Symposium Title: Measuring Small but Meaningful Change

Chair: Connie Kasari

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Overview: Despite several workgroup and consensus meetings, we do not yet have an agreed upon and accepted endpoint for treatment trials with children with ASD. One reason concerns the significant heterogeneity among children with ASD. For many children with ID/DD improvements can be made with targeted interventions, but these are often small and may be difficult to detect with standardized measures. Another difficulty in the field is the lack of accepted measures that index meaningful change. These are often experimental or observation measures where we have yet to agree upon the metric for significant, meaningful change. In the case of children with ASD, we also must consider what targets are meaningful to change. Core impairments for these children include social communication domains of development which are often challenging to impact. In this symposium we tackle the issue of how small effects from a targeted intervention can have significant effects on social communicative and language outcomes. In presentation 1, Dr. Shih describes an active ingredient in intervention that mediates the change in initiating joint attention for 2 to 5 year-old children with ASD. Increasing joint engagement by 20% over baseline improves joint attention, and joint attention in turn predicts language outcome on follow up. In presentation 2, Dr. Gulsrud presents data on a large sample of young children with ASD who receive a targeted social communication intervention aimed at improving play and language outcomes. In this study, increased diversity of play acts predicted expressive language. Finally, in presentation 3, Dr. Shire explores parent implementation fidelity of a social communication intervention with school-aged minimally verbal children with ASD. While the average level of parent fidelity affects increases in social communicative utterances of their children, a small, but meaningful increase in fidelity impacts the much harder to obtain communication outcome of initiated spoken comments. Our discussion will focus on the need to develop well-validated measurement of instruments that can reliably measure small but meaningful changes in children with ID/DD.

Paper 1 of 3

Paper Title: Does Joint Engagement Mediate Intervention Outcomes of Joint Attention in Young Children with ASD in Preschool Classrooms?

Authors: Wendy Shih, Ya-Chih Chang, Stephanie Shire, and Connie Kasari

Introduction: Joint attention is a core developmental challenge for children with autism spectrum disorders (ASDs) that has been the focus of early intervention programming. Initiating more joint attention is associated with better language outcomes, as is the amount of time children spend actively and jointly engaged with others (Adamson, Bakeman, Deckner, & Romski, 2009; Kasari et al, 2008; Kasari, Gulsrud, Wong, Kwon, & Locke, 2010). Although time jointly engaged is hypothesized to lead to greater gains in joint attention and language skills, this mediation has not been tested. The current study examines whether joint engagement mediates intervention outcome targets of joint attention and language (which are often small but meaningful) with 179 children with ASD in early intervention classrooms.

Objectives: First, the study will examine: (1) the mediating effect of joint engagement on joint attention skills in the context of a naturalistic developmental behavioral intervention (NDBI)- Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER: Kasari et al., 2008; 2014; 2015) delivered by community paraprofessionals, (2) if joint attention is associated with language at follow up for children receiving the JASPER intervention, and (3) to explore the degree to which children need to gain in joint engagement in order to anticipate gains in children’s joint attention.
Methods: Participants. 179 children age 2-5 years (mean age=38 months; SD = 9.35) were randomized to immediate treatment (IT) or wait list control (WL) for 3 months plus 1 month follow up. Participants were part of two independent studies (Chang, Shire, Shih, Gelfand, & Kasari, 2016 and Shire et al., in press).

Intervention: Teachers and paraprofessionals were provided with two weeks of in-vivo training with the research team to learn the JASPER intervention. In the IT group, teachers and paraprofessionals implemented JASPER 30 minutes a day to their students in their classrooms for 3-months, while teachers and paraprofessionals in the WL continued to implement their regular school curriculum for 3 months.

Measures: Ten-minute teacher-child interactions were videotaped and coded at entry, exit, and follow up. Children’s joint engagement (e.g. child initiates to teacher in a block building routine; total duration) and joint attention (JA) skills (e.g. spontaneous initiated eye contact, gestures (pointing, showing, giving) and language) were coded by blind assessors. Expressive and receptive language (age equivalency) from the Mullen Scales of Early Learning (MSEL) was collected at entry and follow-up. All measurements are collected and/or coded by independent assessors.

Results: Mediation analyses with linear mixed models (Baron & Kenny, 1986, The Four Steps) was used to explore the potential mediating effect of joint engagement on joint attention. There was a significant treatment difference between JASPER and Waitlist from baseline to exit in joint engagement (Path A: $\beta = 0.305, p<0.001$) and joint attention (Path C: $\beta = 0.80, p<0.001$) where children in the JASPER intervention made significantly more improvements compared to children in the Waitlist group. After adjusting for joint engagement, the treatment effect diminished to non-significance ($\beta= 0.252, p=0.159$) while joint engagement remained significantly associated with joint attention (Path B: $\beta = 1.826, p<0.001$). Consequently, joint engagement mediated the effect of treatment on joint attention.

Language from the Mullen was collected at entry and one-month follow-up (study 1 only). The association between joint attention and language was examined using linear mixed models. Joint attention was included in the model as a time-varying predictor with expressive or receptive language as the outcome. Joint attention was positively and significantly associated with expressive ($F(1,51)=7.06, p=0.01$) and receptive language ($F(1,51)=5.37, p=0.025$) across time.

Lastly, logistic regression was used to explore the degree to which children need to gain in joint engagement in order to anticipate gains in children's joint attention. Testing the hypothesis in one study, children in the JASPER intervention improved in 20% out of ten minutes from pre to post intervention. Combining studies, children in the JASPER intervention who improved at least 20% out of ten minutes was significantly associated with increased odds of having gains in joint attention from pre to post intervention ($Z=2.10, p=0.034$).

Conclusion: These results suggest that joint engagement is the path by which increases in young children’s joint attention and language skills develop. Studies have demonstrated that joint engagement is more difficult to sustain in young children with autism compared to other children (Adamson et al., 2009). Our findings highlight that even small but sustained changes in child initiated joint engagement can improve difficult to improve core impairments of initiating joint attention. Improved joint attention in turn affects the distal outcome of language.

References/Citations:


**Paper 2 of 3**

**Paper Title:** The Power of Play: How Even Small Changes in Play Diversity Lead to Expressive Language Gains

**Authors:** Amanda Gulsrud, Justin Williams, Wendy Shih, and Connie Kasari

**Introduction:** Play is an important pastime of all young children, but it can be particularly challenging for young children on the autism spectrum. In recent years, play, and specifically symbolic play, has become an important target for intervention, but there is little agreement in the field regarding how to measure play outcomes or what constitutes a meaningful change in this domain. This talk will explore the concept of diversity in play as one important aspect to consider in the treatment of young children with ASD. Often overlooked and misunderstood, this aspect may in fact be one of the more meaningful and impactful outcomes that leads to broader developmental gains. In particular, this study will explore the relationship between diversity in play and expressive language in a large sample of young children with ASD.

**Methods:** A total of 184 children with ASD between the ages of 2 and 5 years participated in this study. The children were in one of three randomized control studies examining the effects of the JASPER intervention on social-communication and play outcomes in preschoolers (Chang et al., 2015, Kasari et al., 2010, Kasari et al., 2014). Overall, the children’s average age at baseline was 39.57 months (sd=9.76) and average mental age was 26.03 months (sd=11.71). The Structured Play Assessment (Kasari et al, 2010; Ungerer and Sigman, 1981), a standardized measure of the frequency and diversity of child play acts, was administered to each children before and after treatment and at a follow-up. Important to this study is the diversity of play, which constitutes a measure of the number of different unique ways children can play with a toy or set of toys and not the frequency of play acts. For example, a child would show diversity in a specific level of play if he/she could, 1) put a puzzle together, 2) put shapes in a shape sorter, and 3) nest cups. This would equate to a diversity of three. This is different from a measure of frequency, which would measure how many times the child repeated a single play act, such as a count of how many times he/she put a shape in the shape sorter. The Mullen Scales of Early Learning (Mullen, 1995) was used to measure expressive language gain at exit and a follow-up visit.

**Results:** This study explored the relationship between diversity of play and expressive language in preschoolers with ASD. First we found that regardless of treatment assignment (JASPER or control), gains in play diversity were positively associated with expressive language at exit. Controlling for study, the data showed that a gain of 8-units of play diversity equated to a one-month increase in expressive language (p=.0006, coefficient-0.138). Next, treatment assignment was explored and using a Poisson mixed model, we found that children who received the JASPER intervention made more gains in diversity of symbolic play compared to children who received an active control (F(1,169)=11.5, p<0.01). Lastly, a partial correlation, removing the effect of entry symbolic play, revealed a positive correlation between exit symbolic play diversity and expressive language gains at a follow-up time point (r=0.45, p<0.001).
Discussion: This study lends support for diversity of play as an important predictor of expressive language in young children with ASD. Diversity in play is often overlooked, as most consider the frequency or the level at which the child plays as the most important play outcome in early intervention. Our data suggest that children’s ability to generate and execute a variety of novel play acts within a play level may be as important as increasing the overall level of play achieved. One hypothesis is that diversity represents flexibility and underlining creativity in play. In children with typical development, creativity and generativity in play is an important predictor of language and overall social functioning. JASPER directly targets diversity in play in young children with ASD and puts a premium on this outcome, which may appear small but has important implications for language outcomes over time.

References/Citations:

Paper Title: Advancing Spoken Comments in School Age Children with Autism who are Minimally Verbal: Benchmarks for Caregiver Implementation

Authors: Stephanie Shire, Wendy Shih, & Connie Kasari

Introduction: Research has demonstrated that parents’ implementation of intervention strategies can support their children’s social engagement and communicative development. However, it is not clear to what degree caregivers must master the strategies in order to effectively support gains in core challenges such as communicative initiations to socially share (for the purpose of joint attention). This paper aims to examine: (1) the association between caregivers’ intervention implementation with children’s spontaneous comments (joint attention language) and (2) to explore the degree to which parents must demonstrate strategy mastery in order to anticipate gains in children’s spontaneous comments.

Methods: Participants. Participants included 22 children with ASD and their primary caregivers. Included children were 5-8 years old, diagnosed with autism, displayed less than 20 spontaneous words, demonstrated a developmental age of at least 24 months, and had a history of at least 2 years of early intervention programming. Intervention. Dyads participated in a 6-month intervention based on two evidence-based approaches: Joint Attention Symbolic Play Regulation and Engagement (JASPER: Kasari et al., 2006) and Enhanced Milieu Training (EMT: Kaiser & Hancock, 2003). The intervention focused on facilitating joint engagement in the context of play in order to create opportunities for language learning (Kasari et al, 2014). Children were randomized to receive the spoken language intervention (spoken) or spoken language plus access to a speech generating device (spoken plus SGD). The intervention included two stages, stage 1 where children received 3 months of clinician delivered intervention with caregiver observation and stage 2, where caregivers were coached to implement the intervention for 3 months. Measures and Outcomes. Dyads participated in 10-minute play interactions with a standard toy set at 3 time points (entry, midpoint, exit). Independent raters coded the interactions for parents’ intervention strategy implementation (implementation) and children’s spontaneous comments, and children’s spontaneous communicative utterances including children’s initiations of both comments, and requests (SCU).
Results: Caregivers’ demonstrated an average strategy implementation score at 71.05% at study exit and children demonstrated an average of 4.75 comments. Although gains in total SCU were significant ($f(1,20)=5.51, p<.029$), average gains in comments alone by exit were not significant. However, looking further at commenting, caregivers’ strategy use was examined as a time varying covariate which significantly predicted children’s proportion of spontaneous comments ($f(1,37)=12.06, p=0.001$).

To then examine the degree to which caregivers’ must appropriately apply the intervention strategies to see an increase in children’s spontaneous comments, caregivers’ strategy use was examined in a poisson regression model. An initial cut point of above or below 70% (binary predictor) was selected to represent the average implementation fidelity of caregivers at study exit. However, 70% was not a significant predictor of children’s comments. A cut point of 75% was then examined, and found to be a significant predictor of children’s comments ($Z=1.95, p=0.05$). Examining commenting in families with implementation scores at or above 75% ($n=10$), significant growth in commenting from study entry to exit was found ($f(1,15)=4.63, p<.048$) while growth in children’s comments for families below 75% fidelity was not significant ($p>.61$).

Discussion: The findings provide preliminary support to indicate that the degree to which caregivers’ implement social communication intervention strategies can affect a small but meaningful change in commenting language which is most impacted in children with ASD who are minimally verbal.

References/Citations: