

RESEARCH

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



EDITORS:

*Bill Ahearn, PhD, BCBA-D, LABA
Director of Research*

*Eileen Roscoe, PhD, BCBA-D, LABA
Director of Behavior Analytic Research*

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*The New England Center for Children®
33 Turnpike Road
Southborough, MA 01772
p: (508) 481-1015
www.necc.org*

Recent Developments in Diagnosing Autism

Bill Ahearn, PhD, BCBA-D, LABA
Director of Research

It has long been assumed that early diagnosis of autism is associated with improved outcomes in that the earlier the disorder is diagnosed, the earlier intervention can be accessed and thus, the better the outcome for the child. In MacDonald et al. (2014), NECC researchers published a study originally aimed at identifying behavioral indicators that predicted better outcome from early intensive behavioral intervention (EIBI). In this study, 83 children with autism (CWA), aged 1, 2 and 3 years at entry into EIBI, and 58 same-aged typically developing children were directly observed in several areas such as language and play skills, responsiveness to social interaction opportunities, and stereotypic behavior. CWA were assessed at entry into NECC's EIBI program and again after one year of treatment. The results of the study showed significant skill gains across all age groups of the CWAs with the greatest gains seen in the children who entered treatment prior to their second birthday. None of the behavioral indicators were as important as the age upon entry into treatment. Studies of EIBI outcomes have been questioned because this research is usually conducted in a fairly controlled setting with access to highly skilled clinicians.

A recent study by Gabbay-Dizdar and colleagues (2022) suggested that early diagnosis, by 2.5 years old, was associated with improvements in social behavior, when compared to CWA diagnosed at 2.5 years old or later. This study measured changes in core autism symptoms over a one-to-two-year period in 131 children with an autism spectrum disorder diagnosis that were receiving

treatment in the community. This treatment was generally eclectic in nature, not well controlled, and not led by well-trained clinicians. Time spent in treatment was roughly equal across the age groups with the CWA diagnosed before 2.5 years old being three times more likely (65% of the sample) to have had improvements in scores of their social behavior relative to the CWA diagnosed 2.5 years old or later (23% showing improvements). Interestingly, neither age group showed improvements in restricted and repetitive behavior (RRBs; e.g., self-injury, stereotypic behavior, inflexible routines), in fact, deterioration in RRB was found in both age groups. These results suggest that early diagnosis and treatment of autism is critically important but also that access to clinical expertise in assessing and treating RRB is something that should be prioritized for CWA.

Another area of diagnostic research that has been receiving increased attention is the diagnosis of children who are assigned female at birth. Autism has been presumed to be a "male dominant" disorder but there is some emerging evidence that autism has been underdiagnosed in females. A study by Harrop et al. (2024), hypothesized that the rate of diagnosis of females as autistic has been increasing. To examine this, they reviewed 20 years of records in the University of North Carolina's autism programs (TEACCH). Over 10,000 records were available, and the years reviewed were from 2000 to 2021. They found that the proportion of males to females receiving a diagnosis of autism decreased over time from about 5.5 to 1 to about 3 to 1, showing that more fe-



males have been receiving a diagnosis of autism over the past 20 years. Females also tend to be diagnosed at a later age, 1.5 years later than males, though both males and females generally receive diagnoses after they enter elementary school.

Gabbay-Dizdar, N., Ilan, M., Meiri, G., Faroy, M., Michaelovski, A., Flusser, H., ... & Dinstein, I. (2022). Early diagnosis of autism in the community is associated with marked improvement in social symptoms within 1–2 years. *Autism*, 26(6), 1353-1363.

Harrop, C., Tomaszewski, B., Putnam, O., Klein, C., Lamarche, E., & Klinger, L. (2024). Are the diagnostic rates of autistic females increasing? An examination of state-wide trends. *Journal of Child Psychology and Psychiatry*, 65(7), 973-983.

MacDonald, R., Parry-Cruwys, D., Dupere, S., & Ahearn, W. (2014). Assessing progress and outcome of early intensive behavioral intervention for toddlers with autism. *Research in Developmental Disabilities*, 35(12), 3632-3644.

Increasing Varied Leisure Item Engagement in Individuals with Autism

Eileen Roscoe, PhD, BCBA-D, LABA
Director of Behavior Analytic Research



Individuals with autism spectrum disorder (ASD) often show limited leisure engagement (i.e., they engage with only one or two activities). Engagement with various leisure activities can lead to more learning opportunities, social interaction, and reinforcer exposure. In addition, increasing leisure item engagement across multiple activities is an essential prerequisite for making choices because it requires previous exposure and engagement with various options (e.g., leisure activities). Therefore, increasing varied leisure item engagement is an important skill to address in individuals with ASD.

