AFIRM

Autism Focused Intervention Resources & Modules

ABI

EVIDENCE-BASED PRACTICE BRIEF PACKET:

ANTECEDENT-BASED INTERVENTIONS

UNC Frank Porter Graham Child Development Institute

Autism Focused Intervention Resources & Modules

Sam, A., & AFIRM Team, Updated 2022

UNC FRANK PORTER GRAHAM CHILD DEVELOPMENT INSTITUTE

The National Professional Development Center on Autism Spectrum Disorder

The National Clearinghouse on Autism Evidence & Practice

NCAEP • BRIDGING SCIENCE AND PRACTICE

Overview of Content

ABI

1. **Table of ABI Contents:** This list details the specific ABI resources that apply to antecedent-based interventions.
2. **What is ABI:** A quick summary of salient features of the evidence-based practice, including what it is, who it can be used with, what skills it has been used with, and settings for instruction.
3. **Evidence-base:** The evidence-base details the National Clearinghouse on Autism Evidence and Practice (NCAEP) criteria for inclusion as an evidence-based practice and the specific studies that meet the criteria for antecedent-based interventions.
4. **Planning Checklist:** This checklist details the steps for planning for antecedent-based interventions, including what prerequisite learning of practices are needed, collecting baseline data of the target goal/behavior/skill if needed, and what materials/resources are needed.
5. **Other Resources:** Other resources may include decision trees, checklists, and/or template forms that will support the use of antecedent-based interventions.
6. **Step-by-Step Guide:** Use this guide as an outline for how to plan for, use, and monitor antecedent-based interventions. Each step includes a brief description as a helpful reminder while learning the process.
7. **Implementation Checklist:** Use this checklist to determine if antecedent-based interventions are being implemented as intended.
8. **Data Collection Form(s):** Use this form as a method for collecting and analyzing data to determine if the learner with autism is making progress towards the target goal/behavior/skill.
9. **Tip Sheet for Professionals:** Use this tip sheet, intended for professionals working with learners with autism, as a supplemental resource to help provide basic information about antecedent-based interventions.
10. **Parent Guide:** Use this guide intended for parents or family members of learners with autism to help them understand basic information about antecedent-based interventions and how it is being used with their child.
11. **Additional Resources:** This list provides additional information for learning more about antecedent-based interventions as well as resources.
12. **CEC Standards:** This list details the specific CEC standards that apply to antecedent-based interventions.
13. **Glossary:** This glossary contains key terms that apply specifically to antecedent-based interventions.
14. **References:** This list details the specific references used for developing this ABI module in numerical order.

Table of ABI Contents

ABI

Antecedent-Based Interventions

ABI

WHAT IS ABI?

Antecedent-based interventions (ABI) can be used to decrease an identified interfering behavior by using environmental modifications to change the conditions in the setting that prompt the learner to engage in the interfering behavior. Interfering behaviors are more likely to occur when particular environmental conditions accompany the behavior and provide reinforcement for the interfering behavior's use (Alberto & Troutman, 2008). The goal of ABI is to identify factors that are reinforcing the identified interfering behavior and then to modify the environment or activity so that the factors no longer elicit the interfering behavior.

EVIDENCE-BASE:

Based upon the 2020 systematic review conducted by the National Clearinghouse on Autism Evidence and Practice (NCAEP), antecedent-based interventions are a focused intervention that meets the evidence-based practice criteria with 47 single case design and 2 group design studies. Antecedent-based interventions has been effective for early intervention (0-2 years), preschoolers (3-5 years), elementary school learners (6-11 years), middle school learners (12-14 years), high schoolers (15-18 years), and young adults (19-22 years) with autism. Studies included the 2020 EBP report (Steinbrenner et al., 2020) detail how antecedent-based interventions can be used to effectively address the following outcomes for a target goal/behavior/skill: academic/pre-academic, adaptive/self-help, challenging/interfering behavior, communication, mental health, play, school readiness, and social.

HOW IS THIS ABI BEING USED?

Antecedent-based interventions can be used by a variety of professionals, including teachers, special educators, therapists, paraprofessionals, and early interventionists in educational and community-based environments. Parents and family members also can use antecedent-based interventions in the home

Suggested Citation:

Sam, A., & AFIRM Team. (2022). *Antecedent-Based Interventions Brief Packet, Updated*. The University of North Carolina at Chapel Hill, Frank Porter Graham Child Development Institute, Autism Focused Intervention Modules and Resources. https://afirm.fpg.unc.edu/antecedent-based-interventions

Evidence-base

ABI

The National Clearinghouse on Autism Evidence and Practice has adopted the following criteria to determine if a practice is evidence-based. The 2020 EBP report (Steinbrenner et al., 2020) provides more information about the systematic review process.

Efficacy must be established through high-quality, peer-reviewed research in scientific journals using:

- At least 2 randomized or quasi-experimental group design studies, or
- At least 5 single subject/case design studies, or a
- Combination of evidence of 1 randomized or quasi-experimental group design study **and** 3 single subject/case design studies

OVERVIEW:

Based upon the 2020 systematic review conducted by the National Clearinghouse on Autism Evidence and Practice (NCAEP), antecedent-based interventions are a focused intervention that meets the evidence-based practice criteria with 47 single case design and 2 group design studies. Antecedent-based interventions has been effective for early intervention (0-2 years), preschoolers (3-5 years), elementary school learners (6-11 years), middle school learners (12-14 years), high schoolers (15-18 years), and young adults (19-22 years) with autism. Studies included the 2020 EBP report (Steinbrenner et al., 2020) detail how antecedent-based interventions can be used to effectively address the following outcomes for a target goal/behavior/skill: academic/pre-academic, adaptive/self-help, challenging/interfering behavior, communication, mental health, play, school readiness, and social.

In the table below, the instructional outcomes identified by the evidence base are shown by age of participants.

EVIDENCE-BASE:

	Academic	Adaptive	Challenging\ Interfering	Communication	Mental Health	Play	School readiness	Social
0-2		Yes	Yes	Yes		Yes		
3-5	Yes	Yes	Yes	Yes		Yes	Yes	Yes
6-11	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
12-14		Yes	Yes	Yes	Yes		Yes	Yes
15-18	Yes	Yes	Yes	Yes	Yes			
19-22			Yes					Yes

EARLY INTERVENTION (0-2 YEARS):

*** Delemere, E., & Dounavi, K. (2017). Parent-implemented bedtime fading and positive routines for children with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 48*, 1002-1019. https://doi.org/10.1007/s10803-017-3398-4**

* Jocelyn, L. J., Casiro, O. G., Beattie, D., Bow, J., & Kneisz, J. (1998). Treatment of children with autism: A randomized controlled trial to evaluate a caregiver-based intervention program in community day-care centers. J*ournal of Developmental & Behavioral Pediatrics*, *19*(5), 326-334. https://doi.org/10.1097/00004703-199810000-00002

Reinhartsen, D. B., Garfinkle, A. N., & Wolery, M. (2002). Engagement with toys in two-year-old children with autism: Teacher selection versus child choice. *Research and Practice for Persons with Severe Disabilities*, *27*(3), 175-187. https://doi.org/10.2511/rpsd.27.3.175

PRESCHOOL (3-5 YEARS):

*** Albert, K. M., Carbone, V. J., Murray, D. D., Hagerty, M., & Sweeney-Kerwin, E. J. (2012). Increasing the mand repertoire of children with autism through the use of an interrupted chain procedure. *Behavior Analysis in Practice, 5*(2), 65-76. https://doi.org/10.1007/bf03391825**

* Cale, S. I., Carr, E. G., Blakeley-Smith, A., & Owen-DeSchryver, J. S. (2009). Context-based assessment and intervention for problem behavior in children with autism spectrum disorder. *Behavior Modification*, *33*(6), 707-742. https://doi.org/10.1177/0145445509340775

*** Delemere, E., & Dounavi, K. (2017). Parent-implemented bedtime fading and positive routines for children with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 48*, 1002-1019. https://doi.org/10.1007/s10803-017-3398-4**

Dunlap, G., & Plienis, A. J. (1991). The influence of task size on the unsupervised task performance of students with developmental disabilities. *Education and Treatment of Children*, *14*(2), 85-95.

*** Eilers, H. J., & Hayes, S. C. (2015). Exposure and response prevention therapy with cognitive defusion exercises to reduce repetitive and restrictive behaviors displayed by children with autism spectrum disorder. *Research in Autism Spectrum Disorders, 19*, 18-31. https://doi.org/10.1016/j.rasd.2014.12.014**

* Jocelyn, L. J., Casiro, O. G., Beattie, D., Bow, J., & Kneisz, J. (1998). Treatment of children with autism: A randomized controlled trial to evaluate a caregiver-based intervention program in community day-care centers. J*ournal of Developmental & Behavioral Pediatrics*, *19*(5), 326-334. https://doi.org/10.1097/00004703-199810000-00002

*** Jung, S., & Sainato, D. M. (2015). Teaching games to young children with autism spectrum disorder using special interests and video modelling. *Journal of Intellectual and Developmental Disability*, *40*(2), 198-212. https://doi.org/10.3109/13668250.2015.1027674**

Koegel, L. K., Koegel, R. L., Frea, W., & Green-Hopkins, I. (2003). Priming as a method of coordinating educational services for students with autism. *Language, Speech, and Hearing Services in Schools*, *34*(3), 228-235. https://doi.org/10.1044/0161-1461(2003/019)

Kuo, N., & Plavnick, J. B. (2015). Using an antecedent art intervention to improve the behavior of a child with Autism. *Art Therapy, 32*(2), 54-59. https://doi.org/10.1080/07421656.2015.1028312

* Lanovaz, M. J., Sladeczek, I. E., & Rapp, J. T. (2011). Effects of music on vocal stereotypy in children with autism. *Journal of Applied Behavior Analysis*, *44*(3), 647-651. https://doi.org/10.1901/jaba.2011.44-647

LeBlanc, L. A., Carr, J. E., Crossett, S. E., Bennett, C. M., & Detweiler, D. D. (2005). Intensive outpatient behavioral treatment of primary urinary incontinence of children with autism. *Focus on Autism and Other Developmental Disabilities*, *20*(2), 98-105. https://doi.org/10.1177/10883576050200020601

*** O'Reilly, M., Fragale, C., Gainey, S., Kang, S., Koch, H., Shubert, J., Zein, F. E., Longino, D., Chung, M., Xu, Z., White, P., Lang, R., Davis, T., Rispoli, M., Lancioni, G., Didden, R., Healy, O., Kagohara, D., van der Meer, L., & Sigafoos, J. (2012). Examination of an antecedent communication intervention to reduce tangibly maintained challenging behavior: A controlled analog analysis. *Research in Developmental Disabilities, 33*(5), 1462-1468. https://doi.org/10.1016/j.ridd.2012.03.017**

Rakap, S., & Balikci, S. (2017). Using embedded instruction to teach functional skills to a preschool child with autism. *International Journal of Developmental Disabilities, 63*(1), 17-26. https://doi.org/10.1080/20473869.2015.1109801

* Rapp, J. T., Vollmer, T. R., Peter, C., Dozier, C. L., & Cotnoir, N. M. (2004). Analysis of response allocation in individuals with multiple forms of stereotyped behavior. *Journal of Applied Behavior Analysis*, *37*(4), 481-501. https://doi.org/10.1901/jaba.2004.37-481

PRESCHOOL (3-5 YEARS) CONTINUED:

* Rispoli, M. J., O'Reilly, M. F., Sigafoos, J., Lang, R., Kang, S., Lancioni, G., & Parker, R. (2011). Effects of presession satiation on challenging behavior and academic engagement for children with autism during classroom instruction. *Education and Training in Autism and Developmental Disabilities*, *46*(4), 607-618.

