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News and Notes About Scientific Research on ASD and Other Developmental and Behavioral Disorders

Recent Studies Examining the Effects of Medications on the Core Symptoms of ASD

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Director of Research

There are currently no medications that have been found to treat the core symptoms of autism, which is characterized by deficits in social functioning accompanied by restricted interests and repetitive behavior. Autism is also often accompanied by severe challenging behavior like self-injury, aggression, and property destruction. There are no definitive estimates of how often severe challenging behavior occurs in the autistic population but persons with an intellectual disability (ID) and autism were twice as likely to have self-injury or other severe challenging behavior than persons with ID who were non autistic (Kats et al., 2013). Some medications have been identified to produce clinically significant reductions in severe challenging behavior. The U.S. Food and Drug Administration has approved risperidone (Risperdal) and aripiprazole (Abilify) for the treatment of irritability associated with autism. Irritability is thought to be related to tantrums, aggression, and self-injury. Though these medications can reduce the level of challenging behavior, they are associated with significant side effects, and they are not universally effective. This is why they are typically viewed as complements to behavioral interventions.

That core symptoms of autism are well understood and many research teams have attempted to develop pharmacological treatment for them. One such line of work has been based on the notion that certain neuropeptides, like oxytocin and vasopressin, are present (or suppressed) during social behavior. Oxytocin has, in some studies, been found to be at a lower level in persons with autism. Many attempts have been made to determine whether providing it as a medication improves social behavior in the autistic population. Sikich and colleagues (2021) recently published the results of a trial with intranasally-administered oxytocin in the *New England Journal of Medicine* that showed it had no effect on social interaction or other social functioning when compared to the placebo control. This was a fairly small-scale study but done with a good deal of rigor.

Another study, Hollander et al. (2022) recently examined whether Balovaptan, which suppresses vasopressin, would produce improvements in social functioning. Previous preliminary studies have suggested that this type of medication could improve social behavior in studies with rodents. Also, a small study with autistic adults without ID suggested there may be some positive impact from a single intravenous administration of Balovaptan. In the Hollander and colleagues' study, 339 individuals with an autism diagnosis participated in the randomized control design. The groups were roughly equivalent with the exception of whether they received a 4-mg dose, a 10-mg dose, or were part of the placebo control. The 4-mg dose was found to not produce sufficient blood levels of the drug and this group was dropped from the study. There were no statistically significant differences observed between the 10-mg dose of Balovaptan and placebo groups in terms of change in social behavior as measured through ratings specific to social functioning as well as to one geared towards a more global clinical evaluation of the core symptoms of autism.

Though neither of these medications have been shown to produce improvements in the core symptoms of autism, future research is warranted. However, there is ample evidence to suggest that behavioral interventions aimed at teaching social and communicative skills can improve the core symptoms of autism.

Hollander, E., Jacob, S., Jou, R., McNamara, N., Sikich, L. et al., (2022). Balovaptan vs Placebo for Social Communication in Childhood Autism Spectrum Disorder: A Randomized Clinical Trial. *JAMA psychiatry, 10.1001/jamapsychiatry.2022.1717*. Advance online publication. https://doi.org/10.1001/jamapsychiatry.2022.1717

Kats, D., Payne, L., Parlier, M. et al. (2013). Prevalence of selected clinical problems in older adults with autism and intellectual disability. *Journal of Neurodevelopmental Disorders, 5, 27.* https://doi.org/10.1186/1866-1955-5-27

Sikich, L., Kolevzon, A., King, B. H., McDougle, C. J., Sanders, K. B., Kim, S. J., … & Veenstra-VanderWeele, J. (2021). Intranasal oxytocin in children and adolescents with autism spectrum disorder. *New England Journal of Medicine, 385(16),* 1462-1473.

NECC Staff Presentation Highlights from ABAI and Additional Noteworthy Presentations

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Director of Behavior Analytic Research

More than sixty NECC staff attended the annual Association for Behavior Analysis International (ABAI) conference in Boston. NECC staff participated in several events including workshops, presentations, and posters to disseminate their work on decreasing problem behavior and increasing a variety of skills to promote independence in individuals with autism spectrum disorder (ASD). In the following article, a symposium on teaching complex social skills in individuals with ASD is highlighted. This symposium, chaired by Becky MacDonald, PhD, BCBA-D, LABA (Senior Program Director), included presentations by Shemariah Ellis, MS, BCBA (Clinical Residential Program Coordinator) and Sydney Berkman, MS, MSEd, BCBA, LABA (Consulting Specialist Substitute).

