

Effective Behavioral Intervention for Adults on the Autism Spectrum: Best Practices in Functional Assessment and Treatment Development

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Abstract

As individuals with autism age out of the educational system, families and practitioners are faced with a number of challenges, including placement concerns and limited behavioral support. Among the most significant concerns is the assessment and treatment of challenging behavior in this population. While assessment and treatment strategies have been well described in the literature, practical solutions for adults with autism are needed. The current manuscript reviews some of the challenges to best practice with older learners and potential risk factors associated with the absence of effective intervention. Alternative assessment and treatment strategies, with implications for adults on the autism spectrum, are presented as part of the review.

Keywords: Functional behavioral assessment, function-based treatment, adults, autism

As individuals with autism age out of the educational system, families and practitioners are faced with a number of challenges, including placement concerns and limited behavioral support. This change in available resources often affects the quality of behavioral intervention available to adults on the autism spectrum. These concerns are highlighted when considering the prevalence of maladaptive behavior in adult populations. While estimates of the prevalence of problem behavior vary considerably, levels of maladaptive behavior tend to be higher for individuals with autism relative to other disorders, and may include aggression, self-injurious behavior, property destruction, ritualistic behavior, disruption, inappropriate vocalization, and pica (among others). It has been estimated that the prevalence of aggressive behavior ranges from 6.4% to 32.0% of cases, self-injurious behavior ranges from 4.4% to 21.0% of cases, and destructive behavior from 2.3% to 19.0% of cases (Holden & Gitlesen, 2004; Lowe, Allen, Jones, Brophy, Moore, & James, 2007). While procedures for assessment and treatment for these kinds of problem behavior are well-established in the behavioral literature, the adult population presents unique challenges for families and care providers.

The purpose of the current paper is to review the status of existing issues in functional assessment and treatment development in adult populations diagnosed with autism. In addition, we will review some potential strategies for improving services to this underserved population.

Challenges to Functional Assessment and Treatment Development in Adults

While assessment and treatment procedures for problem behavior have been well established in the research literature, the representation of adult populations is generally lacking relative to younger populations (Hanley, Iwata & McCord, 2003). There are a number of factors which contribute to this relative dearth in the literature.

Legislation. Perhaps the most salient reason for the lack of services (and subsequently, research) in adult populations is that the legislation mandating the use of functional behavioral assessment and function-based intervention procedures only extend to individuals to age 21. Upon reaching the age of 21, the adult populations are not provided with the same entitlements as their school-age counterparts with regard to “functional behavioral assessment” and “positive behavioral supports.”

Cost of Services. Providing services for adults with autism-spectrum disorders represents a substantial economic expense for families and government agencies (Cimera and Cohan, 2009; Ganz, 2006; Järbrink, McCrone, Fombonne, Zanden, & Knapp, 2007). Adults with autism are among the most costly individuals with disabilities to serve, second only to those individuals with sensory impairments. It has been estimated

that it costs approximately \$3.2 million dollars to financially support an autistic person over their lifetime (Ganz, 2006). Considering that it is not uncommon for individuals with autism to live into their sixties (Shavelle and Strauss, 1998), it is clear that care during adulthood represents a sizeable cost. With limited funds available, assessment and treatment practices are more likely to use less thorough models of assessment and treatment which require less time, money and other resources.

Lack of Qualified Staff. Another significant challenge to the use of the best available assessment and treatment practices with adult populations is a lack of qualified staff to conduct the assessments. It is often the responsibility of direct care staff to implement comprehensive care plans even though many staff members have little training and/or direct care experience (Sigafoos, Roberts, Couzens, & Caycho, 1992; Wood, Luiselli, & Harchik, 2007). Challenges, such as lack of training/support and fear of injury, may deter otherwise qualified staff from working with this population.

Severity of Maladaptive Behavior. Other significant issues are more pragmatic in nature. Perhaps the most obvious difference between a child with autism and an adult with autism is the stature and physical strength of older learners. Adults with autism often engage in challenging behavior that is considerably more intense in comparison with the behavior of their younger counterparts. To this end, many people often avoid working with adults with developmental disabilities who exhibit challenging behavior for fear of injury (Hastings and Brown, 2000). These characteristics deter many from working with this population of learners. In addition, these fears may also understandably make staff less likely to use assessment procedures that would increase the likelihood of the challenging behavior (e.g., functional analysis), even though such environmental manipulations have the most empirical support for their use.