*** Rispoli, M., Lang, R., Neely, L., Camargo, S., Hutchins, N., Davenport, K., & Goodwyn, F. (2013). A comparison of within- and across-activity choices for reducing challenging behavior in children with autism spectrum disorders. *Journal of Behavioral Education, 22*(1), 66-83. https://doi.org/10.1007/s10864-012-9164-y**

* Rispoli, M., O'Reilly, M., Lang, R., Machalicek, W., Davis, T., Lancioni, G., & Sigafoos, J. (2011). Effects of motivating operations on problem and academic behavior in classrooms. *Journal of Applied Behavior Analysis*, *44*(1), 187-192. https://doi.org/10.1901/jaba.2011.44-187

*** Saylor, S., Sidener, T. M., Reeve, S. A., Fetherston, A., & Progar, P. R. (2012). Effects of three types of noncontingent auditory stimulation on vocal stereotypy in children with autism. *Journal of Applied Behavior Analysis, 45*(1), 185-190. https://doi.org/10.1901/jaba.2012.45-185**

Sellers, T. P., Bloom, S. E., Samaha, A. L., Dayton, E., Lambert, J. M., & Keyl-Austin, A. A. (2013). Evaluation of some components of choice making. *Journal of Applied Behavior Analysis, 46*(2), 455-464. https://doi.org/10.1002/jaba.46

* Taylor, B. A., Hoch, H., Potter, B., Rodriguez, A., Spinnato, D., & Kalaigian, M. (2005). Manipulating establishing operations to promote initiations toward peers in children with autism. *Research in Developmental Disabilities*, *26*(4), 385-392. https://doi.org/10.1016/j.ridd.2004.11.003

ELEMENTARY SCHOOL (6-11 YEARS):

Adcock, J., & Cuvo, A. J. (2009). Enhancing learning for children with autism spectrum disorders in regular education by instructional modifications. *Research in Autism Spectrum Disorders*, *3*(2), 319-328. https://doi.org/10.1016/j.rasd.2008.07.004

*** Albert, K. M., Carbone, V. J., Murray, D. D., Hagerty, M., & Sweeney-Kerwin, E. J. (2012). Increasing the mand repertoire of children with autism through the use of an interrupted chain procedure. *Behavior Analysis in Practice, 5*(2), 65-76. https://doi.org/10.1007/bf03391825**

* Cale, S. I., Carr, E. G., Blakeley-Smith, A., & Owen-DeSchryver, J. S. (2009). Context-based assessment and intervention for problem behavior in children with autism spectrum disorder. *Behavior Modification*, *33*(6), 707-742. https://doi.org/10.1177/0145445509340775

Davis, T. N., Dacus, S., Strickland, E., Machalicek, W., & Coviello, L. (2013). Reduction of automatically maintained self-injurious behavior utilizing noncontingent matched stimuli. Developmental Neurorehabilitation, 16(3), 166-71.

*** Delemere, E., & Dounavi, K. (2017). Parent-implemented bedtime fading and positive routines for children with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 48*, 1002-1019. https://doi.org/10.1007/s10803-017-3398-4**

Dudley, L. L., Johnson, C., & Barnes, R. S. (2002). Decreasing rumination using a starchy food satiation procedure. *Behavioral Interventions*, *17*(1), 21-29. https://doi.org/10.1002/bin.104

Dyer, K., Dunlap, G., & Winterling, V. (1990). Effects of choice making on the serious problem behaviors of students with severe handicaps. *Journal of Applied Behavior Analysis*, *23*(4), 515-524. https://doi.org/10.1901/jaba.1990.23-515

*** Eilers, H. J., & Hayes, S. C. (2015). Exposure and response prevention therapy with cognitive defusion exercises to reduce repetitive and restrictive behaviors displayed by children with autism spectrum disorder. *Research in Autism Spectrum Disorders, 19*, 18-31. https://doi.org/10.1016/j.rasd.2014.12.014**

*** Enloe, K. A., & Rapp, J. T. (2014). Effects of noncontingent social interaction on immediate and subsequent engagement in vocal and motor stereotypy in children with autism. *Behavior Modification, 38*(3), 374-391. https://doi.org/10.1177/0145445513514081**

* Graff, R. B., & Green, G. (2004). Two methods for teaching simple visual discriminations to learners with severe disabilities. *Research in Developmental Disabilities*, *25*(3), 295-307. https://doi.org/10.1016/j.ridd.2003.08.002

Hagopian, L. P., & Toole, L. M. (2009). Effects of response blocking and competing stimuli on stereotypic behavior. *Behavioral Interventions*, *24*(2), 117-125. https://doi.org/10.1002/bin.278

Haley, J. L., Heick, P. F., & Luiselli, J. K. (2010). Use of an antecedent intervention to decrease vocal stereotypy of a student with autism in the general education classroom. *Child & Family Behavior Therapy*, *32*(4), 311-321. https://doi.org/10.1080/07317107.2010.515527

ELEMENTARY SCHOOL (6-11 YEARS) CONTINUED:

*** Isong, I. A., Rao, S. R., Holifield, C., Iannuzzi, D., Hanson, E., Ware, J., & Nelson, L. P. (2014). Addressing dental fear in children with autism spectrum disorders: A randomized controlled pilot study using electronic screen media. *Clinical Pediatrics*, *53*(3), 230-237. https://doi.org/10.1177/0009922813517169**

*** Jung, S., & Sainato, D. M. (2015). Teaching games to young children with autism spectrum disorder using special interests and video modelling. *Journal of Intellectual and Developmental Disability*, *40*(2), 198-212. https://doi.org/10.3109/13668250.2015.1027674**

Kelly, A. N., Axe, J. B., Allen, R. F., & Maguire, R. W. (2015). Effects of presession pairing on the challenging behavior and academic responding of children with autism. *Behavioral Interventions, 30*(2), 135-156. https://doi.org/10.1002/bin.1408

Kliebert, M. L., & Tiger, J. H. (2011). Direct and distal effects of noncontingent juice on rumination exhibited by a child with autism. *Journal of Applied Behavior Analysis*, *44*(4), 955-959. https://doi.org/10.1901/jaba.2011.44-955

Ladd, M. V., Luiselli, J. K., & Baker, L. (2009). Continuous access to competing stimulation as intervention for self-injurious skin picking in a child with autism. *Child & Family Behavior Therapy*, *31*(1), 54-60. https://doi.org/10.1080/07317100802701400

* Lanovaz, M. J., Sladeczek, I. E., & Rapp, J. T. (2011). Effects of music on vocal stereotypy in children with autism. *Journal of Applied Behavior Analysis*, *44*(3), 647-651. https://doi.org/10.1901/jaba.2011.44-647

*** O'Reilly, M., Fragale, C., Gainey, S., Kang, S., Koch, H., Shubert, J., Zein, F. E., Longino, D., Chung, M., Xu, Z., White, P., Lang, R., Davis, T., Rispoli, M., Lancioni, G., Didden, R., Healy, O., Kagohara, D., van der Meer, L., & Sigafoos, J. (2012). Examination of an antecedent communication intervention to reduce tangibly maintained challenging behavior: A controlled analog analysis. *Research in Developmental Disabilities, 33*(5), 1462-1468. https://doi.org/10.1016/j.ridd.2012.03.017**

* Rapp, J. T., Vollmer, T. R., Peter, C., Dozier, C. L., & Cotnoir, N. M. (2004). Analysis of response allocation in individuals with multiple forms of stereotyped behavior. *Journal of Applied Behavior Analysis*, *37*(4), 481-501. https://doi.org/10.1901/jaba.2004.37-481

* Rispoli, M. J., O'Reilly, M. F., Sigafoos, J., Lang, R., Kang, S., Lancioni, G., & Parker, R. (2011). Effects of presession satiation on challenging behavior and academic engagement for children with autism during classroom instruction. *Education and Training in Autism and Developmental Disabilities*, *46*(4), 607-618.

*** Rispoli, M., Lang, R., Neely, L., Camargo, S., Hutchins, N., Davenport, K., & Goodwyn, F. (2013). A comparison of within- and across-activity choices for reducing challenging behavior in children with autism spectrum disorders. *Journal of Behavioral Education, 22*(1), 66-83. https://doi.org/10.1007/s10864-012-9164-y**

* Rispoli, M., O'Reilly, M., Lang, R., Machalicek, W., Davis, T., Lancioni, G., & Sigafoos, J. (2011). Effects of motivating operations on problem and academic behavior in classrooms. *Journal of Applied Behavior Analysis*, *44*(1), 187-192. https://doi.org/10.1901/jaba.2011.44-187

Roane, H. S., Kelly, M. L., & Fisher, W. W. (2003). The effects of noncontingent access to food on the rate of object mouthing across three settings. *Journal of Applied Behavior Analysis, 36*(4), 579-582. https://doi.org/10.1901/jaba.2003.36-579

Rosenberg, N., Congdon, M., Schwartz, I., & Ramps, D. (2015). Use of say-do correspondence training to increase generalization of social interaction skills at recess for children with Autism Spectrum Disorder. *Education and Training in Autism and Developmental Disabilities, 50*(2), 213-222.

