

Autism and Child Psychopathology Series
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Handbook of Assessment and Diagnosis of Autism Spectrum Disorder

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About the Editor

Johnny L. Matson, Ph.D. is Professor and Distinguished Research Master in the Department of Psychology at Louisiana State University, Baton Rouge, LA, USA. He has also previously held a professorship in psychiatry and clinical psychology at the University of Pittsburgh. He is the author of more than 800 publications including 41 books. He also serves as Founding Editor-in-Chief of three journals: *Research in Developmental Disabilities* (Elsevier), *Research in Autism Spectrum Disorders* (Elsevier), and *Review Journal of Autism and Developmental Disorders* (Springer).

Introduction

Comorbidity is an area of great importance in autism research. One of the most common co-occurring problems with autism spectrum disorder (ASD) is challenging behaviors. The aim of this chapter is to discuss challenging behaviors in the context of ASD. We need to define challenging behaviors to better understand what constitutes a challenging behavior. One of the difficulties in assessing challenging behaviors is in deciding what is a challenging behavior and what is not a challenging behavior. Often challenging behaviors are subjective. They cause problems to an individual themselves or others around them, and then become challenging. One behavior may constitute a challenging behavior for one individual with ASD or their caregivers and may not be a behavior of concern for another individual with ASD and their caregivers. In order to provide the best treatment for individuals with ASD, it is imperative that a thorough assessment is conducted. Many methods have been developed in order to assess challenging behaviors. This chapter reviews the measures that have been used to assess the maintaining

variables of challenging behaviors. These are the measures used for the functional assessment of challenging behaviors. An additional aim of this chapter is to provide a review of the types of scales that are available to identify whether challenging behaviors are present.

Definition of Challenging Behaviors

Challenging behavior is defined as “culturally abnormal behavior(s) of such intensity, frequency or duration that the physical safety of the person or others is likely to be placed in serious jeopardy, or behavior which is likely to seriously limit or delay access to and frequent use of ordinary community facilities” (Emerson, 2001, p.3). Challenging behavior can be a cause of difficulty for family, staff, society, and importantly the individual themselves. Challenging behaviors include self-injurious behavior (SIB), stereotypic or repetitive behaviors, aggressive behaviors towards others, destructive behaviors, and disruptive behaviors.

Challenging behaviors also include behaviors such as toileting difficulties and feeding problems. All too often these types of behaviors are ignored when considering problem behaviors. Toileting and feeding problems can be very challenging for parents and caregivers to deal with. Some individuals may have many toileting accidents a day, or may engage in behaviors such as

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smearing of feces. With regard to feeding problems, an individual may engage in food selectivity, where only certain foods or types of foods are eaten. They may also engage in mealtime problem behaviors, including food refusal, aggression, and even self-injurious behavior in mealtime situations. They are also challenging for the individual. Individuals who cannot toilet independently may find that lacking this skill may impact on their quality of life. For an individual who is engaging in pica, where they are eating inedible objects, or rumination, where they are regurgitating food, these feeding problems can severely affect an individual's physical health and well-being.

Importance of Studying Challenging Behaviors

More research is needed on challenging behaviors in individuals with ASD. Challenging behaviors can severely impact on an individual's self-esteem and their quality of life. They can interrupt one living an independent life. For some individuals, challenging behavior is maintained by environmental events, such as escape from a demand, or attention from others. At times, behavior can be maintained by physical events. Challenging behaviors can be caused by an individual experiencing pain. Challenging behaviors may be a reaction to physical pain caused by medical issues, such as gastrointestinal symptoms and epilepsy. Gastrointestinal symptoms, such as acid reflux, abdominal pain, bloating, diarrhea, nausea, and constipation, are common in individuals with ASD (Mannion & Leader, 2014; Mannion, Leader, & Healy, 2013). Gastrointestinal symptoms or other sources of discomfort could be a maintaining variable for challenging behavior that does not appear to be maintained by environmental events. It is very important to study challenging behaviors. It is important that the source of challenging behavior is identified for pain attenuation.

Individuals with ASD can experience psychological symptoms or disorders, as well as ASD. It is important to study challenging behavior in order to better understand the role that comorbid psychopathology can play in individuals with

ASD. An individual with ASD may present with challenging behaviors, such as aggression, self-injurious behavior, or stereotyped behavior, due to internal events that they are experiencing. These could include depressed symptoms, anxiety symptoms, or other feelings or emotions.

Verbal ability is an important aspect to consider when investigating challenging behaviors. If an individual is nonverbal, they may communicate through challenging behaviors. If they want to get someone's attention but cannot ask for it, they may engage in an inappropriate behavior. If they want to take a break or access a tangible item, they may display challenging behaviors. It is also important to consider challenging behaviors that are communicating a person is in pain, or that a person is experiencing symptoms of anxiety. All behavior is communication, and it is up to researchers and practitioners to better understand what an individual with ASD is communicating through different types of challenging behaviors.

Treatment is a key reason why we need to research challenging behaviors. If we can understand what is causing a challenging behavior, and what increases and decreases the likelihood of a behavior occurring in the future, effective treatment packages can be designed. No two individuals with ASD are alike. Similarly, no two behaviors are exactly alike. While a behavior may look topographically similar to a behavior emitted by another individual, its function may be completely different. Functional assessment is a way in which the variables maintaining a challenging behavior can be investigated and explored. When functional assessment is accurate, the most effective treatment intervention can be provided. Therefore it is extremely important that consideration is given when choosing a measure to assess the function of a challenging behavior.

Functional Assessment of Challenging Behaviors

A variety of different measures exist that are designed to determine the maintaining variables of challenging behaviors. The function of a behavior needs to be established before an effective

treatment plan can be designed. Behaviors can be maintained by positive reinforcement, negative reinforcement, and by automatic reinforcement. Some behaviors are maintained by attention from others, whereby someone else being present or paying attention can be a variable that can maintain a behavior. Behaviors can be maintained by access to tangible items. Behaviors can be maintained where an individual wants to escape from a situation that they find aversive, such as a task demand. Behaviors can also be maintained automatically, whereby social variables do not affect the occurrence of the behavior. Individuals may receive sensory input by engaging in some typographies of challenging behavior, and thus are automatically reinforced. Behaviors can also be maintained by physical pain, whereby an individual engages in a particular behavior because of physical pain. Some challenging behaviors are maintained by multiple functions. In what follows, there is a discussion of a number of different functional assessment measures that can be used with individuals with ASD who display problem behavior.

Functional Assessment Measures

Questions About Behavioral Function (QABF)

The Questions about Behavioral Function (QABF; Matson & Vollmer, 1995) is a 25-item measure. Informants are asked to rate an individual's behavior from "X"="Does Not Apply," "0"="Never," "1"="Rarely," "2"="Sometimes," and "3"="Often." There are five functions of behavior, including Attention, Escape, Non-social, Physical, and Tangible. Attention is scored based on items 1, 6, 11, 16, and 21 and an example of an item is "Does he/she seem to be saying 'come see me' or 'look at me' when engaging in the behavior?" Escape includes items 2, 7, 12, 17, and 22 and an example of an item is "Does he/she seem to be saying 'leave me alone' or 'stop asking me to do this' when engaging in the behavior?" Non-social includes items 3, 8, 13, 18, and 23 and an example of an item is "Does he/she

seem to enjoy the behavior, even if no one is around?" Physical includes items 4, 9, 14, 19, and 24 and an example of an item is "Does the behavior seem to indicate to you that he/she is not feeling well?" Tangible includes items 5, 10, 15, 20, and 25 and an example of an item is "Does he/she seem to be saying 'give me that (toy, item, food)' when engaging in the behavior?" The function that receives the highest score is deemed to be the function maintaining the behavior.

Matson, Tureck, and Rieske (2012) conducted a review on the current status of the QABF. The authors commented that the QABF can be completed and scored in 20 min. The rationale for the QABF is discussed, alongside the psychometrics, and behaviors and corresponding functions. The authors commented that "The QABF is the scale with the best psychometrics, at this point" (p.632). Paclawskyj, Matson, Rush, Smalls, and Vollmer (2000) provided psychometric data for the QABF, examining test-retest, inter-rater, and internal consistency. Test-retest reliability was examined with 34 participants with profound intellectual disability. In order to examine inter-rater reliability, an additional 23 male participants were included, who were mainly in the profound and severe levels of intellectual disability. Test-retest reliability was found to be high. Inter-rater reliability was found to be good, with total agreement ranging from 69.67 to 95.65 %. Paclawskyj et al. (2000) found that "the internal consistency and factor structure demonstrate that the QABF consists of five underlying factors that are statistically significant and clinically meaningful" (p.228). Nicolson, Konstantinidi, and Furniss (2006) examined the psychometric properties of the QABF in 40 individuals, aged between 10 and 26 years with autism and/or severe learning difficulties and severe challenging behavior. There was inter-rater agreement in primary function of the behavior for 59 % of the QABFs. Inter-rater agreement was found to be higher for higher-rate behaviors and lower for lower-rate behaviors. Internal consistency was found to be high.

Paclawskyj, Matson, Rush, Smalls, and Vollmer (2001) compared the convergent validity of the QABF and analogue functional analyses.

The agreement between the QABF and analogue functional analyses was found to be 56.3 %. In support, Watkins and Rapp (2013) examined the convergent validity of the QABF and functional analysis in six participants with ASD, aged from 9 years to 19 years. For 5 out of 6 participants, both QABF and functional analyses identified non-social reinforcement as the function of behavior.

Healy, Brett, and Leader (2013) compared the QABF with experimental functional analysis in 32 individuals with autism, ranging in age from 6 years to 19 years. The QABF and functional analysis had exact agreement for 24 participants, which was a concordance rate of 75 %. Partial agreement was found for 6 out of the other 7 participants. Through functional analysis and the QABF, it was found that self-injurious behavior was mostly maintained by automatic reinforcement and escape from demands. Stereotypy was mostly maintained by automatic reinforcement. Aggressive/destructive behavior was mostly maintained by escape and access to tangibles. The authors commented that the QABF addresses some of the disadvantages of the use of functional analysis as “it does not involve invoking a challenging behavior, it can be used to assess low-rate behaviors, it is easily administered and scored, it has demonstrated good reliability and validity” (p.80).

Matson and Wilkins (2009) examined the reliability, frequency, and related characteristics of 95 adults with intellectual disability. Functional assessment of high-rate and low-rate challenging behaviors were investigated. Inter-rater reliability was found to be higher for behaviors that occurred more frequently. The reliability of the function of a behavior appeared to be affected by frequency and type of challenging behavior. For the individual items, there was higher inter-rater reliability for aggression than self-injurious behavior.

Matson et al. (2005) assessed the behavioral function of feeding problems using the QABF in 125 adults, aged 16–84 years, who were primarily in the profound range of intellectual disability. Five different types of feeding problems were identified. These were mealtime behavior problems (e.g., aggression and self-injurious behavior), food stealing behavior, pica, rumination, and food refusal. A QABF was completed for each

identified feeding problem. Participants who engaged in food refusal received significantly higher scores on the escape subscale of the QABF than those engaging in rumination, pica, and food stealing. Those who engaged in mealtime problem behaviors also had significantly higher scores on the escape subscale than those engaging in pica or food stealing, but not food refusal. Those who engaged in rumination received significantly higher escape subscale scores than those who engaged in food stealing. Participants engaging in pica received significantly higher scores on the non-social subscale than mealtime problem behaviors, food stealing, and food refusal. Participants with rumination scored significantly higher on the non-social subscale than those engaging in mealtime problem behaviors, food stealing, and food refusal, but not pica. Participants who engaged in food refusal scored significantly higher on the physical subscale than those with mealtime problem behaviors, food stealing, and pica, but not rumination. Those with rumination and mealtime problem behaviors scored significantly higher on the physical subscale than those with food stealing. Participants with food stealing behavior scored significantly higher on the tangible subscale than those engaging in pica and rumination.

Wilke et al. (2012) examined functional assessment of stereotypy using the QABF with 53 children with ASD. Out of 39 assessments that yielded interpretative results, it was found that automatic reinforcement was the primary source of reinforcement for 35 participants. Therefore, 90 % of participants displayed stereotypy that was maintained by automatic reinforcement. Automatic reinforcement was found to be the most common maintaining variable for both vocal and non-vocal stereotypy.

Adaptations have been made to the QABF. These include a shortened version and versions using different languages. Singh et al. (2009) shortened the QABF from 25 items to 15 items and investigated if a short form (QABF-SF) was psychometrically valid and reliable. The QABF-SF was administered to 75 individuals with intellectual disabilities, aged from 19 to 85 years of age. Internal consistency, test-retest

reliability, and inter-rater reliability were investigated. The short form retained the same five-factor structure as the QABF.

Simó-Pinatella et al. (2013) adapted the QABF into Spanish and validated its use with Spanish-speaking informants. Participants were 300 individuals with intellectual disabilities. The authors concluded that the Spanish version of the QABF had good psychometric properties. Similarly, other language adaptations have been made. Dixon, Jang, Chung, Jung, and Matson (2013) translated the QABF into Korean, becoming the QABF-K. Participants were 153 individuals with developmental disabilities and challenging behavior, ranging in age from 2 years to 38 years of age. The QABF-K showed good internal consistency. A total of 40 participants participated in an investigation of test-retest reliability. The QABF-K was found to have good test-retest reliability.

Questions About Behavior Function-Mental Illness (QABF-MI)

The Questions about Behavior Function-Mental Illness (QABF-MI; Singh et al., 2006) is an adaptation of the QABF for use for individuals with mental illness who engage in challenging behaviors. Singh et al. (2006) investigated the validity of the QABF-MI in 135 individuals with serious and persistent mental illness and maladaptive behavior. Diagnoses included schizophrenia spectrum disorders, depressive disorders, and anxiety disorders. The QABF-MI contains 25 items, which are the same number as the QABF. Items were reworded in the QABF-MI to apply to individuals with mental illness. Items were found to load onto five factors. Inter-rater agreement and test-retest reliability coefficients were found to be high. The authors commented on the need to use other assessments in conjunction with the QABF-MI for some individuals as “therapists will need to be careful in not relying exclusively on the QABF-MI in identifying functions of the maladaptive behavior particularly in individuals with comorbid personality disorders, such as borderline personality disorder or antisocial personality disorder” (p. 748).

Functional Assessment for Multiple Causality (FACT)

The Functional Assessment for multiple Causality (FACT; Matson, Dixon, & Kuhn, 2003) is a 35-item measure designed to determine the function of a behavior where two functions seem to be likely to be maintaining the behavior. These two functions could be determined from a measure like the QABF or the Functional Analysis Screening Tool (FAST; Iwata, DeLeon, & Roscoe, 2013). The informant is asked to write the letter, shown in the parenthesis that corresponds to the informant’s forced choice. An example of a question would be “Engages in the behavior more (A) to get attention, or more (P) because he/she is in pain, or (N) neither?” There are five functions: Attention (A), Escape (E), Non-social (S), Physical (P), and Tangible (T). The frequency and the percentage of each function are calculated. The frequencies for each letter are totalled and graphed under the corresponding function subscale. The percentage column indicates the percentage of presentations each behavioral function was positively endorsed. The FACT is a very useful measure for use if it appears that a behavior is maintained by two or more functions. By determining what function specifically is maintaining the behavior most strongly, a more effective behavior support plan can be designed. Where a behavior is determined to be maintained by multiple functions, one function can be designated as primary, while another is designated as having a secondary function, using the FACT.

Matson et al. (2003) developed the FACT and examined its factor structure. In Study 1, participants were 297 individuals with intellectual disabilities, ranging in age from 9 years to 85 years. Internal consistency across subscales was found to be excellent. It was found that items loaded onto five factors. Study 2 was conducted to replicate the factor analysis and to reassess internal consistency. In Study 2, participants were 197 individuals with intellectual disabilities, ranging from 16 years to 85 years of age. Internal consistency was found to range from 0.88 to 0.92, which indicated good to high estimates of reliability. The authors concluded that “one may infer that the forced-choice format of

the FACT possesses good initial estimates of reliability and validity” (Matson et al., 2003, p.494).