Complexity of Challenging Behavior in Adults. Another issue that affects the use of functional assessment with adults is the fact that intervening with challenging behavior tends to be more labor-intensive and difficult with this population (Fox, Holtz, & Moist 2009). Reasons for this may include a longer history of engaging in the behavior (Matson, 1988), multiple functions for the behavior (Rojahn & Schroeder, 1991), or multiple topographies of behavior (Borthwick-Duffy, 1994). The complexity of long standing and multiply controlled problem behavior can increase both the difficulty and the duration of the assessment and intervention process.

Implications for Untreated Problem Behavior in Adults

More Intrusive Placements/Less Community Integration. Common goals for adults with autism include independence in a variety of contexts and community integration through various supported employment opportunities and recreational outings. The presence of persistent and/or ineffectively treated maladaptive behavior leads to more restrictive placements for older learners with autism (Carr and Carlson 1993; Joyce, Ditchfield & Harris, 2001). These placements may include long term institutionalization or restrictive day treatment programs. Ultimately, problem behavior places adults at risk for exclusion from community services, high levels of physical restraint, abuse from caregivers/day program staff, and self-inflicted injury (Allen, Lowe, Moore, & Brophy, 2007).

Quality of Day Treatment Services. The quality of adult services provided in day treatment settings varies considerably. Reid, Parsons & Green (2001) recently evaluated 100 day program settings and found that approximately half of the adult clients were not engaged with any functional activity and were generally emitting high levels of off-task, stereotypical or self-stimulatory behavior, even when leisure materials were provided. A similar study indicated that disabled adults may not be functionally engaged for up to 70% of the day (Parsons, Rollyson, & Reid, 2004). The possible relationship of this lack of engagement to challenging behavior is two-fold. One, it is possible that the lack of functional engagement seen in many of these settings is a result of untreated behavior problems. Clients with ASD may react negatively to the presentation of tasks or demands related to vocational or structured activities. Settings without proper supports (supports required

to create opportunities tailored for individual clients' skills and preferences) may result in little or no expectation to "work" in an attempt to avoid or end behavior problems. Secondly, individuals who receive services in such settings may respond to this lack of engagement by developing behavior problems to gain access to more attention or engagement, thus contributing to the development or perpetuation of challenging behavior patterns.

Risk for Abuse. Several studies have indicated that the risk of physical and sexual abuse is heightened in individuals with disabilities (Crosse, Kaye, & Ratnofsky, 1993; Rusch, Hall, & Griffin, 1986; Zirpoli, Snell, & Loyd, 1987). Mandell, Walrath, Manteuffel, Sgro & Pinto-Martin (2005) found that individuals with autism and Asperger's disorder treated in community mental health settings are particularly at risk. The authors found that almost one in five individuals on the autism spectrum had experienced physical abuse and one in six had experienced sexual abuse. Because of their social isolation and poor communication skills, individuals with autistic spectrum disorders may represent a group at particular risk of physical and sexual abuse (Howlin & Clements, 1995). It is possible that many cases of physical abuse may arise in response to the challenging behavior of a person with ASD. Staff members who are confronted with behavior challenges and/or insufficient resources to meet client needs may resort to less desirable means of preventing or responding to behavior problems, such as restraint or reactive aggression. This may contribute to the development or maintenance of ongoing behavior problems. It is also possible that abuse or neglect occur independent of challenging behavior, and these situations may also directly contribute to the development of new behavior problems.