Before teaching functional leisure item engagement, assessing whether the individual shows limited leisure item engagement is essential. A type of preference assessment helpful for this purpose is the response restriction (RR) preference assessment (Hanley et al., 2003). In the RR assessment, a therapist presents multiple leisure items concurrently, and observers record the duration of engagement with each item. Item(s) associated with high levels of engagement are removed from the array at the end of a session, and the remaining items are presented in subsequent sessions. If the individual shows engagement with only one item (e.g., an iPad) and, following removal of that item, does not interact with the other available items, then this would indicate that they have limited leisure item engagement and could benefit from leisure-item training.

Previous research has illustrated the potential benefits of the RR assessment for determining whether intervention is needed and evaluating its effects. For

example, Hanley et al. conducted the RR assessment before assessing various treatment approaches (e.g., to increase engagement) with a less-preferred activity (i.e., one previously associated with little to no engagement in the initial RR assessment) for individuals with intellectual disabilities. Although Hanley et al. demonstrated the utility of the RR assessment, some additional questions remain. Most notably, it is unclear whether the RR assessment can help assess whether intervention increased leisure engagement among individuals with autism after intervention. Conducting an RR assessment both before and after treatment can provide information about whether functional engagement persists after treatment is no longer in effect.

In addition to an RR assessment, teaching individuals to engage appropriately with leisure items is also essential. An example of an intervention for increasing leisure engagement was conducted by Leif et al. (2020), who assessed the efficacy of prompting alone and in combination with reinforcement. The experimenters presented each leisure item singly during each intervention while measuring the duration of leisure item engagement. Although prompting alone effectively increased leisure item engagement, adding reinforcement was necessary for achieving sufficient increases. Leif et al. increased leisure-item engagement in the form of item contact and only when items were singly presented. Therefore, additional research is needed to assess the utility of this approach for increasing functional leisure-item engagement when multiple items are concurrently available.

Roscoe et al. extended Hanley et al. (2003) and Leif et al. (2020) by assessing and increasing functional leisure item engagement with multiple items for individuals who showed limited leisure engagement. Specifically, participants engaged with only one leisure item, an iPad, when various items were presented and did not engage with alternative items when the iPad was no longer available. Roscoe et al. (2023) extended Hanley et al. by assessing the utility of the RR assessment both before and after training. The RR assessment was conducted before training to confirm that individuals displayed limited leisure-item engagement, and the RR assessment was conducted following training to determine whether treatment effects were maintained (i.e., whether participants showed functional engagement with alternative items after the iPad was removed from the array and intervention components were no longer in effect).

In the Roscoe et al. (2023) study, five individuals with ASD who were reported to exhibit limited leisure item engagement participated. During the pre-training RR assessment, all participants showed limited leisure item engagement (i.e., they engaged with only an iPad and did not engage with any other activities after the iPad was removed). During training, target leisure items were singly presented, and treatment components included prompting alone, followed by prompting plus reinforcement. In the prompting condition, the experimenter presented a vocal and model prompt (i.e., stated, "Stack the blocks" while modeling how to stack them) if the participant was not showing functional engagement. In the

prompting plus reinforcement component, prompting continued as described above, and the experimenter delivered a highly preferred edible contingent on a pre-determined number of responses of functional engagement. The treatment effectively increased functional engagement to criterion levels (i.e., 80% for three consecutive sessions) for all trained items for all participants. However, the effective training component(s) varied across participants and items. For two participants, prompting alone increased functional engagement to criterion levels for two training items. For the three other participants, prompting plus reinforcement was necessary to increase functional engagement to criterion levels with all training items. By introducing treatment components successively and as needed, a more individualized and less intensive intervention was identified for each participant.

Following training, Roscoe et al. (2023) conducted a post-RR assessment to assess whether the effects of training were maintained. If adequate levels of functional engagement were not observed with the previously trained item during the RR assessment, one or more remediation strategies were conducted.

These strategies involved embedding the most effective training component into the RR assessment context for the most recently trained item or conducting additional leisure-item training sessions for the previously trained item. Four of the five participants required a remediation strategy. Following training and remediation, criterion performance was maintained for all target items during the post-intervention RR assessment.