Functional Analysis Screening Tool (FAST)

The Functional Analysis Screening Tool (FAST; Iwata et al. 2013) is a measure used to identify factors that may influence problem behaviors. It is recommended to be used for screening as part of a comprehensive functional analysis. It is also recommended that it is administered to several individuals who interact with the client on a regular basis. There are 16 items included in the FAST. Each item is rated “Yes,” “No,” or “N/A.” There are four potential sources of reinforcement: Social (attention/preferred items), Social (escape from tasks/activities), Automatic (sensory stimulation), and Automatic (pain attenuation). Each item that is rated as “Yes” should be circled in the scoring summary and the number of items that are circled is entered in the Total column. The potential source of reinforcement that receives the highest number of “Yes” responses is indicated to be the maintaining source of reinforcement for the problem behavior.

Social (attention/preferred items) contains items 1–4, and an example of an item is “Does the problem behavior occur when the person is not receiving attention or when caregivers are paying attention to someone else?” Social (escape from tasks/activities) contains items 5–8, and an example of an item is “Does the person usually fuss or resist when (s)he is asked to perform a task or to participate in activities?” Automatic (sensory stimulation) contains items 9–12, and an example of an item is “Does the problem behavior occur even when no one is nearby or watching?” Automatic (pain attenuation) contains items 13–16 and an example of an item is “Is the problem behavior cyclical, occurring for several days and then stopping?”

Prior to the 16 items of the FAST, there is also an Informant-Client Relationship section and a Problem Behavior Information section. The Informant-Client Relationship section asks the informant to indicate their relationship to the cli-

ent, the length of time that they have known the client, whether they interact with the client daily, and in what situations that they usually interact with the client. The Problem Behavior Information section asks about the type of problem behavior, the frequency, severity, the situations where the problem behavior is most and least likely to occur, what usually happens to the person right before and after the problem behavior occurs, and the current treatment.

Iwata et al. (2013) investigated the reliability and validity of the FAST. In Study 1, the authors assessed inter-rater reliability of the FAST by administering the tool to pairs of raters assessing the same client. Data was collected for 151 individuals, ages 5–53 years, with a diagnosis of intellectual disability or autism, and problem behavior. Informants were parents, relatives, teachers, teacher aides, and direct care staff. Overall inter-rater agreement for the FAST was found to be 71.5 %, which the authors found to be moderate at best, using the 80 % criterion typically considered acceptable for direct observation measures. Agreement for individual items ranged from 53.3 to 84.5 %. Outcome agreement, which is the extent to which two informants’ most frequent yes answers were for the same function, was found to be 64.8 %.

In Study 2, Iwata et al. (2013) compared 59 Functional Analysis (FA) to FAST data of the individuals who participated in Study 1. Overall correspondence between FAST and functional analysis outcomes was found to be 63.8 %. The highest degree of correspondence was found when results of the functional analysis indicated that the problem behavior was maintained by social-positive reinforcement. The authors emphasized that “the FAST is not an approximation to a FA of problem behavior; it is simply one way to gather information during an interview” (p.283).

Motivation Assessment Scale (MAS)

The Motivation Assessment Scale (MAS; Durand & Crimmins, 1998) is a measure designed to access what factors are motivating a particular problem behavior. There are four areas: Sensory,

Escape, Attention, and Tangible. In each function area, there are four items. The function areas are labeled and the items for each are grouped together. An example of a Sensory function item is “Would this behavior occur continuously if your child was left alone for long periods of time (e.g., one hour)?” An example of an Escape function item is “Does this behavior occur following a command to perform a difficult task?” An example of an Attention function item is “Does this behavior occur when you are talking to other persons in the room?” An example of a Tangible function item is “Does this behavior ever occur to get a toy, food, or game that they had been told they can’t have?” Items are rated on a seven-point scale from 0 to 6, including “Never,” “Almost Never,” “Seldom,” “Half The Time,” “Usually,” “Almost Always,” and “Always.” For each function area the numbers are added. The function area with the highest score suggests the function of the behavior.

Paclawskyj et al. (2001) examined the convergent validity between the MAS and the QABF, and also compared them to analogue functional analyses in 13 participants with intellectual disabilities. The agreement between the MAS and QABF was 61.5 %. The agreement between the MAS and analogue functional analyses was 43.8 %. The authors concluded that the two checklists have similar content dimensions. Duker and Sigafos (1998) examined the reliability and construct validity across three typographies of behaviors in individuals with intellectual disabilities. It was found that reliability and internal consistency were found to be poor. The authors suggested that the psychometric properties of the MAS may be related to the typographies of the problem behaviors involved.

Holden and Gitlesen (2008) investigated the relationship between psychiatric symptomatology and motivation of the most severe challenging behavior in adults with intellectual disabilities. It was found that automatic/sensory reinforcement was the main function of challenging behavior in 21 % of participants, while in 33.6 % of individuals, escape from demands was the main function, in 20.2 % of individuals, attention was the main function, and in 31.9 % of individuals,

tangible reinforcement was the main function. Individuals who were endorsed by informants on the item “Less able to use self-care skills, such as dressing, bathing, using the toilet, and cooking,” were found to be associated with automatic/sensory reinforcement. “Broken sleep, waking up for an hour or more, before falling back to sleep” was associated with escape. “Change of weight, enough to make clothing fit less well” was found to be associated with escape also, as well as tangible reinforcement. “Sad or ‘down’ (noticed for at least 3 days in the past 4 weeks)” was associated with attention. “Repeated actions, such as checking over and over that a door has been locked, or having to do things in a particular order” was also associated with attention, and tangible reinforcement.

Motivation Analysis Rating Scale (MARS)

The Motivation Analysis Rating Scale (MARS; Wieseler, Hanson, Chamberlain, & Thompson, 1985) is also referred to as the Contingency Analysis Questionnaire (CAQ). It consists of 6 items, ranging from “Never” to “Almost Always,” and the items represent the following functions: Social and tangible positive reinforcement, social and situational escape, and self-stimulation (Rojahn, Schroeder, & Hoch, 2007). Little research has been conducted to examine its psychometric properties (Sipes & Matson, 2012). No other studies have been published besides the original Wieseler et al. (1985) article (Belva, Hattier, & Matson, 2013).

Problem Behavior Questionnaire (PBQ)

The Problem Behavior Questionnaire (PBQ; Lewis, Scott, & Sugai, 1994) is a 15-item measure designed to determine the function of a behavior. Items are rated by percent of the time and are rated 0-“Never,” 1-“10 %,” 2-“25 %,” 3-“50 %,” 4-“75 %,” 5-“90 %,” and 6-“Always.” Informants are asked to keep in mind a typical episode of the

problem behavior, and to circle the frequency at which the statements are true. A score is then circled for each question, and scores are summed into total scores. Possible functions include Peers Escape, Peers Attention, Adults Escape, Adults Attention, and Setting Events. Peers Escape includes items 3, 10, and 14 and an example of a question is “During a conflict with peers, if the student engages in the problem behavior do peers leave the student alone?” Peers Attention includes items 4, 7, and 11 and example of an item is “When the problem behavior occurs, do peers verbally respond or laugh at the student?” Adults Escape includes items 1, 9, and 13 and an example of an item is “Does the problem behavior occur and persist when you make a request to perform a task?” Adults Attention includes items 2, 6, and 12 and an example of an item is “When the problem behavior occurs, do you redirect the student to get back to task or follow rules?” Setting Events includes items 5, 15, and 18 and an example of an item is “Is the problem behavior more likely to occur following unscheduled events or disruptions in classroom routines?”

Scales to Identify Challenging Behaviors

A number of different scales are available to identify the types of challenging behaviors an individual presents with. There are measures designed for babies and infants, children, adolescents, and adults. Some measures have been designed specifically for individuals with ASD, while other scales were developed for use with individuals with intellectual disabilities. Some scales have been developed for the general population, but have been validated for use with individuals with ASD. The following outlines a number of these scales that have been designed to identify the type of challenging behaviors that an individual presents with. Some measures identify the frequencies and severity of specific types of challenging behaviors. Others deliver mean and total scores. Some measures have clinical cut-off points. There is much choice available for researchers and it is important that researchers are adequately pre-

pared in their knowledge about the variety of measures available in order to choose the most suitable measure for their purposes.

Baby and Infant Screen for Children with aUtism Traits (BISCUIT-Part 3)

The Baby and Infant Screen for Children with aUtism Traits (BISCUIT-Part 3; Matson, Boisjoli, & Wilkins, 2007) is a measure designed to assess challenging behaviors in toddlers between 17 and 37 months in age. It contains 15 items about stereotypic behavior, aggressive/disruptive behavior, and self-injurious behavior. Items are rated as (0) not a problem or impairment; not at all, (1) mild problem or impairment, or (2) severe problem or impairment. Items are rated as to the extent that they are a recent problem.

Matson et al. (2009) established the reliability and the item content of the BISCUIT-Part 3. Participants were 276 children ages 17–37 months who were identified as being at risk for developmental and/or physical disabilities. The internal reliability coefficient of the BISCUIT-Part 3 was 0.91. Rojahn et al. (2009) investigate the cut-offs, norms, and patterns of problem behaviors on the BISCUIT-Part 3. Participants were 312 toddlers with ASD. In Study 1, cut-offs were derived for the scale, which are No/minimal impairment, Moderate impairment, and Severe impairment. In Study 2, the frequency of challenging behaviors in toddlers was examined. A control group of atypically developing toddlers without a diagnosis of ASD was included. Total problem behaviors were greater for those with autism, followed by those with PDD-NOS, and those with no ASD diagnosis. Toddlers with autism were more likely to receive higher subscales and total scores when compared to toddlers with PDD-NOS. Toddlers with autism were more likely to receive scores in the severe cut-off range than toddlers with PDD-NOS or atypically developing toddlers.

In support, Matson, Fodstad, Mahan, and Rojahn (2010) investigated the cut-off, norms, and patterns of problem behaviors on the BISCUIT-Part 3 in 644 infants. For the total

behavior score, it was found that 6.2 % of toddlers were in the severe impairment range. For the aggressive/destructive behavior subscale, 7 % were in the severe impairment range. For the stereotypies subscale, 2.5 % of toddlers were in the severe impairment range. For the self-injurious behavior subscale, 2.8 % of toddlers were in the severe impairment range. Matson, Boisjoli, Rojahn, and Hess (2009) conducted a factor analysis of the BISCUIT-Part 3. The factor analysis yielded a three-factor structure. Matson, Boisjoli et al. (2009) also examined the differences in challenging behaviors in those with and without ASD. The ASD group were 270 participants diagnosed with ASD. The control group were 505 toddlers with developmental delays, but without ASD. Infants and toddlers with ASD scored significantly higher on all factors of the BISCUIT-Part 3 compared to children without an ASD diagnosis.

Horovitz and Matson (2013) developed age-based scoring procedures for the BISCUIT-Part 3. Separate cut-off scores were developed for individuals with ASD and for those with developmental delays but without ASD. Participants were 3022 infants and toddlers. Cut-offs were derived for three age groups: (1) 17–23 months, (2) 24–30 months, and (3) 31–37 months. The authors found that as children with ASD grow older, challenging behaviors become more frequent and severe. Fodstad, Rojahn, and Matson (2012) examined how challenging behaviors affect different age groups. Participants were divided into four age groups: 12–18 months, 19–25 months, 26–32 months, and 33–39 months. There were 297 children in the ASD group, and 327 in the non-ASD, atypically developing group. It was found that younger children engaged in less severe challenging behaviors, and the severity of challenging behaviors increased as infants and toddlers aged. There were increases in Aggressive/Destructive Behaviors and Stereotypic Behaviors beginning around 26–32 months of age.

Matson, Boisjoli, and Mahan (2009) explored the relationship between communication and challenging behaviors. Lower levels of receptive communication were associated with higher lev-

els of stereotypic behavior, and self-injurious behavior, and to a lesser extent, aggressive/disruptive behavior. Medeiros, Kozlowski, Beighley, Rojahn, and Matson (2012) investigated the effect of developmental quotient (DQ) and diagnostic criteria on challenging behaviors in toddlers with developmental disabilities. The relationship between developmental quotient and challenging behaviors varied depending on whether a child received a diagnosis of autistic disorder, PDD-NOS, or atypical development. Toddlers with autistic disorder and PDD-NOS exhibited more challenging behaviors with higher total DQ.

Matson et al. (2011) investigated the effects of symptoms of comorbid psychopathology on challenging behaviors in infants and toddlers. Aggressive behaviors and stereotypies were significantly different for those with no/minimal impairment and moderate/severe impairment in Inattention/Impulsivity. Aggressive behaviors, stereotypies, and SIB were all significantly different in the no/minimal impairment and moderate/severe impairment in Avoidance behavior. For the anxiety/repetitive behavior scores, stereotypies were significantly lower in the no/minimal impairment group than the moderate/severe impairment group. There were significant differences in aggressive behaviors, stereotypies, and SIB between the no/minimal impairment and the moderate/severe impairment in Tantrum behavior. Participants with higher rates of eating and sleeping problems displayed greater aggressive/destructive behavior and stereotypies, than those with lower rates of eating and sleeping problems. Participants with high scores in Anxiety/Repetitive behavior displayed greater levels of stereotypy.

Cervantes, Matson, Tureck, and Adams (2013) investigated the relationship between comorbid anxiety symptom severity and challenging behaviors in 385 infants and toddlers with ASD. Participants were divided into two groups based on their Anxiety/Repetitive Behavior score, with 291 participants in the no/minimal impairment group, and 94 participants with moderate/severe impairment. Children with moderate/severe anxiety symptoms displayed significantly

more challenging behaviors than children with no/minimal impairment in anxiety symptoms. There were significant differences in 13 of the 15 challenging behaviors, with the moderate/severe anxiety group scoring significantly higher on challenging behaviors in comparison to the no/minimal impairment anxiety group. Autism symptom severity was entered as a co-variate and it was significant for the following behaviors: “repeated and unusual vocalizations,” “repeated and unusual body movements,” and “unusual play with objects.” Toddlers in the moderate/severe impairment in anxiety symptoms scored significantly higher than the no/minimal impairment in 9 out of 10 aggressive/destructive behaviors.

Hattier, Matson, Belva, and Horovitz (2011) compared challenging behaviors in children with ASD and atypical development. It was found that toddlers in the ASD group exhibited a higher percentage of challenging behaviors than those in the atypically developing group. Sipes, Rojahn, Turygin, Matson, and Tureck (2011) used the BISCUIT-Part 3 to compare problem behaviors in atypically developing infants and toddlers. Participants were divided into five different groups: Down syndrome, developmental delay, prematurity, cerebral palsy, and seizure disorder. No significant differences were found in challenging behaviors between the groups. It was found that aggressive and destructive behaviors were more common than SIB or stereotyped behavior.

Horovitz, Matson, Rieske, Kozlowski, and Sipes (2011) investigated the relationship between race and challenging behaviors in 453 Caucasian and 409 African American infants and toddlers. Significant difference were found for the following aggressive/destructive behaviors: kicking objects, throwing objects at others, aggression towards others, pulling others' hair, and property destruction, with African American toddlers scoring higher on these items than Caucasian toddlers. No significant differences were found for SIB or stereotypic behavior. The authors concluded that cultural factors need to be taken into account when assessing challenging behaviors in infants and toddlers with ASD.

Williams et al. (2013) investigated the effect of the DSM-5 criteria on challenging behaviors in children that no longer meet the diagnostic criteria for ASD. Participants were divided into three groups: (1) 501 participants who maintained an ASD diagnosis using the DSM-5 criteria, (2) 439 toddlers who failed to meet DSM-5 criteria, but did meet DSM-IV-TR criteria, and (3) 2399 toddlers with atypical development. Large effect sizes were found between the atypical development group and the DSM-5 group on total problem behaviors, aggressive/destructive behaviors, SIB, and stereotyped behaviors. Large effect sizes were found between the DSM-IV-TR group and the DSM-5 group on total problem behaviors and stereotyped behaviors. Medium effect sizes were found between the DSM-IV-TR group and the DSM-5 group on aggressive/destructive behaviors and SIB. Those who no longer met criteria for ASD with the DSM-5 still displayed significantly more challenging behaviors than those who were atypically developing. While a toddler may no longer met criteria for ASD with the DSM-5, it is important for practitioners and researchers to recognize that challenging behaviors are occurring at higher rates in these children than other children with atypical development, who never met the DSM-IV-TR criteria for ASD.

Autism Spectrum Disorders-Behavior Problems for Children (ASD-BPC)

The Autism Spectrum Disorders-Behavior Problems for Children (ASD-BPC; Matson & González, 2007) is an 18-item scale used to determine the frequency of behavior problems in children with ASD. Informants are asked to rate each item from “0=Not a problem or impairment; not at all,” “1=Mild problem or impairment,” and “2=Severe problem or impairment.” The scale is composed of two dimensions: an externalizing scale and an internalizing scale. Examples of items included in the scale are “Poking him/her self in the eye,” “Kicking objects (e.g., doors, walls),” and “Repeated and

unusual body movements (e.g., hand flapping, waving arms, etc.).”

Matson, González, and Rivet (2008) investigated the reliability and factor structure of the ASD-BPC. Participants were 218 children and adolescents aged between 2 and 16 years. An ASD group included 110 children and adolescents and a control group included 108 children and adolescents without a diagnosis of ASD. The mean inter-rater reliability was found to have fair clinical significance, with a mean agreement of 92 %, which is excellent clinical significance. Mean test-retest reliability was found good clinical significance, with a mean agreement of 92 %, which is excellent clinical significance. Items loaded onto two factors: externalizing behavior and internalizing behavior.

Mahan and Matson (2011) investigated the convergent and discriminant validity of the ASD-BPC against the Behavioral Assessment System for Children, Second Edition (BASC-2). Participants were 49 children and adolescents with ASD, aged from 4 to 16 years. The ASD-BPC externalizing scale demonstrated convergent validity with the BASC-2 hyperactivity and aggression subscales. The ASD-BPC internalizing scale demonstrated convergent validity with the BASC-2 atypicality subscale. The ASD-BPC and BASC-2 also demonstrated discriminant validity for the ASD sample.

Jang, Dixon, Tarbox, and Granpeesheh (2011) used the ASD-BPC to investigate the relationship between challenging behavior and autism symptom severity in 84 children with ASD, ranging from 29 to 218 months. All children were receiving Early Intensive Behavioral Intervention (EIBI). It was found that 94 % of participants displayed challenging behavior. The most common challenging behavior was repeated and unusual vocalizations, where 73.8 % of participants displayed this behavior. This was followed by unusual play with objects, where 57.1 % of participants emitted this behavior. Leaving the supervision of caregiver was the third most common challenging behavior, where 56 % of participants displayed this behavior. Significant differences were found in challenging behaviors, depending on autism symptoms severity. A num-

ber of items were found to be significantly different between the mild and severe autism symptoms groups. These are unusual play with objects, playing with own saliva, aggression towards others, repeated and unusual vocalizations, and repeated and unusual body movements. Smearing or playing with feces and property destruction were found to be significantly different between the severe and moderate ASD groups. It was found that the presence of challenging behavior was predicted by autism severity.

Matson, Mahan, Hess, Fodstad, and Neal (2010) examined how challenging behaviors progress as children with ASD get older, using the ASD-BPC. Participants were 167 children with ASD, aged 3–14 years. Children were divided into three different age groups: (1) young children (1–6 years), (2) children (7–10 years), and (3) young adolescents (11–14 years). No significant differences were found between the different age groups in terms of challenging behavior. Therefore, it appears that challenging behaviors are stable over time as children age and move into adolescence.

Kozlowski, Matson, and Rieske (2012) investigated gender effects on challenging behaviors in children with ASD. The ASD-BPC was conducted with 291 children, aged 2–17 years. Children were assigned to four groups: (1) male with ASD, (2) male without ASD, (3) female with ASD, and (4) female without ASD. It was found that individuals with ASD displayed more challenging behavior than individuals without ASD. In general, males and females did not differ in challenging behavior presentation. However, females with ASD were more likely to engage in yelling or shouting at others than males or females without ASD. Males with ASD did not differ from other groups in exhibiting yelling or shouting at others. Males with ASD displayed significantly more throwing objects at others than females with ASD.

Chung et al. (2012) used the ASD-BPC to examine cross-cultural differences in challenging behavior between Israel, South Korea, the UK, and the USA. The aim of the study was to examine differences between cultures in the presence and severity of challenging behaviors. Participants

were 285 children with ASD, aged between 2 and 16 years. A large degree of consistency was found between the USA and South Korea and Israel. Where there were differences, the USA had higher endorsements of the presence and severity of challenging behavior than South Korea or Israel. It was found that nearly half of the challenging behaviors differed between the USA and the UK. The UK had higher endorsements in the presence and the severity of challenging behaviors when compared to the USA.

Autism Spectrum Disorders-Behavior Problem for Adults (ASD-BPA)

The Autism Spectrum Disorders-Behavior Problem for Adults (ASD-BPA; Matson, Terlonge, & González, 2006) was designed to assess problem behaviors in adults with ASD. It contains 19 items. Items are rated as 0 (not a problem or impairment, not at all), or 1 (some problem or impairment). Items are rated as to the extent that they are a recent problem. There are four subscales, including Aggression/Destruction, Stereotypy, Self-Injurious Behavior (SIB), and Disruptive Behavior.

Matson and Rivet (2007) assessed the validity of the ASD-BPA by comparing it to the Behavior Problems Inventory (BPI-01). Participants were 27 adults with intellectual disabilities, aged from 29 to 87 years. In addition to intellectual disabilities, 8 participants had a diagnosis of autistic disorder and 10 participants had a diagnosis of Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS). All ASD-BPA subscales were significantly correlated with the BPI-01 subscales. Moderate correlations were found for the aggression and destruction subscales. Strong correlations were found for the self-injury subscales and the stereotypic and disruptive behaviors subscales. Total scores of the ASD-BPA and the BPI-01 were strongly correlated. The ASD-BPA Disruptive Behavior subscale was strongly correlated with the BPI-01 total score. A moderate correlation was found between the ASD-BPA Self-Injurious Behavior

(SIB) subscale and the BPI-01 total score. Matson and Rivet (2008b) established the psychometric properties of the ASD-BPA. Participants were 171 adults with ASD and intellectual disabilities, ranging in age from 16 to 78 years. It was found that 88 % of participants had profound intellectual disability. Inter-rater reliability was found to be moderate to good. Test-retest reliability was found to be moderate to good. Items loaded onto a four-factor model.

Smith and Matson (2010) investigated challenging behavior in adults and compared four groups: (1) Intellectual disability, (2) Epilepsy, (3) ASD, and (4) ASD and epilepsy combined. The ASD-BPA was used to investigate challenging behavior. It was found that the ASD group was significantly more impaired in self-injury than those with intellectual disability, and the additional diagnosis of epilepsy did not add to this. Those with ASD and epilepsy were more impaired on measures of disruptive behavior than those with intellectual disability alone, ASD alone, or epilepsy alone. There was also a surprising finding that epilepsy contributed more on the disruptive behavior scale than ASD did. The authors commented that this may be due to direct care staff considering seizures to be more disruptive than the disruptive behaviors of those with ASD.

Horovitz, Matson, Hattier, Tureck, and Bamburg (2013) investigated the effects of race and autism spectrum disorders on challenging behaviors in adults with intellectual disabilities and used the ASD-BPA. Participants had a diagnosis of intellectual disability, while 49.7 % of participants had a comorbid diagnosis of ASD. Participants ranged in age from 20 to 87 years of age. It was found that 75 % of participants had a profound intellectual disability. Participants were divided into four groups; (1) Caucasian with ASD, (2) African American with ASD, (3) Caucasian with no ASD diagnosis, and (4) African American with no ASD diagnosis. It was found that Caucasian participants with ASD received higher ASD-BPA scores than did African American participants with ASD. For individuals with intellectual disabilities alone, it was found that African American participants

without a diagnosis of ASD received higher ASD-BPA scores than Caucasian participants without an ASD diagnosis. Specifically, Caucasian participants with ASD received higher stereotypy scores than African American participants with ASD. African American participants without a diagnosis of ASD received higher stereotypy scores than Caucasian participants without ASD. Participants with ASD and comorbid intellectual disability displayed significantly greater rates of challenging behaviors than those with ID alone.

Matson and Rivet (2008a) investigated the characteristics of challenging behaviors in adults with ASD. Participants were 161 adults with ASD, and 159 matched control participants with ID only. Participants were divided up into groups of participants with autistic disorder, PDD-NOS, and ID only. It was found that frequency of aggression/destruction, stereotypy, self-injurious behavior, and disruptive behavior increased with severity of autism symptoms. Participants with autistic disorder had higher rates of problem behavior than those with PDD-NOS or ID only. Behaviors that showed the most differences between groups were stereotypy (repeated/unusual body vocalizations/body movements, unusual object play), self-injurious behavior (harming self, mouthing/swallowing objects), aggression/destruction (banging on objects), and disruptive behavior (elopement).

Matson and Rivet (2008c) investigated the effects of autism and PDD-NOS symptoms on challenging behaviors in adults with intellectual disabilities, using the ASD-BPA. Participants were 298 adults with intellectual disabilities, aged from 21 to 88 years. The majority (76.5 %) of participants had a profound intellectual disability. It was found that 49.7 % of participants met criteria for autistic disorder or PDD-NOS. Participants were divided up into two groups: those with severe autism symptoms and those with mild autism symptoms. Participants with severe autism symptoms had significantly higher endorsements of disruptive behavior and self-injurious behavior than participants with mild autism symptoms. There were no significant differences in aggressive/destructive behavior for those with mild or severe autism symptoms.

Turygin, Matson, MacMillan, and Konst (2013) used the ASD-BPA to investigate the relationship between challenging behavior and symptoms of depression in adults with intellectual disabilities, with and without ASD. Participants were 332 adults with intellectual disabilities, the majority (76.2 %) of which had a profound intellectual disability. Participants were divided up into three groups: (1) ASD, (2) PDD-NOS, and (3) No ASD. It was found that in participants with ASD, aggression, disruptive behavior, and self-injurious behavior were all moderately associated with depressive symptoms. Similarly, for those with PDD-NOS, aggression, disruptive behavior, and SIB were also moderately associated with depressive symptoms. It was found that the association between SIB and depressive symptoms was significantly higher in those with ASD, than in those with no pervasive developmental disorder (PDD). It is important for researchers and clinicians to be aware of the role that comorbid psychopathology can play in challenging behaviors. An individual may be engaging in challenging behaviors due to feelings of anxiety or depressive symptoms. It is important that comorbid psychopathology is screened for when designing intervention packages for individuals with challenging behaviors.

Rojahn, Wilkins, Matson, and Boisjoli (2010) compared the ASD-BPA to the BPI-01 in adults with intellectual disabilities, with and without ASD. Participants were 57 adults with intellectual disabilities, ranging in age from 23 to 81 years. The majority (49 participants) of the sample were diagnosed with profound intellectual disability. Participants were divided into two groups: ASD and No ASD. The majority (40 participants) of the sample met criteria for ASD. No significant differences were found between those with ASD and without ASD on the ASD-BPA. Significant differences were found on the BPI-01 on total frequency, SIB frequency and severity, and stereotypy frequency and severity between those with ASD and those without ASD. The convergent validity of the ASD-BPA and the BPI-01 was investigated. Total ASD-BPA scores were significantly correlated with BPI-01 total severity and frequency scores. ASD-BPA aggression/destruction was significantly correlated with BPI-01

aggression/destruction frequency and severity subscales. ASD-BPA stereotypy was significantly correlated with BPI-01 stereotypy frequency and severity subscales. ASD-BPA self-injurious behavior was significantly correlated with the BPI-01 SIB frequency and severity subscales.

Behavior Problems Inventory (BPI-01)

The Behavior Problems Inventory (BPI-01; Rojahn, Matson, Lott, Esbensen, & Smalls, 2001) is designed to assess behavior problems in individuals with intellectual and developmental disabilities. It contains 52 items and items are scored on a frequency and a severity scale. Items are rated on the five-point frequency scale from 0 (Never), 1 (Monthly), 2 (Weekly), 3 (Daily), and 4 (Hourly). Items are rated on the four-point severity scale from 0 (No problem), 1 (A slight problem), 2 (A moderate problem), and 3 (A severe problem). Informants are asked to respond as to whether the behavior occurred during the past 2 months. Items are divided into three subscales: Self-injurious Behavior (SIB), Stereotypic Behavior, and Aggressive/Destructive Behavior. There are 14 SIB items, 24 Stereotypic Behavior items, and 11 Aggressive/Destructive Behavior items. There is also a generic behavior problem definition (e.g., Other SIB) asked for each type of behavior problem.

Rojahn et al. (2001) found test-retest reliability to be good to excellent. The BPI-01 demonstrated good clinical criterion validity. The authors concluded the BPI-01 “was found to be a reliable (retest reliability, internal consistency, and between-interviewer-agreement) and valid (factor and criterion validity) behavior rating instrument” (p.577). González et al. (2009) investigated the reliability and factor validity in adults with intellectual disabilities. The internal consistency of the BPI-01 was found to be in the good to excellent range. The inter-rater and test-retest reliability were found to be adequate. Lower reliability was found for the Stereotypy subscale. González et al. (2009) confirmed that the three-factor structure of the BPI-01 was a

good fit. The BPI-01 has been translated in different languages, including Swedish, Dutch, Romanian, Korean, and Chinese.

Rojahn, Aman, Matson, and Mayville (2003) investigated the convergent and divergent validity of the BPI-01 and the Aberrant Behavior Checklist (ABC), in 226 adults with intellectual disabilities. It was found that participants with high BPI-01 scores also had high ABC scores. The subscales of the BPI-01 were significantly and positively related to the subscales of the ABC. Both measures also yielded information that was not received from the other measure. In support, Hill, Powlitch, and Furniss (2008) investigated the convergent validity of the BPI-01 and the ABC. Participants were 69 children and adults with intellectual disabilities. Strong evidence of convergent validity was found between the BPI-01 and the ABC.

Rojahn et al. (2013) investigated the validity and the reliability of the BPI-01, the ABC, and the Repetitive Behavior Scale-Revised (RBS-R) in 180 infants and toddlers at risk of intellectual or developmental disabilities. High rates of convergent and discriminant validity were found across the three instruments. The authors recommended using all three measures to assess behavior problems in infants at risk of intellectual or developmental disabilities.

Murphy, Healy, and Leader (2009) used the BPI-01 to examine challenging behaviors in 157 children with ASD. It was found that 64.3 % of children displayed challenging behaviors. McTiernan, Leader, Healy, and Mannion (2011) analyzed the risk factors and early predictors of challenging behaviors in 174 children with ASD, and used the BPI-01 to investigate the prevalence of challenging behaviors in this sample. Hattier, Matson, MacMillian, and Williams (2013) investigated stereotyped behaviors in toddlers with ASD and atypical development. Stereotyped behavior was assessed using the BPI-01. The ASD group displayed significantly more stereotyped behavior than the atypically developing group.

Schroeder, Richman, Abby, Courtemanache, and Oyama-Ganiko (2014) investigated the comparison between functional analysis and

the BPI-01 in 17 infants and toddlers at risk for developmental delays. Overall agreement for functional analysis and the BPI-01 for aggression was 91 %, for stereotyped behavior was 83 %, and for SIB was 73 %. However, for less frequently occurring topographies, the overall agreement for aggression was 48 %, for stereotyped behavior was 50 %, and for SIB was 42 %. Overall, functional analysis and the BPI-01 agreed approximately 75 % of the time.

Behavior Problems Inventory-Short Form (BPI-S)

The Behavior Problems Inventory-Short Form (BPI-S; Rojahn et al., 2012a) is an informant-based behavior rating tool designed to evaluate maladaptive behaviors in individuals with intellectual disabilities. The rating scale uses the same system as the BPI-01 (Rojahn et al., 2001) but has fewer items. It consists of 30 items and has three subscales: Self-injurious behavior, Aggressive/destructive behavior, and Stereotyped behavior. The Self-injurious behavior subscale has 8 items. The Aggressive/destructive behavior subscale has 10 items. The Stereotyped behavior subscale has 12 items. Each item on the Self-injurious behavior and Aggressive/destructive behavior subscales is rated on a frequency scale and a severity scale. The Stereotyped behavior subscale is rated on a frequency scale only. Each frequency scale was rated from “Never/No problem,” “Monthly,” “Weekly,” “Daily” to “Hourly.” Each severity scale was rated from “Mild,” “Moderate” to “Severe.” Rojahn et al. (2012b) investigated the reliability and validity of the BPI-S. The BPI-S was found to be psychometrically sound. The internal consistency values on the BPI-S frequency subscales ranged from fair (Self-injurious Behavior) to good (Aggressive/Destructive Behavior and Stereotyped Behavior).

Williams, Leader, Mannion, and Chen (2015) used the BPI-S to investigate the relationship between anxiety and challenging behavior in 109 children and adolescents with ASD. A high

prevalence of challenging behavior was found. It was found that 99 % of the sample exhibited at least one form of challenging behavior. It was found that 67 % displayed all three typographies of challenging behavior, 28 % displayed two types of challenging behavior, and only 5 % displayed one type of challenging behavior. The mean for self-injurious behavior frequency was 4.61 (SD=4.54), and self-injurious behavior severity was 2.96 (SD=3.19). The mean for aggressive/destructive behavior frequency was 7.05 (SD=6.82), while aggressive/destructive behavior severity was 5.09 (SD=5.29). The mean for stereotyped behavior frequency was 16.02 (SD=10.30). There were no significant correlations found between anxiety and the subscales of the BPI-S. Severity of self-injurious behavior was found to be a negative predictor of anxiety.

Fragile X syndrome may be an underdiagnosed comorbid disorder in individuals with ASD. Newman, Leader, Chen, and Mannion (2015) investigated challenging behavior in children and adolescents ages 2–17 years with Fragile X syndrome using the BPI-S. It was found that 72 % of individuals displayed all three types of challenging behavior, while 21 % displayed two forms of challenging behavior, and only 6 % engaged in one form of challenging behavior. It was found that all participants displayed some form of stereotypy, while 85 % displayed aggressive/destructive behavior, and 80 % displayed self-injurious behavior. It was found that individuals with Fragile X syndrome and ASD exhibited significantly higher rates of challenging behavior than those with Fragile X syndrome and no comorbid diagnosis of ASD. No significant differences in challenging behavior were found between males and females, and between those with and without intellectual disability. Presence of ASD was found to be a significant predictor of challenging behavior. It was also found that challenging behavior and comorbid psychopathology were positively correlated, where stereotypy correlated most strongly with comorbid psychopathology.

Aberrant Behavior Checklist (ABC)

The Aberrant Behavior Checklist (ABC; Aman, Singh, Stewart, & Field, 1985) is a 58-item behavior rating scale. Items are rated on a 4-point scale from 0 (never a problem), 1 (slight problem), 2 (moderately serious problem), to 3 (severe problem). There are five subscales: Irritability (15 items), Lethargy (16 items), Stereotypy (7 items), Hyperactivity (16 items), and Inappropriate speech (4 items). Higher scores indicate more severe problems. The ABC has been shown to have high internal consistency among subscales, excellent test-retest reliability, and acceptable inter-rater reliability (Aman et al., 1985; Schmidt, Huete, Fodstad, Chin, & Kurtz, 2013).

Schmidt et al. (2013) investigated the ABC for use with children with intellectual and developmental disabilities under the age of 5 years. Participants were 97 children under the age of 5 years. It was found that 45.4 % of the children had a developmental delay or intellectual disability, while 13.4 % were diagnosed with ASD. The authors found that the five-factor structure of the ABC was not fully supported for children under the age of 5 years. The authors suggested that the factor structure of the ABC may need to be revised for the younger population.

Baeza-Velasco, Michelon, Rattaz, and Baghdadli (2014) investigated whether aberrant behavior patterns are associated with adaptive behavior in teenagers with ASD. Participants were 152 adolescents with ASD. Teenagers with high rates of aberrant behavior were found to have high rates of severity of autism symptoms. Adolescents with low rates of aberrant behavior were more likely to have functional language. It was found that most adolescents with higher scores on communication and socialization had lower/medium levels of aberrant behavior. However, adolescents with lower adaptive behavior were found across all groups of levels of aberrant behavior, from cluster (1) low scores on the ABC four domains, (2) high scores in irritability, and hyperactivity, (3) medium scores on the ABC four domains, to (4) medium level of irritability and high scores in stereotypy, lethargy, and hyperactivity.

Brown, Aman, and Haverkamp (2002) investigated the factor analysis and norms of the ABC for young people in special education. Participants were 601 children and young people, aged from 6 to 22 years. Participants were divided into three age groups: 6–10 years, 11–14 years, and >14 years. It was found that boys scored higher than girls on hyperactivity. The younger groups scored higher on hyperactivity and irritability than the adolescents. Individuals in the multi-handicapped classes scored higher on Stereotypic Behavior than those in the developmentally handicapped classes. The authors concluded that for the factor structure of the ABC, “the Inappropriate Speech subscale should perhaps be considered as tentative where parent ratings of children are concerned” (p.58).

Green, O'Reilly, Itchon, and Sigafos (2005) investigated the persistence of early emerging aberrant behaviors in 13 preschool children, aged 35–55 months when the study began, with developmental disabilities. Children were assessed every 6 months over a 3-year period. All children presented with challenging behaviors at the start of the study. Nine of the children received high scores on the ABC at the start and continued to receive high scores. Three children showed a reduction in ABC scores, and one child showed an increase in aberrant behavior.

Brinkley et al. (2007) examined the factor analysis of the ABC in individuals with ASD. Participants were 275 individuals with ASD who were between 3 and 21 years of age. The authors found that the ABC is generally robust for use with individuals with ASD and found the five-factor solution to be a moderate fit. The research found a self-injury factor to be present. More research is needed on this self-injury factor.

Kaat, Lecavalier, and Aman (2014) examined the validity of the ABC in children with ASD. Participants were 1893 individuals with ASD, aged 2–18 years. The ABC was compared to the Child Behavior Checklist (CBCL) and good convergent validity was demonstrated. The original five-factor structure of the ABC was found to be robust in children with ASD. The subscales were found to have acceptable to excellent internal consistency.

Child Behavior Checklist (CBCL)

The Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000, 2001) includes a measure for children aged 1.5–5 years. The CBCL 1.5–5 is a 100-item measure. There are six syndrome scales. These contribute to either Internalizing or Externalizing problems. Emotionally Reactive, Anxious/Depressed, Somatic Complaints, and Withdrawn contribute to Internalizing problems. Attention Problems and Aggressive Behavior contribute to Externalizing problems. Sleep problems do not contribute to either Internalizing or Externalizing problems, but is used for the Total Problems score. The CBCL 6–18 has eight empirically derived Syndrome Scales, as well as six DSM-Oriented scales. Externalizing problems contains the Rule Breaking Behavior and Aggressive Behavior syndrome scales. Internalizing problems contains Anxious/Depressed, Withdrawn/Depressed, and Somatic Complaints. The other syndrome scales do not belong to Externalizing or Internalizing problems, and these are Attention Problems, Thought Problems, and Social Problems. For both age groups, items are rated from 0 (Not True), 1 (Somewhat or Sometimes True), or 2 (Very True or Often True). Raw scores are converted to T-scores. T-scores are rated from normal to borderline to clinical ranges.

Pandolfi, Magyar, and Dill (2009) investigated the factor analysis of the CBCL 1.5–5 in 128 children with ASD. The two-factor model of Internalizing and Externalizing factors was supported in this study. Pandolfi, Magyar, and Dill (2012) investigated the psychometric properties of the CBCL 6–18 in children and adolescents with ASD. Individuals were divided into two groups: ASD and emotional and behavioral disorders (EBD), and ASD only. The ASD+EBD group had significantly higher mean scores on Total Problems, Anxious/Depressed, Somatic Complaints, Thought Problems, Withdrawn/Depressed, and Internalizing domain than those with ASD only. Factor analysis supported the Internalizing and Externalizing factor structure.

Individual scales of the CBCL can be used to look at specific problem issues or behaviors.

Presmanes Hill et al. (2014) explored aggressive behavior problems in children with ASD, and used the CBCL Aggressive Behavior scale T-scores. Individuals were 400 children and adolescents aged 2–18 years with ASD. Individuals were split into two groups: those with aggressive behavior scores in the clinical range, and those with scores below the clinical range. Prevalence of aggressive behavior problems was found to be 25 %. The authors noted “In clinical settings, it may be beneficial to administer questionnaires with known psychometric properties and normative data such as the CBCL to provide parents the opportunity to rate challenging behaviors that the clinician can then use to facilitate open discussions with families” (p. 1131). Williams et al. (2015) used the DSM-Oriented Anxiety Problems Scale of the CBCL. It was found that 75 % of children and adolescents with ASD were in the clinical range for anxiety problems, while 10 % were in the borderline range, and 15 % were in the normal range.