*** Saylor, S., Sidener, T. M., Reeve, S. A., Fetherston, A., & Progar, P. R. (2012). Effects of three types of noncontingent auditory stimulation on vocal stereotypy in children with autism. *Journal of Applied Behavior Analysis, 45*(1), 185-190. https://doi.org/10.1901/jaba.2012.45-185**

* Smith, C. E., Carr, E. G., & Moskowitz, L. J. (2016). Fatigue as a biological setting event for severe problem behavior in autism spectrum disorder. *Research in Autism Spectrum Disorders, 23,* 131-144. https://doi.org/10.1016/j.rasd.2015.12.003

Stichter, J. P., Randolph, J. K., Kay, D., & Gage, N. (2009). The use of structural analysis to develop antecedent-based interventions for students with autism. *Journal of Autism and Developmental Disorders*, *39*(6), 883-896. https://doi.org/10.1007/s10803-009-0693-8

* Taylor, B. A., Hoch, H., Potter, B., Rodriguez, A., Spinnato, D., & Kalaigian, M. (2005). Manipulating establishing operations to promote initiations toward peers in children with autism. *Research in Developmental Disabilities*, *26*(4), 385-392. https://doi.org/10.1016/j.ridd.2004.11.003

Vasquez, S., Brewer, A., Leon, Y., & Vasquez, J. (2017). The effects of advance notice on problem behavior occasioned by interruptions of an ongoing activity in a young girl with autism. *Behavior Analysis in Practice, 10*(4), 417-421. https://doi.org/10.1007/s40617-017-0187-7

MIDDLE SCHOOL (12-14 YEARS):

Ahearn, W. H. (2003). Using simultaneous presentation to increase vegetable consumption in a mildly selective child with autism. *Journal of Applied Behavior Analysis*, *36*(3), 361-365. https://doi.org/10.1901/jaba.2003.36-361

Banda, D. R., McAfee, J. K., & Hart, S. L. (2012). Decreasing self-injurious behavior and fading self-restraint in a student with autism and Tourette syndrome. *Behavioral Interventions, 27*(3), 164-174. https://doi.org/10.1002/bin.1344

Butler, L. R., & Luiselli, J. K. (2007). Escape-maintained problem behavior in a child with autism antecedent functional analysis and intervention evaluation of noncontingent escape and instructional fading. *Journal of Positive Behavior Interventions*, *9*(4), 195-202. https://doi.org/10.1177/10983007070090040201

Clay, C. J., Clohisy, A. M., Ball, A. M., Haider, A. F., Schmitz, B. A., & Kahng, S. (2017). Further evaluation of presentation format of competing stimuli for treatment of automatically maintained challenging behavior. *Behavior Modification, 42*(3), 382-397. https://doi.org/10.1177/0145445517740322

*** Enloe, K. A., & Rapp, J. T. (2014). Effects of noncontingent social interaction on immediate and subsequent engagement in vocal and motor stereotypy in children with autism. *Behavior Modification, 38*(3), 374-391. https://doi.org/10.1177/0145445513514081**

* Graff, R. B., & Green, G. (2004). Two methods for teaching simple visual discriminations to learners with severe disabilities. *Research in Developmental Disabilities*, *25*(3), 295-307. https://doi.org/10.1016/j.ridd.2003.08.002

*** Isong, I. A., Rao, S. R., Holifield, C., Iannuzzi, D., Hanson, E., Ware, J., & Nelson, L. P. (2014). Addressing dental fear in children with autism spectrum disorders: A randomized controlled pilot study using electronic screen media. *Clinical Pediatrics*, *53*(3), 230-237. https://doi.org/10.1177/0009922813517169**

Mason, S. A., & Newsom, C. D. (1990). The application of sensory change to reduce stereotyped behavior. *Research in Developmental Disabilities*, *11*(3), 257-271. https://doi.org/ 10.1016/0891-4222(90)90012-W

*** Smith, C. E., Carr, E. G., & Moskowitz, L. J. (2016). Fatigue as a biological setting event for severe problem behavior in autism spectrum disorder. *Research in Autism Spectrum Disorders, 23,* 131-144. https://doi.org/10.1016/j.rasd.2015.12.003**

* Taylor, B. A., Hoch, H., Potter, B., Rodriguez, A., Spinnato, D., & Kalaigian, M. (2005). Manipulating establishing operations to promote initiations toward peers in children with autism. *Research in Developmental Disabilities*, *26*(4), 385-392. https://doi.org/10.1016/j.ridd.2004.11.003

Tiger, J. H., Fisher, W. W., Toussaint, K. A., & Kodak, T. (2009). Progressing from initially ambiguous functional analyses: Three case examples. *Research in Developmental Disabilities, 30*(5), 910-926. https://doi.org/ 10.1016/j.ridd.2099.01.005

HIGH SCHOOL (15-18 YEARS):

Barahona, C., DuBard, M., Luiselli, J. K., & Kesterson, J. (2013). School-based feeding intervention to increase variety and quantity of foods consumed by an adolescent with autism. *Clinical Practice in Pediatric Psychology, 1*(4), 361-368. https://doi.org/10.1037/cpp0000035

*** Isong, I. A., Rao, S. R., Holifield, C., Iannuzzi, D., Hanson, E., Ware, J., & Nelson, L. P. (2014). Addressing dental fear in children with autism spectrum disorders: A randomized controlled pilot study using electronic screen media. *Clinical Pediatrics*, *53*(3), 230-237. https://doi.org/10.1177/0009922813517169**

Koegel, L. K., Koegel, R. L., Frea, W., & Green-Hopkins, I. (2003). Priming as a method of coordinating educational services for students with autism. *Language, Speech, and Hearing Services in Schools*, *34*(3), 228-235. https://doi.org/10.1044/0161-1461(2003/019)

* Mason, S. A., & Newsom, C. D. (1990). The application of sensory change to reduce stereotyped behavior. *Research in Developmental Disabilities*, *11*(3), 257-271. https://doi.org/ 10.1016/0891-4222(90)90012-W

Sigafoos, J., Green, V. A., Payne, D., O'Reilly, M. F., & Lancioni, G. E. (2009). A classroom-based antecedent intervention reduces obsessive-repetitive behavior in an adolescent with autism. *Clinical Case Studies*, *8*(1), 3-13. https://doi.org/10.1177/1534650108327475

* Tiger, J. H., Fisher, W. W., Toussaint, K. A., & Kodak, T. (2009). Progressing from initially ambiguous functional analyses: Three case examples. *Research in Developmental Disabilities, 30*(5), 910-926. https://doi.org/ 10.1016/j.ridd.2099.01.005

Walpole, C. W., Roscoe, E. M., & Dube, W. V. (2007). Use of a differential observing response to expand restricted stimulus control. *Journal of Applied Behavior Analysis*, *40*(4), 707-712. https://doi.org/10.1901/jaba.2007.707-712

YOUNG ADULT (19-22 YEARS):

Kennedy, C. H. (1994). Manipulating antecedent conditions to alter the stimulus control of problem behavior. *Journal of Applied Behavior Analysis*, *27*(1), 161-170. https://doi.org/10.1901/jaba.1994.27-161

Note: * denotes the study has participants in at least two age ranges; **new studies since 2011 (2012 till 2017) are denoted in bold**

Data Collection: A-B-C

ABI

Learner's Name: _____ **Date/Time:** _____
Observer(s): _____
Interfering Behavior: _____
Directions: Collect data what happens directly before the behavior (antecedent), describe the behavior, and determine what happens directly after the behavior (consequence).

A-B-C DATA CHART:

Date	Start Time	Stop Time	Antecedent	Behavior	Consequence

ANECDOTAL NOTES:

Data Collection: Scatterplot

ABI

Learner's Name: _____ **Date/Time:** _____
Observer(s): _____
Interfering Behavior: _____
Directions: Collect data on the setting and time of the learner's behavior to identify patterns.

SCATTERPLOT:

Time	Activity	Date									

ANECDOTAL NOTES:

Hypothesis Statement & ABI Goal

ABI

Learner's Name: _____ **Date/Time:** _____

Observer(s): _____

Target Goal/Behavior/Skill (short): _____

Directions: Complete this checklist to determine if this is an appropriate practice to use with the learner with autism as well as if antecedent-based interventions are ready to be implemented.

IDENTIFY FEATURES OF THE BEHAVIOR:	
1.	Where is the behavior occurring?
2.	With whom is the behavior occurring?
3.	When does the behavior occur?
4.	During what activities does the behavior occur?

IDENTIFY FEATURES OF THE ENVIRONMENT:	
1.	What are other students/peers doing when the behavior occurs?
2.	What is the proximity of other students, teachers, and/or adults when the behavior occurs?
3.	Number of individuals in the area:
4.	Other environmental conditions:

DETERMINE FUNCTION OF THE BEHAVIOR:	
To get or obtain: ☐ Attention ☐ Food ☐ Toys ☐ Hugs ☐ Sensory Stimulation	**To escape or avoid:** ☐ Attention ☐ Difficult task/activity ☐ Undesirable activity ☐ Sensory stimulation ☐ Social stimulation

DEVELOP HYPOTHESIS STATEMENT:		
Antecedents & Consequences	**Interfering Behavior**	**Function of behavior**

HYPOTHESIS STATEMENT:

DETERMINE OVERALL GOAL FOR ABI:

Assessment Worksheet: EC

ABI

Learner's Name: _____ **Date/Time:** _____
Observer(s): _____
Interfering Behavior: _____
Directions: Complete this worksheet to assess/determine the preferences of a learner with autism, observe them for at least 30 minutes during a free choice activity time. Every 2 to 5 minutes, circle the material or toy that the learner is interacting with or looking at. If the material/toy is not listed in the following chart, please record in the blank spaces at the bottom of the chart. Complete at least 3 observations to identify highly preferred materials or toys. Highly preferred materials/toys can then be incorporated into non-preferred activities to increase motivating and engagement.