In summary, individuals with autism often show limited leisure item engagement (i.e., interest in one or two activities and no engagement when alternative activities are available). Teaching leisure-item engagement is essential because it exposes individuals to various potential reinforcers, learning experiences, and opportunities to make choices. Leisure-item training, using prompting alone or in combination with reinforcement, can increase functional engagement with multiple leisure items. In addition, conducting an RR assessment before and after training is helpful to determine whether training is needed and whether functional engagement persists following training.

Hanley, G. P., Iwata, B. A., Roscoe, E. M., Thompson, R. H., & Lindberg, J. S. (2003). Response-restriction analysis: II. Alteration of activity preferences. *Journal of Applied Behavior Analysis*, 36(1), 59-76. <https://doi.org/10.1901/jaba.2003.36-59>

Leif, E. S., Roscoe, E. M., Ahearn, W. H., Rogalski, J. P., & Morrison, H. (2020). Increasing item engagement and decreasing automatically reinforced problem behavior within a modified competing stimulus assessment. *Journal of Applied Behavior Analysis*, 53(3), 1638-1659. <https://doi.org/10.1002/jaba.695>

Roscoe, E. M., Hall, V. A., McVarish, A. E., & Cornaglia, R. B. (2023). Increasing leisure-item engagement in individuals with autism. *Behavioral Interventions*, 39(1), e1981. <https://doi.org/10.1002/bin.1981>



RESEARCH PRESENTATION HIGHLIGHTS

Several NECC researchers attended the Berkshire Association of Behavior Analysis and Therapy (BABAT) conference in Worcester, MA in October 2024. Some of the titles and abstracts of presentations on a range of topics are highlighted below.

Assessment and treatment of repetitive and restricted behaviors.

EDITOR'S NOTE:

Individuals with autism often exhibit repetitive and restrictive behavior that is maintained by automatic reinforcement (i.e., it seems to be maintained by the sensory consequences directly produced by the response) and is challenging to treat. Riley Fergus, MS, BCBA, LABA, along with her advisor Dr. Ahearn, evaluated the utility of an augmented competing stimulus assessment in which various leisure stimuli are singly presented. Items associated with lower levels of challenging behavior were subsequently included during an intervention.



RILEY FERGUS (The New England Center for Children), Olivia Pandola (The New England Center for Children), and William H. Ahearn (The New England Center for Children; Western New England University).

Abstract: To date, only one behavior analytic study has systematically examined the use of functional analysis to assess arranging and ordering, which is a form of higher-level repetitive behavior (Rodriguez et al., 2012). The authors found this response was automatically maintained and developed effective interventions that involved some form of prompting and response disruption. Hagopian, Rooker, and Zarcone (2015)

evaluated a model for subtyping and predicting effective treatments for automatically reinforced self-injurious behavior (SIB). The current study applied Hagopian's subtyping analysis and treatment model (i.e., competing stimulus assessments) to higher level repetitive behavior (Hagopian et al. 2015, 2017). A variety of assessments, including preference assessments and augmented-competing stimulus assessments (A-CSA) were conducted to inform treatment. Following treatment, generalization probes were conducted. For all participants, effective treatments were identified that consisted of providing competing stimuli identified via the A-CSA.

Promoting generalization of hand washing with general case instruction.

EDITOR'S NOTE:

Teaching handwashing skills is essential to help individuals with autism maintain good hygiene, prevent the spread of germs, and reduce their risk of illness. It also fosters independence in a skill that improves their overall health and well-being. Zalika Tyrell, MS, BCBA, LABA, with advisor Chata Dickson, PhD, BCBA-D, LABA, conducted a study comparing two different training strategies for teaching an individual with autism how to complete a handwashing routine across various contexts. The authors found that teaching across a variety of stimuli from multiple settings was more effective than teaching across a single set of stimuli for promoting generalization.



ZALIKA TYRELL (The New England Center for Children) and Chata A. Dickson (The New England Center for Children; Western New England University).

Abstract: The effects of two methods of training; single exemplar training (SET) and general case instruction (GCI), were compared to evaluate which method is more effective in pro-

moting skill generalization of a six-step handwashing task. The participant was an adolescent student attending a school for children with autism. In SET there was one training trial type which sampled only one set of stimuli when teaching the handwashing skill. In GCI, a variety of stimuli were sampled from relevant environments to make up three unique training trial types. Baseline probes were conducted prior to training and posttest

probes were conducted following training for each training phase. Handwashing was mastered at 100% of task analysis steps correct in both the SET and GCI conditions. On probe trials, successful performance was defined as 83% (five out of six steps) correct for the handwashing task analysis. Generalization was more robust following GCI than SET; only two out of eight

probe contexts yielded successful generalization following SET. GCI yielded successful generalization for three out of five contexts. This study provides a successful demonstration of GCI to promote skill generalization. IOA and PI were collected for 33% of sessions. Means were 91% and 99%.