Greater use of Psychotropic Medication. The increased prevalence of medication use is another implication of ineffective assessment and intervention. Research has shown that physical aggression and other problem behavior exhibited by adults with autism predicts the use of psychotropic medication (Aman, Lam & Collier-Crespin, 2003; Tsakanikos, Costello, Holt, Sturmey and Bouras, 2007). In other words, individuals exhibiting maladaptive behavior are more likely to be prescribed medication. A recent study found that 70% of a sample of adults and adolescents on the autism spectrum were taking some form of medication (psychotropic or non-psychotropic) at the beginning of the investigation and the proportion increased to 81% by the end of the 4.5 year study (Esbensen, Greenberg, Mailick Seltzer, Aman, 2009). Aman and colleagues (2003) indicated that the demographic variables frequently found to be associated with medication use included greater age, more severe autism, more severe intellectual handicap, and housing outside the family home (Aman, Lam & Collier-Crespin, 2003; Martin, Scahill, Klin, & Volkmar, 1999). In addition, there may be a greater risk of unmanaged side effects due to the fact that individuals with autism are less able to communicate side effects and physical symptoms accurately.

Psychological toll on service-staff. In addition to the possibility of physical harm resulting from challenging behaviors, the psychological well-being of service staff may be at risk as well (Hastings, 2005). It has been reported that staff working with clients with challenging behavior report higher levels of anxiety, lower job satisfaction, a feeling of being less supported, and more emotional exhaustion than those working with similar clients without challenging behaviors (for a review of the topic, see Duff, Redhead, Paxton, Icton, & Rochester, 2006).

Psychological toll on family members. Caregivers of adults with autism report significantly more maladaptive behavior problems (in the adults with autism), lower levels of personal well-being, and higher levels of stress compared to the family caregivers of adults with almost any other type of disability (Blacher and McIntyre, 2006; Smith, Hong, Seltzer, Greenburg, Almeida, & Bishop, 2010). A recent study has shown that mothers who have an adult child on the autism spectrum report the occurrence of substantially more stressful family events such as arguments, avoided arguments, work-related events, home-related events, and stressful events associated with their social network when compared to mothers of adolescents and adults without autism. The study also showed that mothers of adolescents or adults with ASD reported feelings of

fatigue twice as often and spent significantly less time engaged in leisure activities than mothers of adolescents and adults without ASD (Smith, Hong, Seltzer, Greenburg, Almeida, & Bishop, 2010).

In sum, untreated maladaptive behavior in older learners with autism often leads to poorer outcomes affecting the quality of life for the individuals and their families. Failure to address these problems increases the likelihood of a number of undesired outcomes, including, placement in restrictive settings, the risk of sexual or physical abuse, the use of psychotropic medication, and undue stress upon staff and family members. These risks highlight the importance of empirically-supported assessment practices to develop effective treatments.

Functional Assessment: A Brief Overview

Functional assessment is a process of gathering data to generate and test hypotheses regarding relations between environmental events and behavior (Cooper, Heron, & Heward, 2007). In other words, functional assessment is a tool to assist in identifying factors that maintain problem behavior. By identifying these factors, functional assessment efficiently narrows down the potential function-based interventions that can be applied to a treatment geared towards behavioral change. While topography-based modification strategies address *what* behavior is occurring, functional behavior assessment strategies ask *why* this behavior is occurring.

Research has shown that there are at least three general factors that maintain problem behavior (Iwata, Smith, & Michael, 2000). These three general classes include: behavior maintained by social positive reinforcement, behavior maintained by social negative reinforcement, and behavior maintained by automatic reinforcement (not socially mediated).

Problem behavior maintained by social positive reinforcement refers to a class of behavior that results in access to some stimulus (e.g., access to social attention, access to tangibles) that increases the future likelihood of that response. For instance, contingent upon disruptive behavior, family members may talk to the student/individual, which may increase the likelihood that the student will engage in problem behavior to access attention in the future.

Problem behavior maintained by social negative reinforcement refers to behavior that results in escape or avoidance from aversive stimulation. For instance, when presented with a difficult task, an individual may engage in problem behavior to avoid completing the task. In the event that escape/avoidance follows the behavior, it may therefore increase the likelihood that problem behavior may occur when presented with demands in the future.