RECORD EVERY 2 TO 5 MINUTES:									
Animals	Animals	Animals	Animals	Animals	Animals	Animals	Animals	Animals	Animals
Blocks	Blocks	Blocks	Blocks	Blocks	Blocks	Blocks	Blocks	Blocks	Blocks
Books	Books	Books	Books	Books	Books	Books	Books	Books	Books
Bristle blocks	Bristle blocks	Bristle blocks	Bristle blocks	Bristle blocks	Bristle blocks	Bristle blocks	Bristle blocks	Bristle blocks	Bristle blocks
Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars
Computer	Computer	Computer	Computer	Computer	Computer	Computer	Computer	Computer	Computer
Dolls	Dolls	Dolls	Dolls	Dolls	Dolls	Dolls	Dolls	Dolls	Dolls
Gross motor	Gross motor	Gross motor	Gross motor	Gross motor	Gross motor	Gross motor	Gross motor	Gross motor	Gross motor
Kitchen	Kitchen	Kitchen	Kitchen	Kitchen	Kitchen	Kitchen	Kitchen	Kitchen	Kitchen
Letters	Letters	Letters	Letters	Letters	Letters	Letters	Letters	Letters	Letters
Little people	Little people	Little people	Little people	Little people	Little people	Little people	Little people	Little people	Little people
Playdough	Playdough	Playdough	Playdough	Playdough	Playdough	Playdough	Playdough	Playdough	Playdough
Pop up toy	Pop up toy	Pop up toy	Pop up toy	Pop up toy	Pop up toy	Pop up toy	Pop up toy	Pop up toy	Pop up toy
Put in toy	Put in toy	Put in toy	Put in toy	Put in toy	Put in toy	Put in toy	Put in toy	Put in toy	Put in toy
Puzzles	Puzzles	Puzzles	Puzzles	Puzzles	Puzzles	Puzzles	Puzzles	Puzzles	Puzzles
Sensory toy	Sensory toy	Sensory toy	Sensory toy	Sensory toy	Sensory toy	Sensory toy	Sensory toy	Sensory toy	Sensory toy
Sorting toy	Sorting toy	Sorting toy	Sorting toy	Sorting toy	Sorting toy	Sorting toy	Sorting toy	Sorting toy	Sorting toy
Stacking toy	Stacking toy	Stacking toy	Stacking toy	Stacking toy	Stacking toy	Stacking toy	Stacking toy	Stacking toy	Stacking toy
Swing	Swing	Swing	Swing	Swing	Swing	Swing	Swing	Swing	Swing
Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains
Water/ Sand table	Water/ Sand table	Water/ Sand table	Water/ Sand table	Water/ Sand table	Water/ Sand table	Water/ Sand table	Water/ Sand table	Water/ Sand table	Water/ Sand table

QUESTIONS TO CONSIDER (DUNST, HERTER, & SHIELDS, 2000):	
1.	What makes the learner smile and laugh?
2.	What makes the learner happy and feel good?
3.	What kinds of things get the learner excited?
4.	What are the learner's favorite things to do?
5.	What does the learner work especially hard at doing?
6.	What gets and keeps the learner's attention?
7.	What gets the learner to try new things?

IDENTIFIED HIGHLY PREFERRED MATERIALS/TOYS:

Assessment Worksheet: E, M, or H

ABI

Learner's Name: _____ **Date/Time:** _____
Observer(s): _____
Interfering Behavior: _____
Directions: Complete this worksheet to assess/determine the preferences of a learner with autism, observe them for at least 30 minutes during a free choice activity time. Every 2 to 5 minutes, circle the material or toy that the learner is interacting with or looking at. If the material/toy is not listed in the following chart, please record in the blank spaces at the bottom of the chart. Complete at least 3 observations to identify highly preferred materials or toys. Highly preferred materials/toys can then be incorporated into non-preferred activities to increase motivating and engagement.

RECORD EVERY 2 TO 5 MINUTES:									
Balls	Balls	Balls	Balls	Balls	Balls	Balls	Balls	Balls	Balls
Board game	Board game	Board game	Board game	Board game	Board game	Board game	Board game	Board game	Board game
Books	Books	Books	Books	Books	Books	Books	Books	Books	Books
Card game	Card game	Card game	Card game	Card game	Card game	Card game	Card game	Card game	Card game
Comic books	Comic books	Comic books	Comic books	Comic books	Comic books	Comic books	Comic books	Comic books	Comic books
Computer	Computer	Computer	Computer	Computer	Computer	Computer	Computer	Computer	Computer
Cooking	Cooking	Cooking	Cooking	Cooking	Cooking	Cooking	Cooking	Cooking	Cooking
Gross motor	Gross motor	Gross motor	Gross motor	Gross motor	Gross motor	Gross motor	Gross motor	Gross motor	Gross motor
Paint	Paint	Paint	Paint	Paint	Paint	Paint	Paint	Paint	Paint
Puzzles	Puzzles	Puzzles	Puzzles	Puzzles	Puzzles	Puzzles	Puzzles	Puzzles	Puzzles
Sand/ Water	Sand/ Water	Sand/ Water	Sand/ Water	Sand/ Water	Sand/ Water	Sand/ Water	Sand/ Water	Sand/ Water	Sand/ Water
Sensory material	Sensory material	Sensory material	Sensory material	Sensory material	Sensory material	Sensory material	Sensory material	Sensory material	Sensory material
Swing	Swing	Swing	Swing	Swing	Swing	Swing	Swing	Swing	Swing
Writing	Writing	Writing	Writing	Writing	Writing	Writing	Writing	Writing	Writing

QUESTIONS TO CONSIDER (DUNST, HERTER, & SHIELDS, 2000):	
1.	What makes the learner smile and laugh?
2.	What makes the learner happy and feel good?
3.	What kinds of things get the learner excited?
4.	What are the learner's favorite things to do?
5.	What does the learner work especially hard at doing?
6.	What gets and keeps the learner's attention?
7.	What gets the learner to try new things?

IDENTIFIED HIGHLY PREFERRED MATERIALS/TOYS:

ABI Events/Conditions

ABI

To fully understand what might be causing an interfering behavior, consider four key concepts: behavior, antecedent stimulus, consequence, and setting events.
For more information, please visit https://afirm.fpg.unc.edu/.

Setting Event

Anything that increases the likelihood that the identified event will occur

- Loud noise
- Group work
- Starting new medicine
- Not getting enough sleep

Antecedent

Events or conditions that occur directly before the identified interfering behavior occurs

- School bell rings to change classes
- Teacher asks learner to wash their hands
- Assignment of a math worksheet
- Peer asks learner for a book

Behavior

Identified interfering behavior

- Screaming
- Crying
- Hitting
- Biting
- Hand flapping

Consequence

Events or conditions that occur directly after the identified interfering behavior occurs

- Teacher says, "No biting"
- Learner allowed to go to the resource room
- Learner gets a break
- Learner allowed to work alone

ABI Strategies

ABI

Learn more about the strategies of ABI to support your understanding of this evidence-based practice.
For more information about these evidence-based practice strategies, please visit https://afirm.fpg.unc.edu/.

USING LEARNER PREFERENCE

- Tasks/activities are modified and adapted to increase the learner's interest
- Functions addressed: Escape/avoid
- Examples:
  - Use monster trucks in math problems
  - Use a Batman pencil for writing activities

CHANGING SCHEDULES/ROUTINES

- Routines/schedules are changed to decrease interfering behaviors
- Functions addressed: Escape/avoid
- Examples:
  - Changing hand washing routine
  - Going outside (preferred activity) after completing work assignment (non-preferred activity)
  - Using a visual timer to show how long learner must remain seated
  - Clearly labeling parts of the classroom

IMPLEMENTING PRE-ACTIVITY INTERVENTIONS

- Implemented before a task/activity associated with the interfering behavior
- Functions addressed: Escape/avoid
- Examples:
  - Reviewing assignment components before receiving assignment
  - Using visual activity schedules
  - Providing a warning before time to switch centers or activities

USING CHOICE-MAKING

- Learner is presented with choice materials or tasks
- Functions addressed: Escape/avoid
- Examples:
  - Choosing where to sit at circle time
  - Choosing who to work with in a group
  - Choosing which assignment to complete first

ALTERING HOW INSTRUCTION IS DELIVERED

- Modify instruction in order for learner to understand expectations
- Functions addressed: Escape/avoid
- Examples:
  - Provide written instructions rather than verbal instructions
  - Read text passage rather than requiring learner to read silently

ENRICHING ENVIRONMENT WITH SENSORY STIMULI

- Provide access to appropriate behaviors
- Functions addressed: Get/obtain
- Examples:
  - Allow learner to play with a fidget toy when teacher is reading from text
  - Provide access to a rocking chair to allow for rocking

Activity Matrix

ABI

Learner's Name: _____ **Date/Time:** _____
Observer(s): _____
Interfering Behavior: _____
Directions: Use this form to develop a plan for using ABI strategies to promote learner engagement across the day.

PLAN ACTIVITIES IN ADVANCE TO REDUCE/PREVENT THE OCCURRENCE OF IDENTIFIED BEHAVIORS:		
Routine or Activity	**Target skill(s)**	**Strategy**

Adapted from: Grisham-Brown, J., Hemmeter, M. L., & Pretti-Frontczak, K. (2005). *Blended practices for teaching young children in inclusive settings*. Baltimore: Paul H. Brooks Pub. Co.

Adaptations Worksheet

ABI

Learner's Name: _____ **Date/Time:** _____
Observer(s): _____
Target Goal/Behavior/Skill: _____
Directions: Use this worksheet to identify instructional adaptations for the learner.

CONDUCT A TASK ANALYSIS ASSESSMENT:

1. Complete an inventory of a typically developing peer completing the skill, task, or activity. As you observe a peer completing the task or activity, write down each step. For more detailed information on this process, check out the Task Analysis module.
2. Observe the learner completing the skill, task, or activity. Record behaviors/steps that are performed independently and those that are not performed independently.
3. Identify behaviors that the learner with autism cannot be expected to perform independently.
4. Create a list of potential adaptations that would allow the learner with autism to participate in the activity. This step will help identify specific instructional modifications that can help the learner participate in a specific activity and reduce interfering behavior.

IDENTIFY BEHAVIORS/STEPS AND ADAPTATIONS:			
Step	**Independent**	**Notes**	**Adaptations**
1.	☐ Yes ☐ No		
2.	☐ Yes ☐ No		
3.	☐ Yes ☐ No		
4.	☐ Yes ☐ No		
5.	☐ Yes ☐ No		
6.	☐ Yes ☐ No		
7.	☐ Yes ☐ No		

Lesson Plan

ABI

Learner's Name: _____ **Date/Time:** _____

Observer(s): _____

Target Goal/Behavior/Skill: _____

Directions: Use this form to develop a lesson plan for using a selected ABI strategy.

Objective/Goal(s):	**Procedure:**
	Materials Needed:

Steps:
1.
2.
3.
4.
5.

Example Lesson Plan

ABI

Learner's Name: Sam **Date/Time:** 2/17/2016

Observer(s): Ms. Hodge (3rd grade)

Target Goal/Behavior/Skill: Work in a small group for 5 minutes

Directions: Use this form to develop a lesson plan for using a selected ABI strategy.