An evaluation of behavioral skills training to teach phone safety skills to adolescents with autism spectrum disorder.

EDITOR'S NOTE:

Teaching phone safety skills to individuals with ASD is important to help them navigate communication safely and appropriately while avoiding potential risks such as sharing their personal information. It also promotes independence, enabling them to use the phone effectively for emergencies, social interactions, and daily tasks. Abigail Kelley (supervised by Amanda Verriden, PhD, BCBA-D, LABA) conducted behavioral skills training with two individuals with autism. Following training, the participants could correctly identify safe from unsafe text messages, demonstrating correct responses across a variety of message types and people.



ABIGAIL KELLEY (The New England Center for Children) and Amanda Verriden (The New England Center for Children).

Abstract: This study evaluated behavioral skills training (BST) for teaching phone safety skills to adolescents with ASD. We taught two individuals to discriminate between safe and unsafe text messages, and then how to respond using instructions, modeling, rehearsal, and feedback until mastery. We conducted post-tests and in-situ generalization probes across different

people, settings, and text message types to evaluate the effects of BST. Both participants discriminated between safe and unsafe messages and demonstrated the correct safety responses post-BST. One participant required a rehearsal and feedback booster session to achieve mastery. Additionally, both participants successfully generalized the skills with new teachers in new settings and maintained the skills three and five weeks later, respectively. Interobserver agreement was 92% overall (range, 83% to 100%).

A practical approach to treatment for improving sleep-conductive behavior in a residential care setting.

EDITOR'S NOTE:

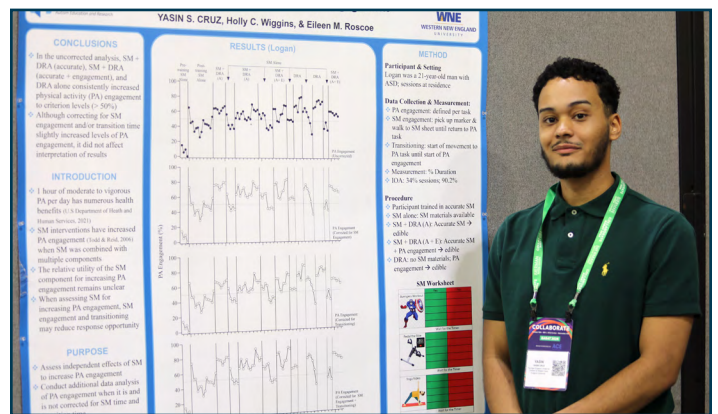
Individuals with ASD often display difficulty initiating or maintaining sleep. Researchers at NECC are working on improving sleep onset and duration with NECC residential students. Former NECC staff Zoe Newman (with advisor Dr. Roscoe) conducted a treatment analysis for improving sleep in three adolescents with ASD in the residential program. A noteworthy aspect of this study was the use of a Fitbit accelerometer to record sleep, preventing the need for overnight live or video data collection. A treatment involving instructions with delayed reinforcement was found to be effective in decreasing the time to sleep initiation.



ZOE A.D. NEWMAN (Regis College Autism Center), Eileen M. Roscoe (The New England Center for Children), Emily Stevens (The Autism Community Therapists, LLC), and Shannon P. Campbell (The New England Center for Children; Western New England University).

Abstract: Sleep problems may be characterized by difficulty falling asleep or staying asleep. Although behavioral interventions have been effective in treating these problems for individuals with developmental disabilities (e.g., Jin et al., 2013), some sleep treatment components require more effort for caregivers to implement. The purpose of this study was to evaluate a multiple-component sleep treatment and assess the maintenance of treatment effects when components were re-

moved. The study took place in a residential group home with three adolescents with autism who had difficulty with sleep initiation. Data were collected using direct observation and a Fitbit. Antecedent interventions were replicated from previous research, including bedtime fading, bedtime routine, and a sound machine. Additionally, sleep research was extended by evaluating a contingency review with delayed reinforcement for increasing sleep-conductive behavior. For all three participants, results showed that a bedtime routine alone was insufficient for improving sleep. A contingency review with delayed reinforcement was an effective treatment component for two participants. Finally, a social validity questionnaire was used to assess the practicality of treatment procedures.



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33 Turnpike Road
Southborough, MA 01772-2108
508.481.1015
www.necc.org