In the first paper, Shemariah Ellis presented research on teaching helping behavior in a child with ASD. Helping behavior is a complex social skill that includes identifying situations in which help is needed, vocally offering to help, and providing help when the offer to help is accepted. Providing help may include assistance in completing a variety of tasks, such as cleaning a room or obtaining an object out of reach. Although typically developing individuals independently acquire this skill before the age of 2, individuals with autism rarely show this skill without direct teaching.

In the behavior analytic literature, there are several different teaching strategies for increasing social skills in children with ASD. One approach is video modeling which involves showing the individual with ASD a video depicting an individual correctly performing the target skill. An advantage of video modeling is that it is efficient and can be used to teach a variety of skills across settings. Another approach that is used to increase a variety of skills is multiple exemplar training. This approach involves teaching multiple skills in a variety of contexts to increase the likelihood that it will occur in novel combinations of responses and across untrained situations. An example of this approach was conducted by MacManus et al. (2015) who used a combination of video modeling and multiple exemplar training to teach imaginative play in children with ASD. This training involved teaching specific vocalizations and actions of imaginative play using video modeling and subsequently assessing whether untrained combinations of skills occurred. As a result of this training, participants demonstrated various forms of untrained imaginative play (i.e., new vocalizations and actions), illustrating the utility of video modeling and multiple exemplar training for untrained skills. Similarly, the use of video modeling and multiple exemplar training has also been found effective in teaching children with autism to engage in various forms of helping behavior (e.g., cleaning, carrying items, and locating items; Reeve et al., 2007).

Shemariah presented research on teaching helping behavior among individuals with ASD using a combination of video modeling and multiple exemplar training. More specifically, she identified and included several different scenarios and stimulus combinations in which offering to help was appropriate. A subset of these stimulus combinations was trained using video modeling, and additional untrained combinations were assessed following training to determine whether novel performances would occur. An example of a scenario could include a therapist spilling crackers on the table while rolling her eyes and saying "oh no." After the individual with ASD offered to help, the therapist sometimes accepted and sometimes declined the participant's offer. When the therapist accepted the participant's offer to help, the participant was trained to engage in helping behavior by assisting the therapist with the task (e.g., cleaning up the spilled crackers). The video modeling teaching procedure was successful in teaching helping behavior across a variety of trained scenarios. In addition, following training across a subset of contexts and situations, the participant offered to help and engaged in helping behavior across various untrained contexts and situations. In summary, a treatment package that included video modeling and multiple exemplar training was effective in increasing a complex social skill (i.e., offering to help and engaging in helping behavior) across a variety of tasks and contexts in an individual with ASD.

In the second paper, Sydney Berkman presented research on an evaluation of two approaches to teach observational learning in a group instructional context. Observation learning is when an individual (i.e., the observer) acquires new

behavior by observing a series of events. Those events include the antecedent context, the behavior of another individual (i.e., the model), and the consequences of that behavior. For example, if the observer views that the model's response resulted in reinforcement (e.g., access to a preferred item), then the observer may imitate the model's response. To assess whether an individual learns through observation, experimenters create an observation opportunity in which a participant (the observer) sits nearby an adult (the model) and the teacher sits across from the student. The teacher asks the model a question, the model then answers the question (typically a prescribed response) and receives a consequence (a reinforcer if the response was correct or informative feedback if it was incorrect).

Observational learning is an important pre-requisite skill that allows individuals to acquire new skills efficiently and across various settings, increasing learning opportunities and promoting their independence. However, some individuals with autism do not show observational learning and can benefit from direct teaching to acquire this skill. One technique to increase observational learning is consequence discrimination training (CDT). In CDT, students are taught to respond differentially based on the consequences delivered for the model's behavior. For example, teaching the individual to imitate models' reinforced responses or to say "I don't know" following models' non-reinforced responses. Training includes providing praise for correctly imitating the model's behavior and providing informative feedback for incorrectly imitating the model's behavior. Another approach

that has been used to improve individual's observational learning is differential observing response training (DORT). In DORT, the teacher or experimenter trains the participant to repeat what the teacher asked the model or what the model's response to the teacher was. The rationale for why DORT may be effective is that it increases attending during the opportunity of observational learning.

The purpose of Berkman's research was to compare the efficacy of CDT and DORT procedures for promoting observational learning among individuals with ASD in a group instructional context. Observational learning performance was assessed following an observation in which a model performed a task correctly and received praise from the therapist or performed a task incorrectly and received informative feedback from the therapist. A participant correct response was imitating the model after they had received praise from the therapist and saying "I don't know" after the model had received informative feedback from the therapist. During CDT, there were positive feedback trials in which the teacher asked the model a question, the model responded, and the teacher delivered positive feedback to the model. Then the teacher asked the participant the same question. If the participant imitated the model, the response was correct, and the therapist provided praise to the participant. There were also negative feedback trials in which the teacher asked the model a question, the model responded, and the teacher delivered corrective feedback to the model. Then the teacher asked the participant the same question. If the participant said, "I don't know," the response was correct, and the therapist provided

praise. If the participant had an incorrect response on either trial type, then the therapist provided error correction statements that were specific to the trial type. If there was an error on a positive feedback trial, the teacher said, "[Model] got it right. Do what [model] did." And if there was an error on a negative feedback trial, the teacher said, "[Model] got it wrong. Say, 'I don't know.'"

DOR training was conducted in the observational learning group context and involved teaching participants to echo the teacher's question to the model when asked. During a trial, the teacher asked the model a question, the model responded, and the teacher delivered positive or negative feedback to the model. Then the teacher asked the participant "What did I ask the model?" and the participant had an opportunity to echo the teacher's question to the model. If the participant accurately echoed the question and the nonsense word, the experimenter praised the participant. If the participant did not accurately echo the teacher, the experimenter said, "That's not what I asked. Listen carefully to the question, the word, or both the question and the word."

Berkman showed data indicating that both CDT and DORT were found to be effective in improving participants' observational learning in a small group. This study extended previous work by separately evaluating CDT and DORT and by conducting learning opportunities in a group setting. Berkman recommend that researchers and practitioners continue to employ CDT and DORT to establish OL in individuals who otherwise don't learn by observing others.
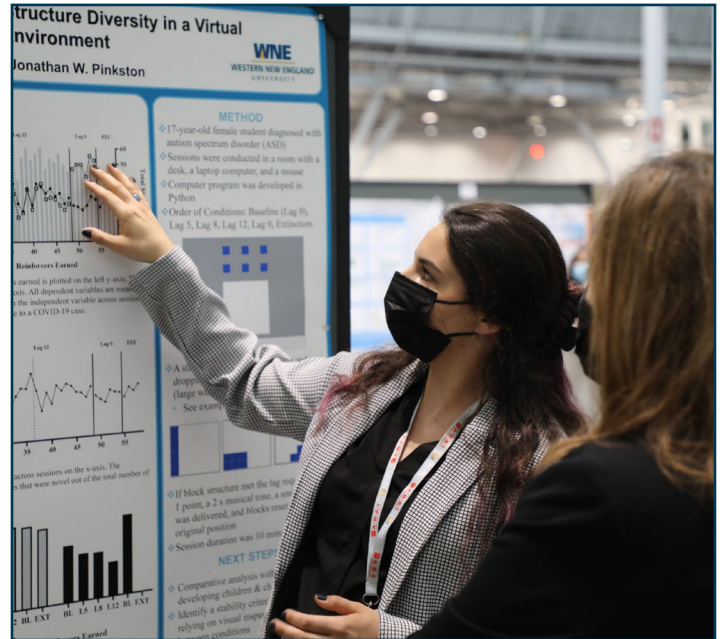

Shemariah Ellis

Sydney Berkman

Examining Procedural Variations of Delivering Competing Stimuli in the Treatment of Stereotypy

EDITOR'S NOTE:

In the presentation below, Julia Touhey describes current research on decreasing stereotypy. Stereotypy consists of repetitive, persistent, and invariant responses that are not contextually appropriate and can include motor or vocal topographies. Stereotypy, if left untreated, can continue into adulthood and impact an individual's adaptive, social, and academic functioning. Therefore, further investigation on the assessment and intervention of stereotypy is warranted. In her presentation, Julia described the utility of a method for identifying leisure materials that the individual will engage with instead of displaying stereotypy. These materials were subsequently incorporated in an antecedent-based intervention that effectively decreased individuals' stereotypy.

Touhey, J. L., Li Volsi, C., Shostek, A., Efflandt, M., & Ahearn, W. H. Examining procedural variations of delivering competing stimuli in the treatment of stereotypy. Paper presented at the Association of Behavior Analysis International; Boston, 2022.

Abstract: Rooker et al. (2018) reviewed the literature for treating automatically reinforced self-injurious behavior (SIB). They found that noncontingent reinforcement (NCR) was a commonly effective procedure when informed by a competing stimulus assessment (CSA). Jennett et al. (2011) suggested for some cases non-contingent access to competing stimuli may be insufficient at decreasing target responding and additional treatment components may be necessary. The present experiment examined effects of procedural variations when presenting competing stimuli on functional engagement and stereotypy for seven participants with autism. A standard functional analysis of stereotypy was conducted. Next, at least three effective competing stimuli (ECS) were identified per participant via an augment competing stimulus assessment (A-CSA). Then, two procedural variations were examined: rotating competing items (RCI) and prompting functional engagement (PE). Item contact, functional engagement, and stereotypy were evaluated. Interobserver agreement data were collected in at least 33% of sessions in each condition for all dependent measures and mean total agreement was above 85% for each measure. Results suggest that for five participants both procedural variations were associated with lower levels of stereotypy and higher levels of appropriate behavior, and for the other two participants redirection to functional engagement was necessary to achieve desired outcomes.

Concurrent Schedules of Differential Reinforcement of Alternative Behavior in the Treatment of Escape-Maintained Problem Behavior without Extinction

EDITOR'S NOTE:
Individuals with ASD often exhibit problem behavior because it results in a break from work or a nonpreferred task. Although withholding reinforcement (in this case, escape from a task) is often recommended, this approach may not be possible for severe forms of problem behavior due to safety concerns. Chelsea Fleck described a study evaluating an intervention for treating problem behavior when it continues to result in escape. Results showed that conducting a variety of reinforcers for an appropriate response was effective in decreasing problem behavior even when problem behavior continued to result in escape.
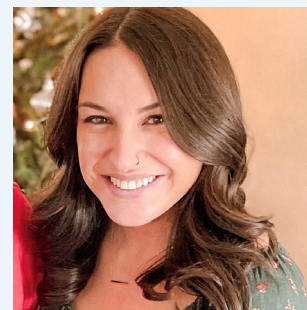
Fleck, C., Bourret, J. C., Jehle, E. Concurrent Schedules of Differential Reinforcement of Alternative Behavior in the Treatment of Escape-Maintained Problem Behavior without Extinction. Paper presented at the Association of Behavior Analysis International; Boston, 2022.

Abstract: Recent research on treatment of problem behavior has focused on interventions that do not require extinction. Positive reinforcement for compliance delivered on an FR 1 schedule has been shown to be an effective intervention for reducing escape-maintained problem behavior without extinction. Several studies have shown that problem behavior may re-emerge when the schedule of reinforcement for compliance is thinned. In the present study, we established and reinforced multiple alternative responses during treatment to decrease the likelihood of problem behavior during a treatment challenge with four participants with autism. First, we conducted a functional analysis to identify the maintaining variable for problem behavior (e.g., vocal protesting, self-injury, or aggression). Then, we reinforced two alternative responses with both the maintaining reinforcer and an arbitrary reinforcer while problem behavior continued to produce only the maintaining reinforcer. Finally, we withdrew reinforcement for one of the alternative responses to determine whether concurrently reinforcing an additional alternative response would avoid the re-emergence of problem behavior without extinction. The addition of a concurrently available alternative response was effective at avoiding the reemergence of problem behavior during a treatment challenge. Interobserver agreement was obtained for at least 33% of sessions and ranged from 81%-100% for all responses.

Assessing Automated Self-Monitoring and Feedback for Increasing Physical Activity

EDITOR'S NOTE:
Although physical activity engagement is associated with various health benefits, many individuals do not meet the recommended guidelines for physical activity engagement, often due to a lack of motivation or time. Nabil Mezhoudi presented research on a remote based intervention for increasing physical activity among NECC staff. The intervention, which included automated self-monitoring and feedback, was found to be effective in promoting increases in participants' physical activity engagement.

Mezhoudi, N., Hedquist, C., Roscoe, E. M. Assessing Automated Self-Monitoring and Feedback for Increasing Physical Activity

Abstract: Approximately three-quarters of American adults do not meet the national guidelines for physical activity – an average of 22 min of moderate physical activity per day (Blackwell & Clarke, 2018; Piercy et al., 2018). Lack of physical activity is associated with a variety of negative long-term health outcomes (McGuire, 2014); therefore, identifying effective interventions for increasing individuals' physical activity is warranted. Physical activity can be measured with devices that use accelerometers and heart rate sensors. The Apple Watch, for example, utilizes these instruments to measure an individual's movement and heart rate and subsequently calculates minutes spent exercising, calories burned, and hours spent standing. Additionally, the Apple Watch has a competition feature that allows users to challenge one another and compete for points awarded for engaging in physical activity. The present study evaluated the impact of this competition feature on levels of physical activity for six participants working at a school for children with autism and assessed an additional incentive component if the competition alone was ineffective. The competition effectively increased physical activity for some but not all participants and adding an incentive for winning the competition improved performance in some cases. Interobserver agreement was 100% across all measures for all participants.