Problem behavior maintained by automatic reinforcement refers to a class of behavior that is maintained by the consequences the behavior itself produces. Simply put, the behavior is maintained by nonsocial consequences. For instance, a behavior, such as hand flapping, may occur for reasons that are nonsocial in nature (it persists in the absence of social consequences). Automatically reinforced behavior may be categorized as automatic positive reinforcement or automatic negative reinforcement. An example of automatic positive reinforcement may involve an individual engaging in some behavior that produces sensory stimulation (e.g., spinning objects, rocking) that provides its own reinforcing consequence. An example of behavior maintained by automatic negative reinforcement might be a person who engages in self injurious behavior to suppress pain.

Components of Functional Assessment. There are three main classes/components of functional assessment. These include: indirect assessment (e.g., rating scales, structured interviews), descriptive assessment (e.g., ABC data collection), and functional analysis (e.g., environmental manipulations).

Indirect models of assessment include a number of measures including interviews, checklists, rating scales, or questionnaires. While these models of assessment are generally easy and cost effective, they may have questionable reliability (Conroy, Fox, & Bucklin, 1996). The biased nature of indirect assessment (i.e., reliance on caregiver report) represents a common threat to the validity of such instruments.

Descriptive assessment involves the use of observation and coding of data related to the antecedents and consequences for problem behavior (e.g. Bijou, Peterson, Ault, 1968, Freeman, Anderson, Scotti, 2000; Mace, Lalli, Pinter-Lalli & Shea, 1993). While descriptive assessment models tend to be more objective than indirect assessment measures, the data obtained are correlational in nature. In other words, just because environmental events and problem behavior are correlated (e.g., attention in the form of reprimands follows maladaptive behavior) does not necessarily mean that the relationship is a functional one (i.e., reprimands may follow problem behavior, but the behavior does not necessarily occur to access that attention). In addition, some research has shown that results obtained using descriptive assessment often do not correspond with the results of more thorough analyses (e.g., Pence, Roscoe, Bourret, & Ahearn, 2009; Camp, Iwata & Hammond, 2009, Thompson and Iwata, 2001).

Functional analysis represents the most sophisticated form of functional assessment procedures (Iwata, Dorsey, Slifer, Bauman & Richard, 1982/1994). Like descriptive assessment procedures, functional analysis employs direct observation of behavior. However, unlike descriptive assessment, the hypotheses are directly tested. For instance, to test if problem behavior is maintained by social attention using a functional analysis, a practitioner would deprive the individual of attention (e.g., acting distracted) and provide attention contingent upon the target behavior and observe the level of responding (e.g., rate of response). Given that these procedures are a direct test of a contingency, they are the most accurate way to determine the function of behavior. However, they also tend to represent the most intrusive and time consuming of the functional assessment models.

Obstacles for Use in Adult Populations

Perhaps the greatest concern for the use of functional assessment with adults is the difficulty with the use of the most empirically-supported models of assessment. Traditional models of functional analysis require that problem behavior be evoked during the course of the analysis, which may raise concerns about staff and client safety. In addition, traditional models of functional analysis often require a significant amount of staff training, time and resources that may not be available to adults with autism in many service settings.

These concerns, therefore, often lead to the use of less intrusive (and less empirically-sound) models of assessment, such as descriptive assessment and indirect assessment (e.g., interviews and rating scales). Given that these models have less empirical support, there is a greater likelihood of errors in the assessment process (e.g. identifying the wrong function). These potential errors in assessment compromise the ultimate effectiveness of intervention and worsen outcomes for adult populations.

Assessment Solutions for Adults

While traditional models of functional analysis may present practical issues when applied to problem behavior in adult populations, recent research has focused on the development of less intrusive models of analysis that may have particular relevance for this population. These less intrusive models of assessment include AB (Antecedent-Behavior) models, trial-based functional analysis models, latency-based models, functional analysis of precursor behavior models.

AB Models of Functional Analysis. Antecedent-Behavior (AB) models of functional analysis (sometimes also referred to as structured descriptive assessment) involve the manipulation of an antecedent and observing the effects on problem behavior (Carr and Durand, 1985; Freeman, Anderson & Scotti, 2000; Anderson & Long, 2002). Specifically, practitioners expose individuals to different antecedent motivating operation (MO) manipulations, such as periods of no attention, restricted access to preferred items/activities,

presentation of aversive stimulation (e.g., demands) and compare occurrence of problem behavior to a control condition (e.g., a condition during which all MOs are satiated/enriched environment). Such models eliminate the concerns about evoking and reinforcing problem behavior. Research has suggested reasonably good correspondence between AB models and traditional models of functional analysis (Freeman, Anderson & Scotti, 2000; Anderson & Long, 2002).

Trial-Based Models of Functional Analysis. Trial-based models of functional analysis are also potentially viable ways to conduct empirically-sound functional analyses (Sigafoos and Sagers, 1995; LaRue, Lenard, Weiss, Bamond, Palmieri, Kelley, 2010; Wallace and Knights, 2003). Trial-based models involve staging scenarios similar to that of a functional analysis, but only reinforcing the first instance of target behavior. The dependent measure for these models is generally the percent of trials with problem behavior (e.g., problem behavior occurred in 8 of 10 trials that an individual was exposed to demands). These models have also been shown to correspond well with traditional models of functional analysis, while reducing the time needed and mitigating concerns about evoking or increasing the problem behavior during the assessment (LaRue et al., 2010; Wallace and Knights, 2003).

Latency-based models of Functional Analysis. Related to the above models, there is also empirical support for the use of latency based measures for conducting functional analyses. (LaRue et al., 2010). Latency models of functional analysis involve measuring the amount of time until the first instance of maladaptive behavior (latency to first response). In other words, rather than using the rate of behavior as the main dependent measure, practitioners would use latency to the first response (with shorter latencies to problem behavior suggesting behavioral function). Such models may be of particular use given that they do not require the repeated evocation of maladaptive behavior as is common in traditional models of functional analysis. Each session would end with the first instance of maladaptive behavior, which could be blocked by the therapist. Such models have also been shown to correspond with traditional models of functional analysis (LaRue et al., 2010).

Functional Analysis of Precursor Behavior. Research has also indicated that another potential model for conducting functional analyses involves reinforcing less severe topographies of maladaptive behavior in a functional analysis (Najdowski, Wallace, Ellsworth, MacAleese, & Cleveland, 2008; Smith & Churchill, 2002). For instance, if practitioners suspect that two topographies of behavior are a part of the same response class (e.g., inappropriate vocalization co-occurs and reliably precedes aggression), they can conduct a functional analysis for the less severe of the topographies (e.g., reinforcement of inappropriate vocalization during the functional analysis, rather than aggression). Such models eliminate the need to reinforce severe topographies of maladaptive behavior.

Treatment Challenges for Adults on the Autism Spectrum

Most research has supported a multi-tiered approach to function-based treatment. Best practice indicates that practitioners should take measures to prevent target behavior from occurring (antecedent-based intervention), should program functionally-equivalent replacement skills (functional communication training) and should alter the consequences for problem behavior (extinction, in some cases, punishment). While consensus in the field strongly suggests that all of these components are essential for effective intervention, practical issues may interfere with best practice. What follows is a brief review of treatment issues for adults with autism and some guidelines for best practice.

Antecedent-Based Intervention. When using sound functional assessment procedures, practitioners can then take measures to prevent problem behavior from happening in the first place. Noncontingent reinforcement (NCR) is a common antecedent-based strategy that involves the delivery of the reinforcer identified in the functional assessment on a time-based schedule (Vollmer, Iwata, Zarcone, Smith, & Mazaleski, 1993). In other words, a functional reinforcer (e.g., social attention, a break) is provided on a

schedule (rather than upon the occurrence of problem behavior) to decrease the occurrence of target behavior. NCR is effective for two reasons. First, NCR disrupts the relationship between the behavior and the reinforcer (an extinction effect). The target behavior no longer produces the reinforcer as it is provided on a time-based schedule. Second, NCR works because it decreases the motivation to engage in the behavior. For instance, the motivation to engage in attention-maintained disruptive behavior would presumably decrease if the learner is gaining access to attention on a frequent schedule independent of the behavior.

While antecedent-based intervention is an important component of any intervention, consistent application is a challenge in adult populations. For instance, staffing ratios may not be sufficient to provide the level of antecedent support required to produce significant clinical effects (e.g., they cannot deliver noncontingent attention at a level that reduces problem behavior). Limited staff allocation or insufficient training at some placements may contribute to these problems. As a result, direct care workers may often *react* to problem behavior after it occurs, rather than taking measures to *prevent* the episode.

Functional Communication Training (FCT). Functional Communication Training (FCT) is a commonly used procedure that involves teaching an alternative response while the target behavior typically contacts extinction (Carr & Durand, 1985). These procedures allow the learner to access the same functional reinforcer that maintains maladaptive behavior with an adaptive response. The topography of the response may take on a variety of forms, including vocal statements (e.g. “Break please”), a card touch/exchange (e.g. touching a break card), or sign language (e.g. signing “break”). The communication response taught should be a response likely to be reinforced in the natural environment.

Challenges to the use of FCT with adult populations primarily involve history of reinforcement. It is often the case that challenging behavior has been reinforced for a period of years, making replacement with an adaptive response difficult. To maximize the effectiveness of FCT, practitioners must consider relevant response parameters during training (Horner & Day, 1991). Research has shown that individuals are more likely to allocate responding to topographies that require less physical effort, are reinforced on a denser schedule of reinforcement and result in the fastest reinforcer delivery (Horner & Day, 1991). While practitioners cannot change an individual’s learning history, they can make adaptive communication more efficient (i.e., easier, quicker, more consistent reinforcement) than the behavior targeted for reduction in order to maximize the effectiveness of FCT.

Consequences to Challenging Behavior. Understanding the function of the behavior also provides critical information about how to respond to challenging behavior when it occurs. Three general things can occur following challenging behavior: it can contact reinforcement (an event occurs contingent upon the behavior that increases future occurrence), it can contact extinction (the previously reinforced behavior no longer contacts reinforcement), or it can be punished (a consequence occurs that decreases the future likelihood of the behavior).

To effectively implement extinction, practitioners must know the cause of challenging behavior. For instance, the appropriate way to implement extinction for escape-maintained behavior would be to work through the behavior and not provide escape contingent upon its occurrence. If target behavior is attention-maintained, the procedure may look like “ignoring” (no attention provided for target behavior). Using extinction inappropriately may inadvertently reinforce challenging behavior (e.g., turning away for a student engaging in escape-maintained problem behavior). For a review on the effective use of extinction, readers are directed to Iwata, Pace, Cowdery, & Miltenberger (1994) and Lerman, Iwata, Shore & Kahng (1996).

Punishment involves either the presentation or the removal of a stimulus contingent upon target behavior that decreases the future likelihood of the behavior. Commonly used punishment procedures include time out, response blocking, reprimands, and response cost. Although these procedures can be effective when used appropriately, they may exacerbate challenging behavior if used without knowledge of the function of

challenging behavior. For instance, placing a student with escape-maintained behavior in time out might reinforce challenging behavior. Similarly, providing reprimands (e.g. telling them to stop) to a learner who has attention-maintained disruptive may reinforce the behavior as well. For a review on the effective use of punishment, readers are directed to Lerman and Vorndran (2002).

Extinction can be particularly difficult to implement with older learners with autism. For instance, maladaptive behavior may increase in frequency and/or intensity upon contacting extinction (i.e., an extinction burst). In such cases, maladaptive behavior may intensify to a point where staff or family members have to intervene to protect the individual or others in the environment, leading to differential reinforcement of severe topographies of maladaptive behavior. Both punishment and extinction can lead to emotional responding that exacerbates maladaptive behavior. In addition, punishment procedures may be negatively reinforcing to the individual delivering the punishment (e.g., the reduction in problem behavior may increase the likelihood that the person delivering the punishment will use the procedure again). This can present significant ethical concerns as punishment procedures may be employed for ease of use for caregivers, rather than used in the best interest of the learner.

