once". A special code of "N/A" was given to children who demonstrated each of the skills within the JA domain or BR domain "two or more times". For these children who demonstrated the full range of behaviours with no missing skills, no individual skill was targeted. Rather teachers were instructed to employ the full range of gestures for these particular students during intervention rather than one specific target skill.

SPACE: Research Coding. Videotaped administrations of the teachers' assessments were coded for JA, BR, and Play skills. Coders watched the videos once without pausing to simulate in vivo coding. Coders recorded the frequency of JA, BR, and play behaviours as "never", "once", or "more than twice" and selected a target behaviour in the same fashion as the teachers. Twenty percent of the videos were double coded to examine coder reliability. ICCs were calculated for the total frequency of behaviour in each domain JA (α=0.91), BR (α=0.92), and play (α=0.90).

Statistical Analyses

Descriptive statistics are provided for teachers' fidelity of administration. Agreement between all teachers and the researcher on children's skill targets are examined using logistic regression models where agreement or disagreement is the dichotomous outcome. In addition, the probability of agreement between each of the eight teachers and the researcher will also be

obtained from the regression model. Further, agreement on JA and BR target skills obtained from the ESCS and the researcher's coding of the teachers' assessment (SPACE) will be examined using a Chi squared test of proportions to determine whether or not agreement was significantly different from a standard of 70% agreement (70/30). The same analysis will be conducted to examine agreement between the play level target obtained from the SPA and the researcher's coding of the SPACE.

Results

Fidelity of Administration

Teacher Training. The trainer spent an average of 2.08 hours with each staff member (Min: 1.5 hours, Max: 3.33 hours) including discussion, video, and practice administrations. Feedback was provided immediately post assessment for each teacher's first three to eight administrations.

Administration. The videotaped administrations were reviewed and rated for administration fidelity (see Appendix 1). Overall, on average the teachers administered the SPACE assessment independently with 86.57% fidelity (*SD*= 8.15%). Teachers did vary in their implementation fidelity (see Table 1) with individual averages across students ranging from 72.55% to 97.65%.

Table 1 Mean Fidelity of Implementation by Teacher

Teacher	Students Assessed (*n*)	Mean Fidelity	Standard Deviation
1	11	84.16%	9.33%
2	10	88.89%	5.15%
3	7	89.96%	6.58%

4	8	78.43%	6.08%
5	13	87.21%	6.10%
6	11	87.03%	5.84%
7	3	72.55%	6.79%
8	5	97.65%	3.22%

Teacher Identified Target Skills

Based on the behaviours observed and noted by the teacher during the SPACE, the teacher identified the first skill in the hierarchy that was not yet mastered. Logistic regression was applied to examine the probability of teachers' agreement in their selected skill target with the researcher's selected skill target. Three regression models were applied to assess agreement, one for each of the three skill domains: joint attention, behaviour regulation, and play. The target outcome was dummy coded for agreement (1) or disagreement (0). Teachers were also assigned a dummy code from 1 to 8. This categorical parameter was added as a predictor to the regression model (Teacher). The probability of agreement between the researcher and the teacher for each skill domain was modeled:

$$log\left(\frac{p_i}{1-p_i}\right) = \hat{\beta}_o + \hat{\beta}_1 Teacher_i$$

where p_i is the probability of agreement for the i^{th} child's first not mastered skill between the teacher and the researcher. Within this model, the outcome disagree or agree (0 or 1) is represented by p_i. In addition, the proportion of agreement was examined against a benchmark of 70% agreement via a chi squared test of proportions.

Joint attention. Targets selected by the teachers and by the researcher are detailed in Table 2a. Across the 68 children completing the SPACE, agreement in selection of the target JA skill occurred 43 times while disagreement occurred 25 times.

Table 2a- Joint Attention Target Skills Identified by Teacher and Researcher

	Respond & Look	Look & Point	Point	Show	Give	N/A
Researcher	3	4	46	8	5	3
Teacher	3	12	45	1	2	2

The categorical predictor "Teacher" was not a significant predictor of agreement (p=0.84) and as such, additional contrasts were not conducted. However, the probability of agreement on JA target selection varied by teaching professional with values ranging from 0.40 to 1.00 (see Table 2b). One teacher demonstrated near perfect agreement while two teachers demonstrated agreement below 50%. Chi squared test of proportions indicated that across all teachers, agreement with the researcher was not significantly different from the expected proportion of 70/ 30 (agreement/disagreement: p=0.22).

