

RECENT STUDIES ON FEEDING PROBLEMS IN CHILDREN
WITH AUTISM

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This paper reviews recent studies on behavioral interventions for children with autism and feeding problems. The applicability of interventions that have been tested with other populations of children with feeding problems is discussed, as well as directions for future research.

Key words: autism, feeding problems, food selectivity

Autism is characterized by impairments in social interaction, communication deficits, and repetitive or stereotyped behavior (American Psychiatric Association, 2000). The estimated prevalence of feeding problems in children with autism has been reported to be as high as 90% (Kodak & Piazza, 2008), with close to 70% of children described as selective eaters (Twachtman-Reilly, Amaral, & Zebrowski, 2008). In fact, some authors have suggested that the presence of feeding difficulties in infancy may be an early sign of autism (Keen, 2008; Laud, Girolami, Boscoe, & Gulotta, 2009; Twachtman-Reilly et al.).

Research has shown that strategies based on applied behavior analysis are effective for increasing appropriate behavior and decreasing inappropriate behavior in children with autism (Kodak & Piazza, 2008). Therefore, it is reasonable to assume that similar strategies would be effective for treating their feeding problems. Surprisingly, only four studies published in the *Journal of Applied Behavior Analysis (JABA)* and a few additional studies published in other journals (e.g., *Behavioral Interventions*) since 2007 focused on treatment of feeding problems in children with autism. A brief description of these studies and suggested areas of future research follow.

In a study by Najdowski et al. (2008), caregivers of 6 children (5 with autism and food selectivity) conducted a functional analysis of their children's inappropriate mealtime behavior. Results showed that caregivers could be trained to implement the functional analyses with high integrity. Borrero, Woods, Borrero, Masler, and Lesser (2010) conducted descriptive analyses for 25 children (3 with autism) who exhibited severe food refusal or selectivity. Results of conditional probability calculations of the consequences delivered by parents (escape, attention, tangible items) for food refusal suggested that escape (meal termination) and attention (coaxing) were the most frequently observed consequences.

Valdimarsdottir, Halldorsdottir, and Sigurdardottir (2010) showed that differential reinforcement of alternative behavior, nonremoval of the fork, and stimulus fading increased consumption of nonpreferred food for 1 child with autism in two settings and with caregivers. Anglesea, Hoch, and Taylor (2008) examined the effects of a pager prompt on the rapid eating of 3 teenagers with autism. Rapid eating decreased when the participants were taught to take bites only following vibrations from a pager.

Sharp and Jaquess (2009) conducted assessments to identify the largest bite size and highest texture 1 child with autism and food selectivity could consume. Escape extinction, noncontingent access to preferred items, and

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texture fading resulted in increases in consumption, volume, and texture of nonpreferred foods. Laud et al. (2009) evaluated the effectiveness of an interdisciplinary feeding program for 46 children with autism. Each participant received therapy based on principles of applied behavior analysis for 3 hr per day and oral motor therapy for 1 hr per day, 5 or 7 days per week. Acceptance and grams consumed increased and refusal behavior and negative vocalizations decreased between admission and discharge. Williams, Riegel, Gibbons, and Field (2007) also demonstrated the effectiveness of a day-treatment feeding program that used behavioral interventions. However, individual data for the children with autism were not presented.

Although recent research that focuses specifically on the assessment and treatment of feeding problems in children with autism is limited, there is a much broader literature for other pediatric populations with similar problems that may provide some guidance. Traditionally, escape extinction (nonremoval of the spoon or physical guidance) has been found to be effective as treatment alone or in conjunction with other procedures (Ahearn, Kerwin, Eicher, Shantz, & Swearingin, 1996; Hoch, Babbitt, Coe, Krell, & Hackbert, 1994; Kerwin, Ahearn, Eicher, & Burd, 1995; Piazza, Patel, Gulotta, Sevin, & Layer, 2003; Reed et al., 2004). For example, escape extinction has been combined with differential reinforcement (Patel, Piazza, Martinez, Volkert, & Santana, 2002), noncontingent reinforcement (Reed et al.), the high-probability sequence (Patel, Reed, et al., 2005), simultaneous presentation of preferred and nonpreferred food (Buckley & Newchok, 2005), and redistribution (Gulotta, Piazza, Patel, & Layer, 2005).

In recent years, only two studies in *JABA* have focused on feeding problems in children without autism. Girolami, Boscoe, and Roscoe (2007) showed that re-presentation (placing expelled bites back into the child's mouth)

using a Nuk brush was more effective in decreasing expulsion than re-presentation with a spoon. Expulsion further decreased when feeders used the Nuk brush to present bites initially. Bachmeyer et al. (2009) used escape extinction (nonremoval of the spoon) and attention extinction (no differential consequence for inappropriate mealtime behavior) individually and in combination with 4 children whose inappropriate mealtime behavior was maintained by escape and attention. Attention extinction alone did not decrease inappropriate mealtime behavior or increase acceptance. By contrast, escape extinction alone decreased inappropriate mealtime behavior and increased acceptance. However, combined attention and escape extinction resulted in further decreases in inappropriate mealtime behavior and increases in the stability of acceptance relative to escape extinction alone.

Although only a few studies have conducted functional analyses of inappropriate mealtime behavior in children with and without autism, we believe that functional analyses could be useful to prescribe treatment for children with autism and feeding problems. Girolami and Scotti (2001), Najdowski et al. (2008), and Piazza, