Symposium Title: Social Motivation: Innovative Social Skills Treatments and Meaningful Outcome Measures for Individuals with ASD

Chair: Grace Gengoux¹, Jan Blacher²

Discussant: Jan Blacher²

Overview: In Autism Spectrum Disorder (ASD), characteristic deficits in social motivation present challenges for clinicians conducting both assessment and treatment. Clinical observations indicate that children with ASD may vary significantly in their degree of social motivation, and this may influence the degree to which they respond to treatments. This symposium examines social motivation and treatment outcomes from multiple perspectives by providing information on measurement of key variables related to social motivation, and by reviewing new scientific support for two treatment approaches that aim to enhance social motivation and social competence in individuals with ASD. In the first presentation, we consider biomarkers of social motivation by examining electrophysiological evidence from children with and without ASD. Then, to further address the lack of reliable tools for assessing social motivation as a predictive factor for treatment outcomes, the second presentation reviews data from the development of a new outcome measure of social motivation which may hold promise for use in future clinical trials. Next, given that treatment approaches to ASD are most successful if children are sufficiently motivated to spontaneously use the skills they have learned in natural contexts, treatment approaches focusing on initiations with peers and skill generalization outside the treatment environment are critical. Therefore, we highlight new data from two promising treatment approaches, one for preschoolers and one for adolescents, which aim to enhance social motivation and generalization of skills outside the treatment context. Specifically, in our third presentation, we review data demonstrating the effectiveness of an inclusive social skills group treatment in enhancing social responsiveness and play with peers. The final presentation examines virtual coaching as an adjunct to parent-assisted social skills treatment for teens and reviews data suggesting that the use of the mobile application may improve generalization of social skills. Our overall intention is to stimulate meaningful progress in both the science and clinical practice related to understanding and enhancing social motivation in ASD.

Paper 1 of 4

Paper Title: Neural Correlates of Reward Anticipation and Processing in Children with and without Autism Spectrum Disorder

Authors: Katherine Stavropoulos², Leslie Carver³

Introduction: How children respond to social and nonsocial rewards has important implications for both typical and atypical social-cognitive development. Individuals with autism spectrum disorders (ASD) are thought to process rewards differently than typically developing (TD) individuals. However, there is little direct evidence to support this claim. One effective way to investigate neural anticipation and processing of rewards is by using electrophysiology, specifically event-related-potentials (ERPs).

Methods: Two event-related potentials were measured. The stimulus preceding negativity (SPN) was utilized to measure reward anticipation, and the feedback related negativity (FRN) was utilized to measure reward processing. Participants were 6- to 8-year-olds with (N = 20) and without (N = 23) ASD. Children were presented with rewards accompanied by incidental face or non-face stimuli. Non-face stimuli were composed of scrambled face elements in the shape of arrows, controlling for low-level visual properties.

Results: SPN: Statistical analysis revealed a significant difference between groups (p = .038) such that SPN amplitude was greater in the social condition for TD participants versus participants with ASD. There was a significant difference between the social versus nonsocial conditions for the TD group (p = .046), with TD participants showing a larger SPN to the social versus nonsocial

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conditions. Children in the ASD group demonstrated the opposite pattern—a larger SPN response to arrows versus faces—however, this difference within the ASD group did not reach significance ($p = .09$). There was no significant group difference for nonsocial stimuli ($p > .05$). **FRN:** An interaction that approached statistical significance was observed ($p = .055$) such children with TD had a larger FRN to correct versus incorrect answers in the social condition, but in the nonsocial condition incorrect answers elicited a larger FRN compared to correct answers. For children with ASD, the pattern was reversed. That is, children with ASD had a larger FRN to correct versus incorrect answers in the arrow condition, but in the face condition their incorrect answers elicited a larger FRN.

**Discussion:** This is the first study using electrophysiology to measure both reward anticipation and processing in ASD while controlling for reward properties. Our results comparing typically developing children and children with ASD provide evidence of a social reward anticipation impairment in children with ASD. Reward processing evidence suggests that TD children may find social stimuli more salient than nonsocial stimuli, whereas children with ASD demonstrate the opposite pattern. The findings provide evidence that children with autism have reward anticipation and processing deficits for social stimuli only, rather than global differences across all facets of reward anticipation and processing. Our results suggest that while typically developing children find social stimuli more salient than nonsocial stimuli, children with ASD may have the opposite preference.

**References/Citations:**

**Paper 2 of 4**

**Paper Title:** Measuring Social Motivation in Children with Autism Spectrum Disorder

**Authors:** Jennifer Phillips$^1$, Salena Schapp$^4$, Elizabeth Solomon$^4$, Emma Salzman$^4$, Lauren Allerhand$^4$, Christine Blasey$^4$, Tom Frazier$^5$, Antonio Hardan$^1$

**Introduction:** Autism Spectrum Disorder (ASD) is defined by deficits in social reciprocity. It is also posited that differences in social motivation play an important role in ASD. Social motivation is broadly defined as the drive to interact socially, to orient to social stimuli, seek and take pleasure in interactions, and work to develop and maintain relationships with others (Chevallier et al., 2012). Much like the heterogeneity observed in cognitive abilities of children with ASD, there is similar variability in degree of social motivation across the autism spectrum. Differing levels of social motivation may have important implications for treatment selection and expected outcomes (Dawson, Bernier & Ring, 2012). However, there are few available tools for measuring this construct.

**Methods:** The aim of this study was the development and validation of a new measure of social motivation for use in research and clinical practice with individuals with ASD. The scale development process included a comprehensive review of the literature on social motivation, as well as a review of available measures of social functioning in children. From this review, a 71-item measure of social motivation was developed and subsequently submitted to expert review for item validation (n=17).

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Results: The process of expert review resulted in content validation for a shortened 28-item measure (95% confidence interval). Items were divided into four content domains, based on theoretical models of social motivation, including: social drive, quality of overtures, social recognition, and behaviors that sustain an interaction. Content analysis revealed 26 items to be extremely relevant to the general construct of social motivation (76% agreement or higher). Of the four content domains, two were found more relevant to the general construct of social motivation: social drive and behaviors that sustain an interaction ($p < 0.001$). Item review from these domains revealed two additional items, for a total of 28 items in the final scale.

The second phase of the project involves further psychometric analysis to establish internal reliability, as well as convergent and divergent validity. Data from parents of children ages 3-18 (mean age = 7 years, SD = 3.62) with an ASD diagnosis ($N = 40$), as well as typically developing control children have been collected. In addition, cognitive, diagnostic, and background information are collected, and parents have completed the Vineland, Second Edition; Social Responsiveness Scale, Second Edition; Child Behavior Checklist; Repetitive Behavior Scale, Revised; and Aberrant Behavior Checklist. Initial descriptive data reveal a mean raw score of 210.02 (SD = 41) in the ASD sample. Diagnostic efficiency statistics will also be calculated in order to examine sensitivity, predictive power, and classification accuracy.

Discussion: This new measure holds promise for providing a means of characterizing social motivation. This information could provide valuable input to treatment teams about specific motivational deficits a child may have at the outset of therapy, which could impact selection of preferred treatment approaches. The aim is for attendees to leave with an appreciation of the current ways that social motivation can be quantified in children with ASD, including tools that can be used now in working with children, as well as introduction of a new tool that holds promise for further enhancing our ability to characterize motivation.

References/Citations:


Paper Title: Social Motivation Intervention for Children with Autism Spectrum Disorder: Improving Peer Initiations

Authors: Grace W. Gengoux¹, Jessica Hopkins⁴, Rachel Schuck¹, Maria Estefania Milan¹, Antonio Y. Hardan¹

Introduction: Studies of children with ASD have repeatedly documented low rates of initiations especially to peers (Sigman & Ruskin, 1999; Wetherby, 1986). Given existing support for motivation-based interventions in improving communication and reducing problem behavior, and preliminary evidence that these strategies can be applied to improve social behaviors such as conversation, play, and social engagement (Koegel et al., 2014; Stahmer, 1995), an important next step is to investigate how these techniques can be applied during social skills treatment to increase initiations with peers. This presentation reviews data from a randomized controlled trial of a social group intervention aimed at motivating children with ASD to initiate with peers.

Methods: Participants included 29 children with ASD (27 males; 2 females) ranging from 4-6 years old ($M = 5.16$). Participants were assigned to one of two conditions: Social Initiation Motivation Intervention (SIMI; $n = 15$) or Delayed Treatment Group (DTG; $n = 14$). Participants in the SIMI condition participated in 8 weekly 75-minute social group sessions with typically-developing peers, during which the adult facilitators arranged the play environment to encourage cooperation and promote frequent prompting and reinforcement directly from peers, in an attempt to enhance the reward value of peer interactions. Participants in the DTG continued community treatment for the duration of the 8-week trial and were compared to participants in the SIMI condition at
post-treatment. Participants in the SIMI group were also asked to complete several measures of progress 3 months after the end of treatment to assess maintenance of treatment gains.

**Results:** Group differences between participants in SIMI and DTG were assessed on five outcome measures following treatment: Clinical Global Impressions-Improvement Scale (CGI-I), Social Responsiveness Scale-2 (SRS-2), Quality of Play Questionnaire (QPO), Vineland Adaptive Behavior Scales-II (VABS-II) and Aberrant Behavior Checklist (ABC). On the CGI-I, significantly greater improvement was observed in the SIMI group compared to DTG in the areas of Communication (F=5.550, \( p < .05 \)), Social Communication Integration (F=40.238, \( p < .01 \)), and Maladaptive Behaviors (F=34.286, \( p < .05 \)). On the SRS-2, significant group differences were observed on the Severity of Symptom category (F=4.249, \( p < 0.05 \)), such that participants in the SIMI condition exhibited significantly lower overall ASD severity scores (\( M=2.00 \) Mild, \( SD=1.4 \)) than participants in the DTG condition (\( M=3.25 \) Moderate, \( SD=0.97 \)) following treatment. On the QPO, significant group differences were observed in the number of playdates to which participants were invited by others (F=5.140, \( p < .05 \)). Specifically, participants in the SIMI condition exhibited greater treatment gains in joint activities with peers such as computer/video games (F=4.419, \( p < .05 \)) and watching tv/movies (F=3.445, \( p < .10 \)), and exhibited decreased arguments (F=6.264, \( p < .05 \)) and teasing (F=8.976, \( p < .01 \)) during playdates than participants in the DTG condition. Results did not reveal significant differences between groups on the ABC or VABS-II following treatment. Finally, results of follow up measures given to participants in the SIMI group revealed significant differences between baseline and 3-months post-treatment including significant decreases in SRS Total t-scores (t=3.092, \( p < .05 \)), Overall Communication t-scores (t=3.382, \( p < .05 \)), and Motivation subscale t-scores (t=2.97, \( p < .05 \)).

**Discussion:** Findings suggest that the SIMI treatment focused on enhancing motivation to initiate to peers was effective in augmenting broad aspects of social functioning including improved social communication skills, reduced symptom severity, and greater frequency of joint play with peers during playdates. Implications for design of effective inclusive social skills programming and future research directions for improving meaningful social outcomes will be discussed.

**References/Citations:**

**Paper Title:** Using Parent Assistance and Virtual Coaching to Improve Social Skills in Teens with Autism: The UCLA PEERS® Program

**Authors:** Elizabeth A. Laugeson, Mi N. Park, Yasamine Bolourian, Jessie Sanchez, & Jessica Hopkins

**Introduction:** One of the greatest limitations of social skills training in ASD is failure to generalize skills (Reichow & Volkmar 2010). Previous studies using PEERS, one of the few evidence-based social skills interventions for youth with ASD, have used parents and teachers as live coaches to aide generalization (Laugeson et al. 2009; 2012; 2014). However, live coaching may create artificial social contexts and stigmatization, and interfere with in-vivo learning and independence. Despite the global popularity of mobile technology as a social communication tool (Blischak & Schlosser 2003), few studies have investigated social skills treatment delivery using mobile technology for youth with ASD.
The purpose of this study was to examine the efficacy of using a mobile application technology, in addition to parent assistance, to promote social functioning in adolescents with ASD.

**Methods:** Participants included 37 adolescents with ASD (36 males; 11 females) ranging from 11-18 (M=14). Adolescents were assigned to one of three conditions: PEERS® Virtual-Coach (VC; n=14), PEERS Treatment-As-Usual (TAU; n=15), or Delayed-Treatment-Control (DTC; n=8). VC and TAU received 14-weeks of 90-minute weekly group instruction with parent-assistance using the North American version of PEERS® (Laugeson & Frankel, 2010). VC treatment was augmented with the FriendMaker app, which provided in-vivo virtual coaching through outlines of rules/steps of targeted skills and embedded role-play videos delivered to adolescents via an iPod Touch 32GB. DTC participants waited 14-weeks and were compared to VC and TAU to detect changes from pre- to post-test. Social functioning was assessed using blinded behavioral observation on the Contextual Assessment of Social Skills (CASS; Ratto et al. 2012), and standardized assessments of adolescent social skills via self-report, parent-report, and blinded teacher-report on the Social Responsiveness Scale-2 (SRS-2; Constantino & Gruber, 2012) and Social Skills Improvement System (SSIS; Gresham & Elliot, 2008).

**Results:** A MANOVA was conducted (SPSS 22.0) to detect treatment effects. VC and TAU groups showed improvements across all domains in comparison to DTC, with greater parent-reported Social Responsiveness, Social Communication, Social Motivation (p’s<.01), Social Cognition (VC: p<.01; TAU: p<.05) and decreased Restricted Interests/Repetitive Behaviors (RIRB; p<.01). VC blinded teacher-reports, however, indicate greater improvement in Social Responsiveness, RIRB (p’s<.05), Social Communication, and Social Motivation (p’s<.01) in school settings. VC and TAU showed improvement on the SSIS through decreased teacher-reported Problem Behaviors (p’s<.05), parent-reported Communication (VC: p<.05; TAU: p<.01), Empathy (p’s<.05), and Engagement (VC: p<.01; TAU: p<.05). Yet, VC showed greater improvements in parent- and teen-reported Social Skills and Problem Behaviors (p’s<.05), as well as increased parent-reported Responsibility (p<.01) and teacher-reported Academic Competence (p<.01). Blinded behavioral observations on the CASS showed improvements in conversational skills for VC and TAU, with VC demonstrating greater rapport (p<.01), but also more social anxiety (p<.05) in conversations.

**Discussion:** Findings suggest virtual coaching as an adjunct to parent-assisted treatment is efficacious in improving social skills for adolescents with ASD, and in particular, leads to greater generalization in educational settings than the traditional parent-mediated model.

**References/Citations:**