Parental Concerns Questionnaire (PCQ)

The Parental Concerns Questionnaire (McGrew et al., 2007) contains 13 items. The severity of core developmental and psychiatric symptomatology is assessed using a 4-point scale, from 1 (No problems), 2 (Mild problems), 3 (Moderate problems), and 4 (Severe problems). Questions ask about social interaction, verbal and nonverbal communication, restrictive and repetitive behaviors, anxiety, obsessive/compulsive behaviors, aggression, SIB, mood swings, hyperactivity and attention issues, and sleep disturbances. Parents are asked to rate the concerns as to what extent that they have been a problem within the last month.

McGrew et al. (2007) investigated the validity of the PCQ in 53 children with ASD, and 48 age-matched typically developing controls. Participants were from age 4 to 10 years. For the ASD group, internal consistency was found to be high. It was not as internally consistent for the typically developing group. Test-retest reliability was found to have substantial agreement. Goldman

et al. (2011) investigated the relationship between sleep problems and problem behaviors, using the PCQ. Participants were 1784 children, ages 2–18 years with ASD. Over 60 % of children had problems with language use and understanding, attention span, and social interactions. Over 50 % of children had problems with anxiety, sensory issues, hyperactivity, and eating habits. It was found that poor sleepers had a higher percentage of behavioral problems on all PCQ scales than good sleepers.

Profile of Toileting Issues (POTI)

Toileting problems have been identified as a common challenging behavior in individuals with ASD (Mannion & Leader, 2013). The Profile of Toileting Issues (POTI; Matson, Dempsey, & Fodstad, 2010) is a 56-item checklist that is designed to screen for the diagnostic criteria for enuresis and encopresis as well as potential functions including pain, avoidance, social difficulties, noncompliance, internal cues, shame/deception, peer rejection, aversive parenting, and medical problems. The scale is completed by the individual's primary caregiver with items rated as "no problem present" (0), "problem present" (1), or "does not apply" (X). A total score is derived by summing the responses for each item, with higher scores indicating more significant toileting problems. The POTI is designed for individuals with intellectual disabilities from age 4 years throughout adulthood. Matson, Neal, Hess, and Kozlowski (2011) established that the POTI questionnaire has good internal consistency, with a Cronbach alpha coefficient reported of 0.83.

Matson, Horowitz, and Sipes (2011) investigated the prevalence of toileting problems in 153 adults with intellectual disability. The POTI was used to determine which toileting problems were the most frequent. Their analysis revealed that the most frequently reported problems were "has a toileting accident during the day," "has toileting accidents during the night," and "has had wet underwear in the past month." The least frequently reported problems were "others tease the individual about the odor" and "the individual is

rejected by peers due to toileting problems." Horovitz et al. (2011) found there were significant differences in toileting problems based on scores on the POTI, in relation to verbal ability of the participant. Participants who were nonverbal scored significantly higher POTI scores, than those who were verbal. Results showed that participants who were verbal scored a mean of 7.66 on the POTI scale, in comparison to those who were nonverbal who scored significantly higher, an average of 10.31.

Belva, Matson, Barker, Shoemaker, and Mahan (2011) examined the relationship between toileting problems and adaptive functioning in individuals with intellectual disabilities. The authors hypothesized that poorer adaptive functioning would be associated with more toileting difficulties. They examined 80 individuals, ranging from 23 to 72 years with intellectual disabilities ranging from mild to profound. They concluded that higher adaptive functioning is associated with significantly fewer toileting problems. Individuals that scored highly on the POTI scored lower on the Vineland Adaptive Behavior Scales, 2nd edition (VABS-II; Sparrow, Cicchetti, & Balla, 2005).

Screening Tool of Feeding Problems (STEP)

Feeding problems are a co-occurring issue in individuals with ASD (Mannion & Leader, 2013). These feeding problems, including food selectivity, food refusal, and mealtime tantrums, can be a great source of challenging behavior for the individual themselves, parents, caregivers, staff members, and for anyone interacting with the individual during mealtimes. Matson and Kuhn (2001) developed the Screening Tool of Feeding Problems (STEP) to identify feeding problems in adults with an intellectual disability. The STEP consists of 23 items. Problems are organized into five categories. These are aspiration risk, feeding skills, selectivity, feeding skills, behavior problems, and nutrition (Kuhn & Matson, 2008). Matson and Kuhn (2001) found test-retest reliability to be 0.72, while cross-rater

reliability was found to be 0.71. Kuhn and Matson (2008) commented that the psychometric properties for the measure are modest.

Fodstad and Matson (2008) compared feeding problems in those with intellectual disabilities, with and without autism. Individuals with ASD and intellectual disability displayed more behaviorally based feeding issues like food selectivity and refusal related behaviors than those with intellectual disability alone. The ASD and intellectual disability group had more severe feeding and mealtime problems than the intellectual disability alone group (Fodstad & Matson, 2008).

Screening Tool of fEeding Problems for Children (STEP-CHILD)

As well as measures designed for adults with ASD, there are also measures designed for children with ASD. The Screening Tool of fEeding Problems for Children (STEP-CHILD; Seiverling, Hendy, & Williams, 2011) is an informant-based questionnaire, which measures feeding problems in children. The STEP-CHILD contains 15 items. Factor analysis yielded six subscales; (1) Chewing Problems, (2) Rapid Eating, (3) Food Refusal, (4) Food Selectivity, (5) Vomiting, and (6) Stealing Food. Caregivers report the number of times their child has exhibited each feeding problem using a three-point rating scale. The subscales demonstrated a mean internal validity of 0.62 (Seiverling et al., 2011). Seiverling et al. (2011) examined convergent validity and it was confirmed by expected associations with another psychometrically tested measure of feeding problems, the Children's Eating Questionnaire (CEBQ; Wardle, Guthrie, Sanderson, & Rapoport, 2001).

Conclusion

Challenging behaviors are a common co-occurring issue for individuals with ASD. This chapter has focused on challenging behaviors, such as SIB, aggressive/destructive behaviors, and stereotyped behaviors. It also included other lesser researched challenging behaviors such as

toileting problems and feeding problems. These challenging behaviors need to be addressed more in future research. A review has been given of the different measures used to assess the function of challenging behaviors. More research is needed to compare these scales with experimental functional analysis in order to determine whether these scales can identify the function of challenging behaviors as effectively as functional analysis. Functional assessments are an efficient way of assessing the function of a challenging behavior, as they are much less time-consuming than functional analysis. However, their validity needs to be compared to functional analysis, in order to determine whether they are as reliable as functional analyses.

Scales used to identify challenging behaviors have also been discussed. While there are a variety of scales available to assess the presence of challenging behavior, there are a limited number of scales that have been validated for use for individuals with ASD. All too often, these scales have been used with typically developing individuals or individuals with intellectual disabilities. For some measures, they have been used with adults with ASD only. It is therefore important that these scales are validated for use with preschool-aged children and school-aged children if they are to be used with these populations. While scales may have been validated for use for individuals with ASD, measures are also available that have been specifically designed for individuals with ASD. Where possible, it is best to use measures that can distinguish between the challenging behaviors that those with ASD present with and challenging behaviors exhibited by those without ASD.

Much more research is needed on the use of these challenging behavior scales in individuals with ASD. We need to better understand how challenging behaviors present in babies and infants, preschoolers, school-aged children, and adolescents. We need to understand how challenging behaviors change as children age. We also need to understand how common challenging behaviors are in younger and older adults with ASD. Little is known about challenging behaviors in an adult population with ASD. While we know more about challenging behaviors in adults

with intellectual disabilities, research is needed in adults with high-functioning ASD, and adults with ASD alone. We need to understand how comorbid medical and psychiatric conditions, such as gastrointestinal symptoms, epilepsy, attention-deficit/hyperactivity disorder (AD/HD), anxiety, depression, and sleep problems, affect challenging behaviors in individuals with ASD of all ages. By better understanding challenging behavior, more effective interventions can be designed to treat these challenging behaviors and in turn improve an individual's quality of life and the quality of life of parents and caregivers.

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