Negative Reinforcement of Caregiver Behavior:
# A Contingency Analysis and Function-Based Solutions

EDITOR'S NOTE:

After identifying an effective treatment, the next step involves training caregivers to implement the intervention in the typical setting. Although caregivers are often eager to learn and adhere to a proposed treatment program, there are environmental variables that can affect caregiver program implementation. One such variable is the child's problem behavior, which can often serve as an aversive event for the caregiver and increase the likelihood of program nonadherence. Therefore, it is important to understand how environmental variables affect both desirable and undesirable caregiver behavior as it relates to treatment of child problem behavior. In the paper listed below, Jackie Rogalski presented a literature review describing the environmental variables that support desirable caregiver behavior during treatment implementation and how those variables may interact with the variables maintaining undesirable caregiver behavior. Jackie also discussed practical based solutions for increasing consistent program implementation.

Rogalski, J. & Roscoe, E. M. Negative Reinforcement of Caregiver Behavior: A Contingency Analysis and Function-Based Solutions. Paper presented at the Association of Behavior Analysis International; Boston, 2022. Problem behavior can function as an aversive event that establishes escape from problem behavior as a reinforcer for caregiver behavior. Often, negatively reinforced caregiver behavior is countertherapeutic in that it reinforces problem behavior. For example, caregivers can quickly escape from attention-maintained aggression by delivering contingent attention. This cycle of reinforcement poses a concerning barrier to the effective treatment of problem behavior. The purpose of this talk is threefold. First, we extend existing literature in this area by discussing how contingencies of negative reinforcement affect desirable caregiver behavior (treatment adherence), and how that contingency interacts with the variables supporting undesirable caregiver behavior. Second, implications of this revised contingency analysis as it relates to caregiver treatment of problem behavior are discussed. And finally, we use the contingency analysis as a guide to propose and discuss conceptually systematic treatments for undesirable caregiver behavior. Solutions are informed by three main areas of research: function-based treatments for negatively reinforced problem behavior, research on treatments using concurrent operant schedules without extinction, and research on mitigating resurgence.
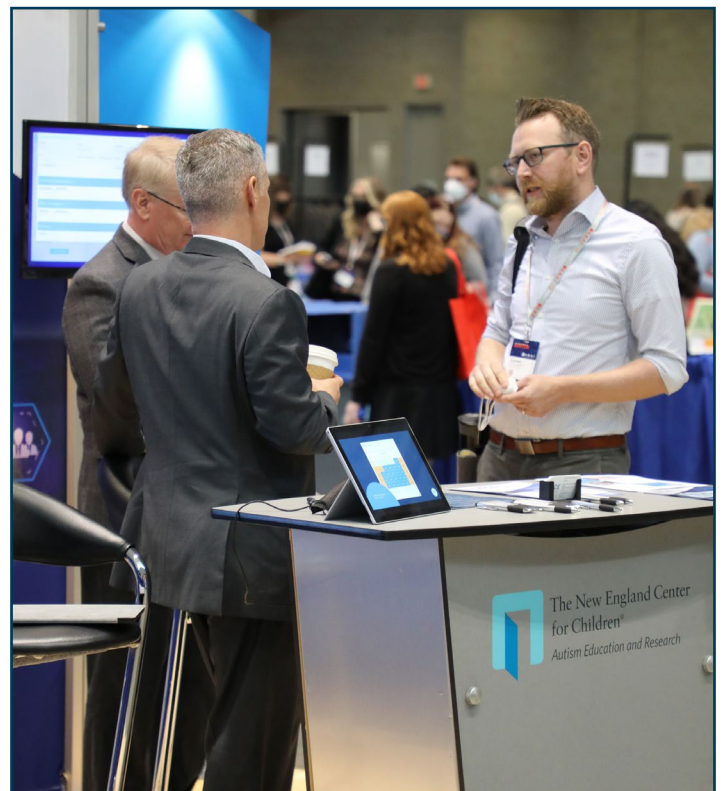
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