Table 2b Probability and Odds of Agreement on JA Skill Targets by Teacher

Teaching Professional	Students Assessed (n)	Probability	Odds
1	11	0.80	4.0
2	10	0.63	1.70
3	7	0.57	1.33
4	8	0.43	0.75

5	13	0.67	2.03
6	11	0.70	2.33
7	3	0.99	99
8	5	0.40	0.67

Behaviour regulation. The target BR skill target selected by the teachers and the researcher was identical in 48 cases, with disagreement occurring for 20 cases. Target selections for both the researcher and the teachers are listed in Table 3a.

Table 3a- Behaviour Regulation Target Skills Identified by Teacher and Researcher

	Give	Point	N/A
Researcher	14	39	15
Teacher	14	49	5

The probability of agreement between the researcher and each of the teachers ranged from 0.30 to 1.00 (see Table 3b). However, with the exception of the one teacher at 0.30, the probability of agreement with all other teachers was at least 0.64 (*mean*= 0.73) with two teachers demonstrating perfect agreement. "Teacher" was not a significant predictor of agreement. Chi squared test of proportions indicated that across all teachers, agreement with the researcher was not significantly different from the expected proportion of 70/ 30 (agreement/disagreement: p=0.92).

Table 3b Probability and Odds of Agreement on BR Skill Targets by Teacher

Teaching Professional	Students Assessed (*n*)	Probability	Odds
1	11	0.99	99

2	10	0.30	0.43
3	7	0.71	2.33
4	8	0.63	1.70
5	13	0.77	3.35
6	11	0.64	1.78
7	3	0.99	99
8	5	0.80	4.0

Play. Amongst the three skill domains, agreement on target play skills was most variable. Of 68 cases, agreement on target play level occurred in 32 cases and disagreement occurred in 36 cases (see Table 4a).

Table 4a- Target Play Skills Identified by Teacher and Researcher

	Simple	Combination	Pre-Symbolic	Symbolic
Researcher	2	1	28	37
Teacher	4	20	26	18

Probability of agreement between the teacher and researcher ranged from 0.18 to 0.80 amongst teaching professionals (see Table 4b) however, "Teacher" was not a significant predictor of agreement. Chi squared test of proportions indicated that across all teachers, agreement with the researcher was significantly different and below the expected proportion (70/30) of agreement and disagreement (χ^2 (1)= 17.04, p<0.01).

Table 4b Probability and Odds of Agreement on Play Skill Targets by Teacher

Teaching Professional	Students Assessed (*n*)	Probability	Odds
1	11	0.18	0.22
2	10	0.20	0.25
3	7	0.57	1.33
4	8	0.63	1.70
5	13	0.77	3.35
6	11	0.37	0.59
7	3	0.33	0.49
8	5	0.80	4.0

Agreement: Research Protocols and Teacher Administered Assessment

Agreement on child skill targets between the researcher's coding of the teacher administered SPACE and the clinician delivered research protocols (ESCS and SPA) was examined. A total of 64 students received both the ESCS and the teacher administered assessment while 62 received the SPA and the SPACE.

Joint attention. JA skill targets selected by coding of the ESCS and the teachers' SPACE are displayed in Table 5. Agreement across the 64 cases was examined between the ESCS and the SPACE with a chi squared test of proportions indicating agreement was not significantly different from expected proportions 70/30 (p=0.30).

Table 5- Joint Attention Target Skills Identified by Teacher and Researcher

	Respond & Look	Look & Point	Point	Show	Give	N/A
ESCS	1	3	32	26	2	0
Teachers' Assessment	2	4	43	7	5	3

Behaviour regulation. Both the ESCS and the SPACE were completed with 64 participants (see target data in Table 6). Comparing BR targets derived from the ESCS and the teachers' assessment demonstrated agreement that was significantly different from the expected proportion of agreement (χ^2 (1)= 1.07 p<0.01).

Table 6- BR Target Skills Identified in the ESCS and the SPACE

	Give	Point	N/A
ESCS	18	25	21
Teachers' Assessment	14	35	15

Play. Both the SPA and the teachers' SPACE were completed with 62 participants (see target data in Table 7). Examination of agreement on target play level between the SPA and the SPACE was not significantly different from the expected proportion of agreement (p=0.96). Disagreements occurred when selecting symbolic play as the child's target play level. Although symbolic play was identified as the target for 57 children via the SPA, only 38 children obtained a symbolic play target from the SPACE.

Table 7- Target Play Skills Identified via the SPA and the SPACE

	Simple	Combination	Pre-Symbolic	Symbolic
SPA	0	1	4	57
Teachers' Assessment	0	1	23	38

Discussion

The SPACE was developed to provide community clinicians with a brief structured tool designed for use in classroom settings to help obtain a picture of the child's mastered and target early social communication and play skills. Overall, findings indicate that teachers learned to administer the brief protocol to assess joint attention, behaviour regulation, and play skills at high fidelity but had mixed success in correctly identifying target skills through in vivo coding of their administration. Further, JA skill targets obtained by the researcher from the teachers' SPACE aligned well with the ESCS, an established research protocol and play targets aligned well with the SPA. However, behaviour regulation targets were more varied and agreement on target selection did not meet an expected proportion of 70/30.

Joint Attention Skills: Points to Share

Close examination of the JA skills demonstrated by children on both the SPACE and the ESCS indicate that children are most frequently obtaining point to share as their JA target skill. This target indicates that children within this sample were either not yet using joint attention gestures indicating significant delays in the development of these core nonverbal social communication skills or that the point is the gesture that is missing amongst the child's splintered profile of JA skills. Recent research indicates that the presence of a JA point in the toddler years may have a unique predictive link to later communication skills in a sample of

children with ASD (Gulsrud, Hellemann, Freeman, & Kasari, in press). The influence of this discrete skill on later communicative development and the significant paucity of JA points within this sample highlights the importance of helping clinicians to notice the presence or absence of this skill in order to provide targeted interventions to facilitate the development of this skill when absent.

Training: Observe and Identify Targets

This group of teaching professionals included six head classroom teachers who had an average of approximately nine years of experience teaching in special education classrooms and graduate degrees in the field. In addition, in two of these classrooms, a paraprofessional with two and 15 years of experience as assistants in special education classrooms for young children also delivered the assessment. Each teacher received training and information specific to the delivery of the assessment protocol as well as discussion and video clips of the target behaviours. With this brief targeted training, these experienced teaching professionals demonstrated substantial agreement (benchmark of 70% agreement) on JA and BR skills but more limited agreement on targets in the domain of play. Although early social communication skills and play skills are both fundamental to young children's development and core deficits for young children with ASD yet even highly trained teachers experienced difficulty noticing and correctly categorizing these skills. Therefore, further information about the developmental sequence and hierarchy of observable behaviours across all three domains and specifically, focusing on play may help increase agreement. Observation and categorization of play is complex. Play skills span a wide range of levels, with a variety of play acts that can occur at each level. In addition, the context of the assessment is toy play. Children's frequency of different play types across play levels may be more difficult to parcel out and note correctly over the course of the 15 minute assessment. In

contrast JA and BR skills comprise only a handful of discrete behaviours that are clearly directed to the adult which may lead these behaviours to have greater salience for the adult observer. Although teachers received targeted training on the SPACE, the majority of the training focused on administering the protocol at fidelity. Considering the complexity of play, teachers may benefit from practicing event coding of play acts by watching live or video taped administrations of the protocol to learn to quickly identify the range of common play acts that occur with the protocol toys and distinguish play levels that are associated with these acts. In addition, knowledge checks that test the teachers' identification and correct categorization of these discrete behaviours prior to administration with their students may provide additional information about teachers' flexible and applied understanding of the concepts and indicate when additional training may be required.

Play: Presymbolic Acts

The Structured Play Assessment includes five sets of toys where sets 2-5 are designed to elicit presymbolic and symbolic play skills through actions the child takes on his/herself (e.g., pretending to brush one's own hair), actions extended to figures (e.g., putting the doll in the bed) and pretending figures take actions (e.g., pretending the baby drinks from the bottle). Although a set of animals and dolls are provided in the teachers' SPACE, the range of materials is limited, particularly related to pretend self actions where the child pretends to act on an object (e.g., pretend to eat). Of the discrepancies noted in play level target selection between the SPA and the SPACE, nearly all consisted of a symbolic target obtained from the SPA and a presymbolic target obtained from the teachers' assessment. Therefore, children demonstrated fewer presymbolic acts during the novel assessment than on the SPA. The addition of materials to target presymbolic actions including actions extended to the self and actions extended to figures

is hypothesized to resolve this difference. Examination of the frequency of play acts across the 64 children who completed the SPA indicated that children most frequently extended the mirror to themselves (70 times), put a figure in the barn structure (78 times), and pretended to use the phone (46 times). Other high frequency presymbolic acts included putting a doll in a chair (63 times) or in a bed (41 times), materials for both of these acts were available to the children in the SPACE. Therefore, materials including a structure to put figures in (child as agent), dress up materials including a hat, glasses and necklace (pretend self), a phone (pretend self), and novel pretend food items (cupcakes or sandwiches that can be put together) will be added to provide children with materials that address the most frequent presymbolic play acts found in the SPA.

Behaviour Regulation: Restricted Opportunities, Prompted Skills and Protocol Fidelity

Agreement between behaviour regulation skills observed during the ESCS and those observed during the SPACE with the same child was more limited than the other skill domains. Several factors may have contributed to this unexpected variation in children's performance between the two protocols including: (a) verbal prompts for BR within the ESCS, (b) adult directed nature of the teachers' delivery of the SPACE, and (c) fidelity of administration of the ESCS.

Two BR gestures were targeted within the SPACE: give and point. Within the ESCS protocol, opportunities are programmed to elicit behavioural regulation bids, specifically BR points. For example, at the beginning of each trial, children are asked "what do you want to play with?". This acts as a verbal prompt for a BR act including language, eye contact and/or often a point to request. Children's behaviour in response to this verbal prompt can be considered elicited by the verbal prompt rather than a spontaneous initiation of BR. In contrast, within the SPACE there are no prompted opportunities for BR, as the purpose of the assessment is to

capture the presence of spontaneous initiations of BR and other skills. These additional prompted opportunities (up to approximately 11 verbal prompts) within the ESCS not only elicit BR responses from the child but also prime the child to independently request, opportunities not present within the teachers' assessment. These differences may have led to different skills including an inflated frequency of IBR points from the child during the ESCS.

Compounding this difference is the adult directed nature of the teachers' assessment. Items within the ESCS are displayed for the child and the verbal prompt is provided at the beginning of each new item or trial, to prompt the child to make the next selection if needed. In contrast, within the SPACE, the adult controlled access to the materials and the order in which the materials were presented. Teachers varied in their response to children's requests for items within the assessment. For example, if a child requested an item that was in view but not currently presented on the table for play, teachers varied in whether or not they honoured the child's request for the other item. Teachers who responded to the child's IBR, thereby reinforcing the child's communication may students engaging in higher frequency IBR than students paired with teachers who refused or ignored the child's request. Future examination of this protocol will include modification of the presentation of the objects where the toys will be placed within eye sight but out of reach of the child. In addition, the teacher will be instructed to allow the child to choose the order of the activities, opening the interaction with one general verbal prompt such as "let's play".

BR gives are also explicitly targeted within both the ESCS and the SPACE via the trials using the balloon. In both assessments, the assessor blows up the balloon, holds it out and lets the air out. The assessor then places the balloon in front of the child. Children often try to inflate the balloon themselves and most often, they are not successful in their attempt leading to a BR give

to ask the adult to inflate the balloon. If the adult prompts the child to give the balloon using a verbal or gestural prompt, the opportunity has been spoiled and the child does not receive credit for giving the balloon to request. Administration fidelity on this item within the ESCS protocol was 88.40% including spoiled presentations of the balloon. Therefore, children who may demonstrated a spontaneous BR 'give' lost the opportunity to do so, thereby changing their BR target. In these cases, discrepancies in target selection are due to poor administration of the item targeting this skill.

Strengths, Limitations, and Future Directions

This study provides preliminary evidence to support the use of a tool designed for use by community-based professionals to capture skills central to the development of young children. The sample includes six classrooms of children with ASD enrolled in public preschool classrooms who span a range of skills and abilities allowing for testing of agreement across the full range of skills in each of the three skill domains captured by the assessment. The study is limited due to a lack of power to assess the influence of the nested nature of the design. The study includes eight different teaching professionals who each administered the assessment with several students. Future examination of the protocol will require a larger number of students to evaluate the influence of individual teacher characteristics. In addition, a larger number of teachers would allow for the examination of teachers as a random effect rather than a fixed effect allowing one to examine the influence of clustering amongst teachers and students.