While implementation of all three treatment components (antecedent strategies, replacement skills, extinction/punishment) is considered ideal, practitioners should consider strategies in the event that it is not possible to address one of the components. Consider a case in which an adult is referred for severe escape-maintained aggressive behavior. In such circumstances, extinction or punishment may not be viable treatment options (i.e., due to the severity of the behavior). To effectively intervene, the practitioner should design a plan that includes a rich schedule of noncontingent escape (breaks on a frequent schedule) and an emphasis on teaching a break response to prevent the aggressive behavior from occurring (and allowing reinforcement of the behavior to occur). If a client was unable to acquire an effective communication response (e.g., to access attention), intervention should focus on the provision of noncontingent reinforcement (attention on a schedule) and ensuring that problem behavior does not contact reinforcement (reprimands) to the extent possible.

Summary/Conclusions

As noted previously in this paper, adults with autism represent a growing population in need of increased financial and clinical support. The Autism Society of America referred to the lack of services and funding for adults with developmental disabilities as a national crisis (Sullivan, 2007). The lack of services and practical difficulties with assessment and treatment of challenging behavior leads to poorer outcomes for this population. These issues can lead to increased likelihood of intrusive placements (institutionalization), less community integration, increased risk for abuse, heightened stress for families and caregivers and increased use of psychotropic medication, which ultimately leads to increased costs in the long term.

These concerns highlight at least two issues in need of attention in education, clinical, and research settings. First, parents, educators and practitioners must continue to work on and improve the effectiveness of transition planning prior to students leaving the educational system at age 21. Emphasis on functional skill development and behavior management is necessary to prepare students for the pending discharge from the educational system. This requires systematic assessment of appropriate life skills (including vocational, communication, self-care, and leisure domains) and evaluating potential post-transition environments. Consideration of post-school setting variables, such as, range of available resources, staff to learner ratios (i.e., availability of attention/rewards), viability of various communication strategies, range available activities, and skill and behavioral expectations is essential in order to develop treatment plans, supports and skills that will successfully extend beyond a school setting. Increased and ongoing focus on issues of generalization and maintenance of skills is critical. Factors raised by Stokes and Baer (1977) regarding best practices to achieve generalized behavior change continue to be timely and relevant and must be considered in educational and transition planning. Consideration should be given to factors, such as aiming for natural contingencies of reinforcement (plan to have desired behavior come under the control of stimuli in the post-transition environment), programming common stimuli (using post-transition materials to prepare for the environment

after transition), and teaching sufficient examples/training loosely (preparing individuals to deal with variability in the post-transition environment) to effectively prepare student for transitions. Development of programming with these factors in mind can have a significant impact on the success of post-transition placements.

However, teaching or developing skills to match the potential treatment settings is not sufficient. It is of critical importance that practitioners improve behavioral services for the current and future populations of adults with autism. This requires systematic extension and replication of findings from clinical and research literature in younger populations and exploration of strategies to implement effective behavioral procedures across the age span and in a continuum of environments. The need for translational research to extend applications of behavioral principles in a variety of settings is a challenge posed to applied researchers and practitioners. Specifically, practitioners must continue to expand and develop effective functional assessment models to specifically address the unique needs of adult populations and service settings. While some models, such as AB, trial-based, latency-based and precursor models of functional assessment have proven useful in these kinds of populations and settings, they are not commonly used and more work is needed to examine their feasibility and applications. Strategies to support dissemination and training of these techniques and systems to support ongoing flow of information from research settings to applied environments is needed. Applied researchers must seek to publish and present their findings and methods beyond scholarly communities in order to reach service providers, families, and agencies responsible for treatment funding. Perhaps the greatest way to bridge the gap between research and practice with this population is to develop training programs and/or some form of certification for working with adults with autism (including education related to the topic of clinical best practice). Institutions of higher learning could, in turn, create coursework in order to guide prospective practitioners.

Effective assessment and treatment procedures exist for this population. The literature, while focused predominantly on younger learners, has shown that these assessment and treatment strategies leads to dramatic improvement of outcomes for individuals with autism. Due to a variety of factors, state of the art assessment and intervention practices have been slower in their extension to adult populations with autism. Practitioners should continue to refine these procedures and take measures to facilitate their use in this underrepresented population.

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