Objective/Goal(s):	Strategy:
Sam will work on an assignment without crumpling his work and putting his head down on the desk when asked to participate in a small group for 5 minutes	• Learner preference • Altering instruction
	Materials Needed:
	Written instructions for assignment Timer Comic book

To implement this strategy, I will:

1. Provide Sam with written instructions for assignment rather than providing them verbally
2. Allow Sam to select the peers he would like to work with during the small group
3. Set a timer for 5 minutes to signal when Sam can leave the small group
4. Allow Sam to have 5 minutes of reading his comic book (his preferred activity) after staying 5 minutes in his small group

Planning Checklist

ABI

Learner's Name: _____ **Date/Time:** _____
Observer(s): _____
Target Goal/Behavior/Skill (short): _____
Directions: Complete this checklist to determine if this is an appropriate practice to use with the learner with autism as well as if antecedent-based interventions are ready to be implemented.

GENERAL PLANNING:			
1.	Has the target goal/behavior/skill been identified?	☐ Yes	☐ No
2.	Has baseline data and/or a functional behavior assessment been collected through direct observation of the learner?	☐ Yes	☐ No
3.	Is the target goal/behavior/skill measurable and observable? Does it clearly state **what** the target goal/behavior/skill is, **when** it will occur, and **how** team members/observers will know it has been mastered?	☐ Yes	☐ No
4.	Is this selected practice appropriate for the learner's target goal/behavior/skill?	☐ Yes	☐ No
5.	Does the learner have needed prerequisite skills/abilities?	☐ Yes	☐ No
6.	Does the learner require additional adaptations/ modifications/supports? Such as visual supports or a communication device?	☐ Yes	☐ No
7.	Have reinforcers/rewards for the learner been identified based on the learner's interests/preferred items and/or activities?	☐ Yes	☐ No
8.	Are additional materials and/or resources for using this selected practice ready and available?	☐ Yes	☐ No

TARGET GOAL/BEHAVIOR/SKILL:

BASELINE DATA:		
Date/Time	**Frequency/Duration**	**Total**

ANECDOTAL NOTES:

Data Collection: Event Sampling

ABI

Learner's Name: _____ **Date/Time:** _____
Observer(s): _____
Interfering Behavior: _____
Directions: Collect data on the frequency of the learner demonstrating the interfering behavior.

EVENT SAMPLING:

Date	Tally (each occurrence of the interfering behavior)	Total Tally

ANECDOTAL NOTES:

Data Collection: Duration (Time)

ABI

Learner's Name: _____ **Date/Time:** _____

Observer(s): _____

Target Goal/Behavior/Skill: _____

Directions: Collect data on the duration of the learner demonstrating the target goal/behavior/skill to determine if the learner is making progress.

MONITORING DATA:

Date	Start Time	Stop Time	Total Time (minutes)	Prompts Needed	Before, During, or After Reinforcement
					☐ Before ☐ During ☐ After
					☐ Before ☐ During ☐ After
					☐ Before ☐ During ☐ After
					☐ Before ☐ During ☐ After
					☐ Before ☐ During ☐ After
					☐ Before ☐ During ☐ After
					☐ Before ☐ During ☐ After
					☐ Before ☐ During ☐ After
					☐ Before ☐ During ☐ After
					☐ Before ☐ During ☐ After

Prompt Key: V = Verbal; G = Gestural; M = Model; P = Physical; I = No prompts needed/Independent

Data Collection: Duration (Bar)

ABI

Learner's Name: _____ **Date/Time:** _____
Observer(s): _____
Interfering Behavior: _____
Directions: This sheet could be completed by highlighting, circling, or shading the duration (length of the behavior). The sheet is designed to provide a graphic representation of the duration over time (the resulting data, if blocks are circled or highlighted, will appear similar to a bar graph). Starting from the bottom, shade the number of boxes that represent the length of the interfering behavior. Each box represents ONE minute.

LENGTH OF INTERFERING BEHAVIOR IN ONE MINUTE INCREMENTS:				
Monday __ / __	**Tuesday** __ / __	**Wednesday** __ / __	**Thursday** __ / __	**Friday** __ / __
15	**15**	**15**	**15**	**15**
14	**14**	**14**	**14**	**14**
13	**13**	**13**	**13**	**13**
12	**12**	**12**	**12**	**12**
11	**11**	**11**	**11**	**11**
10	**10**	**10**	**10**	**10**
9	**9**	**9**	**9**	**9**
8	**8**	**8**	**8**	**8**
7	**7**	**7**	**7**	**7**
6	**6**	**6**	**6**	**6**
5	**5**	**5**	**5**	**5**
4	**4**	**4**	**4**	**4**
3	**3**	**3**	**3**	**3**
2	**2**	**2**	**2**	**2**
1	**1**	**1**	**1**	**1**
0	**0**	**0**	**0**	**0**

Monitoring Progress Checklist

ABI

Learner's Name: _____ **Date/Time:** _____

Observer(s): _____

Target Goal/Behavior/Skill (short): _____

Directions: Complete this checklist to determine if the learner is making progress to the target goal/behavior/skill with antecedent-based interventions.

GENERAL MONITORING:			
1.	Has the learner achieved the target goal/behavior/skill?	☐ Yes	☐ No
2.	Is the target goal/behavior/skill measurable and observable? Does it clearly state **what** the target goal/behavior/skill is, **when** it will occur, and **how** team members/observers will know it has been mastered?	☐ Yes	☐ No
3.	Is the target goal/behavior/skill too difficult/complex? Does it need to be broken down into smaller steps?	☐ Yes	☐ No
4.	Has enough time been devoted to using antecedent-based interventions (frequency, intensity, and/or duration)?	☐ Yes	☐ No
5.	Were antecedent-based interventions implemented with fidelity?	☐ Yes	☐ No
6.	Does the learner require additional adaptations/ modifications/supports? Such as visual supports or a communication device?	☐ Yes	☐ No
7.	Are the selected reinforcers preferred items/activities for the learner?	☐ Yes	☐ No

MONITORING DATA:		
Date/Time	**Frequency/Duration**	**Total**

ANECDOTAL NOTES:

Step-by-Step Guide

ABI

This step-by-step practice guide outlines how to plan for, use, and monitor antecedent-based interventions.

BEFORE YOU BEGIN…

Each of the following points is important to address so that you can be sure antecedent-based interventions is likely to address the target goal/behavior/skill of your learner with autism.

HAVE YOU FOUND OUT MORE INFORMATION ABOUT…?

- ☐ Identifying the target goal/behavior/skill…?
- ☐ Collecting baseline data through direct observation…?
- ☐ Establishing a target goal or outcome that clearly states when the behavior will occur, what the target goal or outcome is, and how team members and/or observers will know when the skill is mastered…?

If the answer to any of the above questions is 'No,' review the process of how to select an appropriate EBP (**https://afirm.fpg.unc.edu/selecting-EBP**).

For more information about antecedent-based interventions, please visit **https://afirm.fpg.unc.edu/**.

Keep in mind that antecedent-based interventions can be used to decrease interfering behaviors and increase engagement.

STEP 1: PLANNING FOR ABI

The planning step details the initial steps and considerations involved to prepare for using antecedent-based interventions with a learner with autism. Be sure to use a functional behavior assessment (FBA) to identify and define the interfering behavior.

1.1 Identify and define the interfering behavior through an FBA

To assist in identifying a behavior that interferes with learning and/or development, team members should complete a functional behavior assessment (FBA). For more information, visit the Functional Behavior Assessment module.

1.2 Collect data using direct observation methods

To collect data on the interfering behavior, team members should use A-B-C data charts. A-B-C data charts help team members identify what happens directly before the behavior (antecedent), describe the behavior, and determine what happens directly after the behavior (consequence).

- *This ABC Data Chart can be used to the record observations of the learner's behavior.*

1.3 Review data collected from direct observations

Data tables (commonly referred to as scatterplots in the FBA literature) can be used to help teams determine possible functions of the behavior, when the behavior is occurring, and times of the day when an intervention might be implemented to reduce the interfering behavior.

- *This Scatterplot can be used to identify patterns in the learner's behavior.*

1.4 Develop a hypothesis statement and overall goal

Based upon the information gathered, the team develops a hypothesis statement that includes the following:

- The setting events, immediate antecedents, and immediate consequences that surround the interfering behavior.
- A restatement and refinement of the description of the interfering behavior that is occurring.
- The function the behavior serves (i.e., get/obtain, escape/avoid).
    - *This Planning Worksheet can be used to develop a hypothesis and goal for the learner's behavior.*

STEP 2: USING ABI

This step details the process of implementing antecedent-based interventions with a learner with autism.

2.1 Select an ABI strategy that addressed the function of the identified interfering behavior

Based upon information gathered from the FBA and planning step, team members identify an ABI strategy that will address the function of the interfering behaviors (Kern & Clemens, 2007). Possible ABI strategies include:

- Using learner preferences (include highly preferred items within a non-preferred activity to prevent learners from wanting to escape or avoid the activity)
- Changing schedules/routines (create predictable schedules/routines and use visual supports)
- Implementing pre-activity interventions (provide learners with information they need to participate in an activity or routine)
- Using choice-making (offer choices to increase learner's control of a situation)
- Altering how instruction is delivered (adapt or modify instruction in order to promote active participation and engagement with classroom materials and activities) or
- Enriching the environment with sensory stimuli (provide access to preferred sensory stimuli).
    - *These ABI Strategies can be used to support your understanding of antecedent-based interventions.*

2.2 Create a lesson plan that includes the selected ABI strategy

Develop lesson plans that include the following components to ensure the selected antecedent-based intervention strategy is included:

- Weekly objectives for the learner with autism that will lead to a decrease in an interfering behavior,
- A statement of the strategy and what the teachers/practitioners will do, and
- The materials needed to implement the antecedent-based intervention strategy.
    - *This Lesson Plan can be used to identify steps needed for using an ABI strategy.*

2.3 Ignore interfering behavior

Teachers and practitioners should not provide reinforcement for the identified interfering behavior when it occurs. For more information on extinction, check out the Extinction module.

STEP 2: USING ABI (CONTINUED)

2.4 Provide learner with reinforcement

To promote appropriate behavior, remember to provide reinforcement each time the learner does not engage in the interfering behavior and completes the weekly objective.

STEP 3: MONITORING ABI

The following step details how to monitor the use of antecedent-based interventions with a learner with autism and how to determine next steps based on the data.

3.1 Collect and analyze data

Measure a learner's engagement in the interfering behavior by collecting frequency data and/or duration data.

- *This Event Sampling Form can be used to monitor the identified interfering behavior.*
- *This Duration (Bar Chart) Form can be used to monitor the identified interfering behavior.*

3.2 Determine next steps based on learner progress

Collecting data will help team members determine if a learner is making progress and reducing the use of the identified interfering behavior. If a learner is making progress based upon data collected, team members should continue to use the selected strategies.