Although the researcher's coding of the SPACE was structured to allow for the best possible simulation of live coding and administration (e.g., coding the video straight through without stopping), the discrepancy between live coding and coding from video cannot be completely remedied. Live coding by a member of the research team was not possible in the

current due to staffing constraints however, future examinations of the protocol would benefit from the addition of living coding alongside but independent of the teacher.

In addition, further examination of the SPACE may include examination of the convergent validity of the SPACE with additional relevant measures of early social communication skills such as the Communication and Symbolic Behavior Scales Developmental Profile (CSBS DP: Wetherby & Prizant, 2002). The CSBS DP in similar fashion to the ESCS is a structured assessment designed to assess children's communication and symbolic abilities. However, the CSBS DP is designed for younger children (age 12-24 months) so it was not selected for examination in this initial trial. Further, additional testing of relevant psychometric properties such as test-retest reliability may also enhance our understanding of the application of the SPACE to this population.

Yet, the current study highlights the need to provide additional information and training for teaching professionals focusing on conceptualizing play as a developmental hierarchy of skills. Additional practice parceling out observed play acts and correctly categorizing these skills into play levels may help to increase teachers' accuracy in selecting developmentally appropriate play skill targets for each of their students.

Conclusions

Findings from this preliminary examination of a novel teacher administered assessment protocol (SPACE) designed to capture the presence of joint attention, behaviour regulation, and play skills in young children with ASD demonstrates that teaching professionals can deliver the protocol with high fidelity after brief training consisting of discussion and practice with live feedback. Teachers also accurately selected target JA and BR skills above chance based on their in vivo observations of children's beahviour during the SPACE but their accuracy was more

limited when selecting play skill targets. Students skill targets obtained from the SPACE were well aligned with joint attention targets from the ESCS however, several factors led to discrepancies in BR targets. Further, play targets were well aligned with targets obtained from the SPA. With additional presymbolic play level materials added to the SPACE, discrepancies in play targets should be resolved. Altogether, this pilot study demonstrates that this novel tool may be a useful mechanism for teaching professionals in the classroom context to obtain a broad profile of their children's JA, BR, and play skills and provide a starting place for developmentally appropriate curriculum and intervention targets in these area. In addition, this study highlights the need to provide targeted training regarding the developmental nature of play and early social communication skills for educational professionals who work with children with ASD who experience challenges in these core areas of development.

Appendix 1: Fidelity Checklist

Teacher JA and Play Assessment
Administration Fidelity Checklist

Date of Assessment: _____ Assessor:_____
Site/Target Child ID:____/_____
Date of Rating: _____ Rater:_____

Action During the Assessment	**Yes**	**No**	**N/A**
1) Does not provide additional verbal or physical prompts related to the toys (assessor may talk naturally and comment on the play)			
2) Imitates play acts and does not model new play acts			
3) If assessor chooses to use prompting hierarchy: rater feels prompting was necessary and the assessor follows the hierarchy appropriately (arrange toys, open question, model)			
Balloons			
4) Two presentations of the balloon (blow up and let air out), places balloon in middle of table for child			
Toy Set 1			
5) Begins set with covered/occluded bag or box of toys and waits for child to explore toys.			
6) Brings out the rest of the toys and plays for what the rater feels is an appropriate length of time			
7) Includes one violation within this set			
Ball			
8) Place ball/car in middle of table to start			
9) If no response cup hands on table to catch ball/car			
10) If child does not initiate turn- model- roll ball/car and say “whee/vroom”			
Toy Set 2			
11) Begins set with covered/occluded bag or box of toys and waits for child to explore toys			
12) Gives child jar and waits for request to open or help			
13) Brings out the rest of the toys and plays for what the rater feels is an appropriate length of time			
14) Includes a nonverbal choice of two objects within this set			

Points			
15) Completes 1 set of 4 distal points			
16) Point fully formed and does not extend past the elbow			
17) Holds gaze with point (does not look back at child)			
18) 4 points in correct order (Left across, left in front, right across, right in front)			
19) Calls child's name twice, wait for response and then assessor labels what s/he is pointing at			
People Game (if included)			
20) Starts with "lets sing a song" or "lets play a game"			
21) Pauses for child to request, then repeats song			

Total Yes: ____ of ____
Percentage Fidelity: _____
Notes:

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