If team members determine that the learner is not making progress, consider the following:

- Is the identified interfering behavior well defined?
- Is the identified interfering behavior measurable and observable?
- Was a functional behavior assessment conducted?
- Did the functional behavior assessment indicate the function of the identified interfering behavior?
- Are the ABI strategies addressing the function of the identified interfering behavior?
- Are team members ignoring the identified interfering behavior?
- Has enough time been devoted to using antecedent-based interventions (frequency, intensity, and/or duration)?
- Were antecedent-based interventions implemented with fidelity (see Implementation Checklist)?
- Does the learner need additional supports?
- Are team members providing the learner with reinforcement for remaining on-task?
- Are the selected reinforcers preferred items/activities for the learner?

If these issues have been addressed and the learner with autism continues not to show progress, consider selecting a different evidence-based practice to use with the learner with autism.

Implementation Checklist

ABI

Before you start, have you…?

- ☐ Identified the interfering behavior…?
- ☐ Identified the target goal/behavior/skill…?
- ☐ Collected baseline data through direct observation…?
- ☐ Established a target goal or outcome that clearly states when the behavior will occur, what the target goal or outcome is, and how team members and/or observers will know when the skill is mastered…?

If the answer to any of the above questions is 'No,' review the process of how to select an EBP.

		Observation:	1	2	3	4	5
		Date:					
		Observer's initials:					
STEP 1: PLANNING							
1.1	Identify and define interfering behavior through an FBA						
1.2	Collect data using direct observation methods						
1.3	Review data collected from direct observations						
1.4	Develop a hypothesis statement and an overall goal						
STEP 2: USING							
2.1	Select an ABI strategy that addresses the function of the interfering behavior						
2.1a	☐ Using learner preferences						
2.1b	☐ Changing schedules/routines						
2.1c	☐ Implementing pre-activity interventions						
2.1d	☐ Using choice-making						
2.1e	☐ Altering how instruction is delivered						
2.1f	☐ Enriching the environment with sensory stimuli						
2.2	Create a lesson plan that includes selected ABI strategy						
2.3	Ignore interfering behavior						
2.4	Provider the learner with reinforcement						
STEP 3: MONITORING							
3.1	Collect and analyze data on interfering behavior						
3.2	Determine next steps based on learner progress						

Tip Sheet for Professionals

ABI

ANTECEDENT-BASED INTERVENTIONS IS…

- An evidence-based practice for children and youth with autism spectrum disorder (ASD) from 0-22 years old that can be implemented in multiple settings.
- Focus on identifying the events that take place immediately before and after an identified interfering behavior in order to modify the environment to change the conditions in the setting that prompt a learner to engage in the behavior.

WHY USE WITH LEARNERS WITH AUTISM?

- ABI are designed to prevent the identified interfering behavior from occurring.
- Team members can use ABI to increase engagement and on-task behaviors.
- ABI are easy to implement and require little additional effort by team members

INSTRUCTIONAL OUTCOMES:

- The evidence-base for antecedent-based interventions supports its use to address the following outcomes, according to age range, in the table below:

TIPS:

- Complete an FBA to identify a behavior that interferes with learning and what function that behavior is serving
- Select an ABI strategy that addresses the functioning of the interfering behavior
- Ignore interfering behavior and provide reinforcement to the learner for not engaging in the interfering behavior and for completing a task or activity.

EVIDENCE-BASE:

	Academic	Adaptive	Challenging\ Interfering	Communication	Mental Health	Play	School readiness	Social
0-2		Yes	Yes	Yes		Yes		
3-5	Yes	Yes	Yes	Yes		Yes	Yes	Yes
6-11	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
12-14		Yes	Yes	Yes	Yes		Yes	Yes
15-18	Yes	Yes	Yes	Yes	Yes			
19-22			Yes					Yes

Antecedent-Based Interventions ABI

This sheet was designed as a supplemental resource to provide basic information about this evidence-based practice for professionals working with learners with autism.

For more information about this selected evidence-based practice, please visit **https://afirm.fpg.unc.edu/**.

STEPS FOR IMPLEMENTING:

1. PLAN

- Identify and define interfering behavior through an FBA
- Collect data using direct observation methods
- Review data collected from direct observations
- Develop a hypothesis statement and an overall goal

2. USE

- Select an ABI strategy that addresses the function of the interfering behavior. ABI strategies include:
  - Using learner preferences
  - Changing schedules/routines
  - Implementing pre-activity interventions
  - Using choice-making
  - Altering how instruction is delivered
  - Enriching the environment with sensory stimuli
- Create lesson plan that includes selected ABI
- strategy.
- Ignore interfering behavior.
- Provide learner with reinforcement.

3. MONITOR

- Collect data and analyze data on interfering behavior
- Determine next steps based on learner progress

Parent's Guide

ABI

Antecedent-Based Interventions
ABI

This parent introduction to EBP was designed as a supplemental resource to help answer questions about this practice.

To find out more about how this EBP is being used with your child, please talk with:

For more information about this selected evidence-based practice, please visit **https://afirm.fpg.unc.edu/**.

WHAT IS ABI?

- Antecedent-based interventions is an evidence-based practice for children and youth with autism spectrum disorder (ASD) from 0-22 years old.
- ABI is used to make changes to the environment to decrease an identified interfering behavior and increase on-task behaviors.

WHY USE THIS ABI WITH MY CHILD?

- Antecedent-based interventions can be used to prevent or reduce interfering behaviors and increase engagement in an activity.
- Research studies have shown that antecedent-based interventions have been used effectively with learners in early intervention, preschool, elementary school, middle school, high school, and young adults with autism to effectively address academic/pre-academic, adaptive/self-help, challenging/interfering behavior, communication, mental health, play, school readiness, and social outcomes.

WHAT ACTIVITIES CAN I DO AT HOME?

- When your child has a challenging behavior, think about what happened before and after the behavior.
- Think of ways you can change what happens before the challenging behavior. For example, if your child refuses to brush his or her teeth, consider introducing a visual schedule to signal your child needs to brush teeth and the steps involved. Changing the environment before an activity (such as using a picture rather than words) the challenging behavior may decrease.
- Remember to praise your child or provide reinforcement for completing a task or activity.

Additional Resources

ABI

Check out these resources, applications, books, and websites, to support your use of this evidence-based practice.
For more information about antecedent-based interventions, please visit https://afirm.fpg.unc.edu/.

APPLICATIONS:

	Developer		Available	Pricing
	Handhold Adaptive, LLC	*iPrompts*	Google Play iTunes Amazon	$9.99-$99.99
	Marz Consulting Inc.	*Behavior Tracker Pro*	iTunes	$29.99
	Good Karma Applications, Inc	*First Then Visual Schedule HD*	iTunes	$14.99
	AssistiveWare	*Pictello: Talking Visual Story Creator*	iTunes	$18.99

BOOKS:

Tarbox, J., & Bermudez, T. L. (2017). *Treating Feeding Challenges in Autism: Turning the Tables on Mealtime.* Academic Press.

WEBSITES:

Gilmore, H. (2017, July 4). ABC's of Behavior (Antecedent-Behavior-Consequence). Reflections from a Children's Therapist. https://pro.psychcentral.com/child-therapist/2017/07/abcs-of-behavior-antecedent-behavior-consequence/.

Hart, A., & Carr, S. Autism Q & A: Antecedent Based Intervention. https://vcuautismcenter.org/resources/factsheets/content.cfm/1193.

National Professional Development Center on Autism Spectrum Disorders. Antecedent-Based Interventions (ABI). CSESA. https://csesa.fpg.unc.edu/resources/antecedent-based-interventions-abi.

Pratt, & Dubie. Observing Behavior Using A-B-C Data. Indiana Resource Center for Autism. https://www.iidc.indiana.edu/irca/articles/observing-behavior-using-a-b-c-data.html.

Webster, J. ABC: Antecedent, Behavior, Consequence. ThoughtCo. https://www.thoughtco.com/abc-antecedent-behavior-and-consequence-3111263.

CEC Standards

ABI

The CEC Standards that apply to all the evidence-based practices can be found on our website at https://afirm.fpg.unc.edu/.

Below are the CEC Standards that apply specifically to this evidence-based practice.

Initial Practice-Based Standards for Early Interventionists/Early Childhood (0-5 years; CEC, 2020)

STANDARD 3: COLLABORATION & TEAMING

3.1 Apply teaming models, skills, and processes, including appropriate uses of technology, when collaborating and communicating with families; professionals representing multiple disciplines, skills, expertise, and roles; and community partners and agencies.

3.2 Use a variety of collaborative strategies when working with other adults that are evidence-based, appropriate to the task, culturally and linguistically responsive, and take into consideration the environment and service delivery approach.

3.3 Partner with families and other professionals to develop individualized plans and support the various transitions that occur for the young child and their family throughout the birth through 8 age-span.

STANDARD 4: ASSESSMENT PROCESSES

4.1 Understand the purposes of formal and informal assessment, including ethical and legal considerations, and use this information to choose developmentally, culturally, and linguistically appropriate, valid, reliable tools and methods that are responsive to the characteristics of the young child, family, and program

4.2 Develop and administer informal assessments and/or select and use valid, reliable formal assessments using evidence-based practices, including technology, in partnership with families and other professionals.

4.3 Analyze, interpret, document, and share assessment information using a strengths-based approach with families and other professionals.

4.4 In collaboration with families and other team members, use assessment data to determine eligibility, develop child and family-based outcomes/goals, plan for interventions and instruction, and monitor progress to determine efficacy of programming.

STANDARD 6: USING RESPONSIVE AND RECIPROCAL INTERACTIONS, INTERVENTIONS, & INSTRUCTION

6.2 Engage in reciprocal partnerships with families and other professionals to facilitate responsive adult-child interactions, interventions, and instruction in support of child learning and development.

6.3 Engage in ongoing planning and use flexible and embedded instructional and environmental arrangements and appropriate materials to support the use of interactions, interventions, and instruction addressing developmental and academic content domains, which are adapted to meet the needs of each and every child and their family.

6.4 Promote young children's social and emotional competence and communication, and proactively plan and implement function-based interventions to prevent and address challenging behaviors.

6.6 Use responsive interactions, interventions, and instruction with sufficient intensity and types of support across activities, routines, and environments to promote child learning and development and facilitate access, participation, and engagement in natural environments and inclusive settings.

6.7 Plan for, adapt, and improve approaches to interactions, interventions, and instruction based on multiple sources of data across a range of natural environments and inclusive settings.

Initial Practice-Based Standards for (grades K-12; CEC, 2020)

STANDARD 2: UNDERSTANDING AND ADDRESSING EACH INDIVIDUAL'S DEVELOPMENTAL AND LEARNING NEEDS

2.1 Apply understanding of human growth and development to create developmentally appropriate and meaningful learning experiences that address individualized strengths and needs of students with exceptionalities.

2.2 Use knowledge and understanding of diverse factors that influence development and learning, including differences related to families, languages, cultures, and communities, and individual differences, including exceptionalities, to plan and implement learning experiences and environments.

STANDARD 4: USING ASSESSMENT TO UNDERSTAND THE LEARNER AND THE LEARNING ENVIRONMENT FOR DATA-BASED DECISION MAKING

4.1 Collaboratively develop, select, administer, analyze, and interpret multiple measures of student learning, behavior, and the classroom environment to evaluate and support classroom and school-based systems of intervention for students with and without exceptionalities.

4.2 Develop, select, administer, and interpret multiple, formal and informal, culturally and linguistically appropriate measures and procedures that are valid and reliable to contribute to eligibility determination for special education services.

STANDARD 4: USING ASSESSMENT TO UNDERSTAND THE LEARNER AND THE LEARNING ENVIRONMENT FOR DATA-BASED DECISION MAKING (CONTINUED)

4.3 Assess, collaboratively analyze, interpret, and communicate students' progress toward measurable outcomes using technology as appropriate, to inform both short- and long-term planning, and make ongoing adjustments to instruction.

STANDARD 5: SUPPORTING LEARNING USING EFFECTIVE INSTRUCTION

5.2 Use effective strategies to promote active student engagement, increase student motivation, increase opportunities to respond, and enhance self-regulation of student learning.

5.6 Plan and deliver specialized, individualized instruction that is used to meet the learning needs of each individual.

STANDARD 6: SUPPORTING SOCIAL, EMOTIONAL, AND BEHAVIORAL GROWTH

6.1 Use effective routines and procedures to create safe, caring, respectful, and productive learning environments for individuals with exceptionalities.

6.2 Use a range of preventive and responsive practices documented as effective to support individuals' social, emotional, and educational well-being.

6.3 Systematically use data from a variety of sources to identify the purpose or function served by problem behavior to plan, implement, and evaluate behavioral interventions and social skills programs, including generalization to other environments.

Advanced Practice-Based Standards (CEC, 2012)

STANDARD 1: ASSESSMENT

1.1 Minimize bias in assessment.

Glossary

ABI

Below are the key terms that apply specifically to this evidence-based practice.

For more information about antecedent-based interventions, please visit https://afirm.fpg.unc.edu/.

A-B-C data charts:
help team members determine what happens before the behavior (the antecedent), when the behavior that occurs (behavior), and what happens directly after the behavior (the consequence)

Antecedent:
the activities and specific events preceding the behavior

Antecedent-based interventions:
an evidence-based practice that can be used to decrease an identified interfering engagement and/or increase engagement by modifying the environment to change the conditions that prompt the interfering behavior from the learner

Baseline:
information gathered from multiple sources to better understand the target behavior, before using an intervention or practice

Baseline data:
data collected on current performance level prior to implementation of intervention

Consequence
events that followed or results of the behavior

Duration data:
records how long a learner engages in a particular behavior or skill.

Event sampling:
collects frequency data at every instance the behavior occurs

Frequency data:
used to measure how often the learner with autism engages in the target skill or behavior

Functional Behavior Assessment:
is an evidence-based practice used when the intensity, duration, or type of interfering behavior creates safety concerns or impacts a child's development

Hypothesis statement
used in FBA, these statements include 1) the setting events, immediate antecedents, and immediate consequences that surround the interfering behavior, 2) a restatement and refinement of the description of the interfering behavior, and 2) the function the behavior serves (i.e., get/obtain, escape/avoid)

Individual schedule
a type of visual support that includes visually presenting the learner's day

Interfering behavior:
is a challenging behavior that interferes with the learner's ability to learn

Reinforcement:
feedback that increases the use of a strategy or target behavior/skill

Reinforcer sampling:
helps to identify activities and materials that are motivating to learner with autism. Also known as a preference assessment

Reinforcers:
increase the likelihood that the target skill/behavior will be used again in the future.

Room arrangement
type of visual support that includes arranging the environment in a systematic way

Sensory reinforcers
motivating for learner with autism, only use when adult can control access to reinforcer, the reinforcer is acceptable and appropriate for the setting, and no other reinforcer is motivating

Team members:
includes the parents, other primary caregivers, IEP/IFSP team members, teachers, therapists, early intervention providers, and other professionals involved in providing services for the learner with autism

Visual instructions
a type of visual support that includes visually organizing an activity or task

Visual supports:
visual supports are concrete cues that are paired with, or used in place of, a verbal cue to provide the learner with information about a routine, activity, behavioral expectation, or skill demonstration

References

ABI

Listed below, in numerical order, are the references used in the module.

For more information about antecedent-based interventions, please visit https://afirm.fpg.unc.edu/.

1. Alberto, P. A., & Troutman, A. C. (2008). Applied behavior analysis for teachers, 8th ed. Upper Saddle River, NJ: Prentice Hall.
2. Kern, L., Choutka, C. M., & Sokol, N. G. (2002). Assessment-based antecedent interventions used in natural settings to reduce challenging behaviors: An analysis of the literature. Education & Treatment of Children, 25, 113-130.
3. Luiselli, J. K. (2008). Antecedent (preventive) intervention. In J. K. Luiselli, D. C. Russo, W. P. Christian, & S. M. Wilczynski (Eds.) Effective practices for children with autism: Educational and behavioral support interventions that work (pp. 393-412). NY: Oxford University Press.
4. Ahearn, W. H. (2003). Using simultaneous presentation to increase vegetable consumption in a mildly selective child with autism. Journal of Applied Behavior Analysis, 36(3), 361-365. https://doi.org/10.1901/jaba.2003.36-361
5. Barahona, C., DuBard, M., Luiselli, J. K., & Kesterson, J. (2013). School-based feeding intervention to increase variety and quantity of foods consumed by an adolescent with autism. Clinical Practice in Pediatric Psychology, 1(4), 361-368. https://doi.org/10.1037/cpp0000035
6. Delemere, E., & Dounavi, K. (2017). Parent-implemented bedtime fading and positive routines for children with autism spectrum disorders. Journal of Autism and Developmental Disorders, 48, 1002-1019. https://doi.org/10.1007/s10803-017-3398-4
7. Isong, I. A., Rao, S. R., Holifield, C., Iannuzzi, D., Hanson, E., Ware, J., & Nelson, L. P. (2014). Addressing dental fear in children with autism spectrum disorders: A randomized controlled pilot study using electronic screen media. Clinical Pediatrics, 53(3), 230-237. https://doi.org/10.1177/0009922813517169
8. LeBlanc, L. A., Carr, J. E., Crossett, S. E., Bennett, C. M., & Detweiler, D. D. (2005). Intensive outpatient behavioral treatment of primary urinary incontinence of children with autism. Focus on Autism and Other Developmental Disabilities, 20(2), 98-105. https://doi.org/10.1177/10883576050200020601
9. Banda, D. R., McAfee, J. K., & Hart, S. L. (2012). Decreasing self-injurious behavior and fading self-restraint in a student with autism and Tourette syndrome. Behavioral Interventions, 27(3), 164-174. https://doi.org/10.1002/bin.1344
10. Davis, T. N., Dacus, S., Strickland, E., Machalicek, W., & Coviello, L. (2013). Reduction of automatically maintained self-injurious behavior utilizing noncontingent matched stimuli. Developmental Neurorehabilitation, 16(3), 166-71. https://doi.org/10.3109/17518423.2013.766819
11. Ladd, M. V., Luiselli, J. K., & Baker, L. (2009). Continuous access to competing stimulation as intervention for self-injurious skin picking in a child with autism. Child & Family Behavior Therapy, 31(1), 54-60. https://doi.org/10.1080/07317100802701400
12. Butler, L. R., & Luiselli, J. K. (2007). Escape-maintained problem behavior in a child with autism antecedent functional analysis and intervention evaluation of noncontingent escape and instructional fading. Journal of Positive Behavior Interventions, 9(4), 195-202. https://doi.org/10.1177/10983007070090040201
13. Hagopian, L. P., & Toole, L. M. (2009). Effects of response blocking and competing stimuli on stereotypic behavior. Behavioral Interventions, 24(2), 117-125. https://doi.org/10.1002/bin.278

14. Tiger, J. H., Fisher, W. W., Toussaint, K. A., & Kodak, T. (2009). Progressing from initially ambiguous functional analyses: Three case examples. Research in Developmental Disabilities, 30(5), 910-926. https://doi.org/10.1016/j.ridd.2099.01.005
15. Cale, S. I., Carr, E. G., Blakeley-Smith, A., & Owen-DeSchryver, J. S. (2009). Context-based assessment and intervention for problem behavior in children with autism spectrum disorder. Behavior Modification, 33(6), 707-742. https://doi.org/10.1177/0145445509340775
16. Clay, C. J., Clohisy, A. M., Ball, A. M., Haider, A. F., Schmitz, B. A., & Kahng, S. (2017). Further evaluation of presentation format of competing stimuli for treatment of automatically maintained challenging behavior. Behavior Modification, 42(3), 382-397. https://doi.org/10.1177/0145445517740322
17. Dudley, L. L., Johnson, C., & Barnes, R. S. (2002). Decreasing rumination using a starchy food satiation procedure. Behavioral Interventions, 17(1), 21-29. https://doi.org/10.1002/bin.104
18. Dyer, K., Dunlap, G., & Winterling, V. (1990). Effects of choice making on the serious problem behaviors of students with severe handicaps. Journal of Applied Behavior Analysis, 23(4), 515-524. https://doi.org/10.1901/jaba.1990.23-515
19. Kelly, A. N., Axe, J. B., Allen, R. F., & Maguire, R. W. (2015). Effects of presession pairing on the challenging behavior and academic responding of children with autism. Behavioral Interventions, 30(2), 135-156. https://doi.org/10.1002/bin.1408
20. Kennedy, C. H. (1994). Manipulating antecedent conditions to alter the stimulus control of problem behavior. Journal of Applied Behavior Analysis, 27(1), 161-170. https://doi.org/10.1901/jaba.1994.27-161
21. Kliebert, M. L., & Tiger, J. H. (2011). Direct and distal effects of noncontingent juice on rumination exhibited by a child with autism. Journal of Applied Behavior Analysis, 44(4), 955-959. https://doi.org/10.1901/jaba.2011.44-955
22. Koegel, L. K., Koegel, R. L., Frea, W., & Green-Hopkins, I. (2003). Priming as a method of coordinating educational services for students with autism. Language, Speech, and Hearing Services in Schools, 34(3), 228-235. https://doi.org/10.1044/0161-1461(2003/019)
23. Kuo, N., & Plavnick, J. B. (2015). Using an antecedent art intervention to improve the behavior of a child with Autism. Art Therapy, 32(2), 54-59. https://doi.org/10.1080/07421656.2015.1028312
24. Lanovaz, M. J., Sladeczek, I. E., & Rapp, J. T. (2011). Effects of music on vocal stereotypy in children with autism. Journal of Applied Behavior Analysis, 44(3), 647-651. https://doi.org/10.1901/jaba.2011.44-647
25. Mason, S. A., & Newsom, C. D. (1990). The application of sensory change to reduce stereotyped behavior. Research in Developmental Disabilities, 11(3), 257-271. https://doi.org/ 10.1016/0891-4222(90)90012-W
26. O'Reilly, M., Fragale, C., Gainey, S., Kang, S., Koch, H., Shubert, J., Zein, F. E., Longino, D., Chung, M., Xu, Z., White, P., Lang, R., Davis, T., Rispoli, M., Lancioni, G., Didden, R., Healy, O., Kagohara, D., van der Meer, L., & Sigafoos, J. (2012). Examination of an antecedent communication intervention to reduce tangibly maintained challenging behavior: A controlled analog analysis. Research in Developmental Disabilities, 33(5), 1462-1468. https://doi.org/10.1016/j.ridd.2012.03.017
27. Rapp, J. T., Vollmer, T. R., Peter, C., Dozier, C. L., & Cotnoir, N. M. (2004). Analysis of response allocation in individuals with multiple forms of stereotyped behavior. Journal of Applied Behavior Analysis, 37(4), 481-501. https://doi.org/10.1901/jaba.2004.37-481
28. Rispoli, M., Lang, R., Neely, L., Camargo, S., Hutchins, N., Davenport, K., & Goodwyn, F. (2013). A comparison of within- and across-activity choices for reducing challenging behavior in children with autism spectrum disorders. Journal of Behavioral Education, 22(1), 66-83. https://doi.org/10.1007/s10864-012-9164-y
29. Roane, H. S., Kelly, M. L., & Fisher, W. W. (2003). The effects of noncontingent access to food on the rate of object mouthing across three settings. Journal of Applied Behavior Analysis, 36(4), 579-582. https://doi.org/10.1901/jaba.2003.36-579
30. Saylor, S., Sidener, T. M., Reeve, S. A., Fetherston, A., & Progar, P. R. (2012). Effects of three types of noncontingent auditory stimulation on vocal stereotypy in children with autism. Journal of Applied Behavior Analysis, 45(1), 185-190. https://doi.org/10.1901/jaba.2012.45-185

31. Smith, C. E., Carr, E. G., & Moskowitz, L. J. (2016). Fatigue as a biological setting event for severe problem behavior in autism spectrum disorder. Research in Autism Spectrum Disorders, 23, 131-144. https://doi.org/10.1016/j.rasd.2015.12.003
32. Vasquez, S., Brewer, A., Leon, Y., & Vasquez, J. (2017). The effects of advance notice on problem behavior occasioned by interruptions of an ongoing activity in a young girl with autism. Behavior Analysis in Practice, 10(4), 417-421. https://doi.org/10.1007/s40617-017-0187-7
33. Albert, K. M., Carbone, V. J., Murray, D. D., Hagerty, M., & Sweeney-Kerwin, E. J. (2012). Increasing the mand repertoire of children with autism through the use of an interrupted chain procedure. Behavior Analysis in Practice, 5(2), 65-76. https://doi.org/10.1007/bf03391825
34. Taylor, B. A., Hoch, H., Potter, B., Rodriguez, A., Spinnato, D., & Kalaigian, M. (2005). Manipulating establishing operations to promote initiations toward peers in children with autism. Research in Developmental Disabilities, 26(4), 385-392. https://doi.org/10.1016/j.ridd.2004.11.003
35. Eilers, H. J., & Hayes, S. C. (2015). Exposure and response prevention therapy with cognitive defusion exercises to reduce repetitive and restrictive behaviors displayed by children with autism spectrum disorder. Research in Autism Spectrum Disorders, 19, 18-31. https://doi.org/10.1016/j.rasd.2014.12.014
36. Enloe, K. A., & Rapp, J. T. (2014). Effects of noncontingent social interaction on immediate and subsequent engagement in vocal and motor stereotypy in children with autism. Behavior Modification, 38(3), 374-391. https://doi.org/10.1177/0145445513514081
37. Sigafoos, J., Green, V. A., Payne, D., O'Reilly, M. F., & Lancioni, G. E. (2009). A classroom-based antecedent intervention reduces obsessive-repetitive behavior in an adolescent with autism. Clinical Case Studies, 8(1), 3-13. https://doi.org/10.1177/1534650108327475
38. Reinhartsen, D. B., Garfinkle, A. N., & Wolery, M. (2002). Engagement with toys in two-year-old children with autism: Teacher selection versus child choice. Research and Practice for Persons with Severe Disabilities, 27(3), 175-187. https://doi.org/10.2511/rpsd.27.3.175
39. Rispoli, M. J., O'Reilly, M. F., Sigafoos, J., Lang, R., Kang, S., Lancioni, G., & Parker, R. (2011). Effects of presession satiation on challenging behavior and academic engagement for children with autism during classroom instruction. Education and Training in Autism and Developmental Disabilities, 46(4), 607-618.
40. Jung, S., & Sainato, D. M. (2015). Teaching games to young children with autism spectrum disorder using special interests and video modelling. Journal of Intellectual and Developmental Disability, 40(2), 198-212. https://doi.org/10.3109/13668250.2015.1027674
41. Rosenberg, N., Congdon, M., Schwartz, I., & Ramps, D. (2015). Use of say-do correspondence training to increase generalization of social interaction skills at recess for children with Autism Spectrum Disorder. Education and Training in Autism and Developmental Disabilities, 50(2), 213-222.
42. Adcock, J., & Cuvo, A. J. (2009). Enhancing learning for children with autism spectrum disorders in regular education by instructional modifications. Research in Autism Spectrum Disorders, 3(2), 319-328. https://doi.org/10.1016/j.rasd.2008.07.004
43. Graff, R. B., & Green, G. (2004). Two methods for teaching simple visual discriminations to learners with severe disabilities. Research in Developmental Disabilities, 25(3), 295-307. https://doi.org/10.1016/j.ridd.2003.08.002
44. Haley, J. L., Heick, P. F., & Luiselli, J. K. (2010). Use of an antecedent intervention to decrease vocal stereotypy of a student with autism in the general education classroom. Child & Family Behavior Therapy, 32(4), 311-321. https://doi.org/10.1080/07317107.2010.515527
45. Rakap, S., & Balikci, S. (2017). Using embedded instruction to teach functional skills to a preschool child with autism. International Journal of Developmental Disabilities, 63(1), 17-26. https://doi.org/10.1080/20473869.2015.1109801
46. Rispoli, M., O'Reilly, M., Lang, R., Machalicek, W., Davis, T., Lancioni, G., & Sigafoos, J. (2011). Effects of motivating operations on problem and academic behavior in classrooms. Journal of Applied Behavior Analysis, 44(1), 187-192. https://doi.org/10.1901/jaba.2011.44-187

47. Walpole, C. W., Roscoe, E. M., & Dube, W. V. (2007). Use of a differential observing response to expand restricted stimulus control. Journal of Applied Behavior Analysis, 40(4), 707-712. https://doi.org/10.1901/jaba.2007.707-712
48. Steinbrenner, J. R., Hume, K., Odom, S. L., Morin, K. L., Nowell, S. W., Tomaszewski, B., Szendrey, S., McIntyre, N. S., Yücesoy-Özkan, S., & Savage, M. N. (2020). Evidence-based practices for children, youth, and young adults with Autism. The University of North Carolina at Chapel Hill, Frank Porter Graham Child Development Institute, National Clearinghouse on Autism Evidence and Practice Review Team. http://autismpdc.fpg.unc.edu/sites/autismpdc.fpg.unc.edu/files/imce/documents/2014-EBP-Report.pdf
49. Cihak, D., Alberto, P. A., & Frederick, L. D. (2007). Use of brief functional analysis and intervention in public settings. Journal of Positive Interventions, 9(2), 80-93.
50. Kern, L., & Clemens, N. H. (2007). Antecedent strategies to promote appropriate classroom behavior. Psychology in the Schools, 44(1), 65-75.
51. Grisham-Brown, J., Hemmeter, M. L., & Pretti-Frontczak, K. (2005). Blended practices for teaching young children in inclusive settings. Baltimore: Paul H. Brooks Pub. Co.
52. Morrison, K., & Rosales-Ruiz, J. (1997). The effect of object permanence on task performance and stereotypy in a child with autism. Research in Developmental Disabilities, 18(2), 127-137.
53. Wolery, M. (1994). Designing inclusive environments for young children with special needs. In M. Wolery & J. S. Wilbers (Eds). Including children with special needs in early childhood programs (pp. 97-118). Washington, DC: National Association for the Education of Young Children.
54. Dunst, C. H. Herter, S., & Shields, H. (2000). Interest-based natural learning opportunities. Young Exceptional Children, Monograph Series No 2, 27-48. Longmont, CO: Sopris West.
55. Van Camp, C. M., Vollmer, T. R., & Daniel, D. (2001). A systematic evaluation of stimulus preference, response effort, and ABI in the treatment of automatically reinforced self-injury. Behavior Therapy, 32, 603-613.
56. Bricker, D., Pretti-Frontczak, K., & McComas, N. (1998). An activity-based approach to early intervention, 2nd edition. Baltimore: Paul H. Brookes Pub. Co.
57. Noonan, M. J., & McCormick, L. (2006). Young children with disabilities in natural environments: Methods and procedures. Baltimore: Paul H. Brooks Pub. Co.
58. Sandall, S. r., & Schwartz, I. S. (2008). Building blocks for teaching preschoolers with special needs, 2nd edition. Baltimore: Paul H. Brookes Pub. Co.
59. Ahearn, W. H., Clark, K. M., DeBar, R, & Florentino, C. (2005). On the role of preference in response competition. Journal of Applied Behavior Analysis, 38, 247-250.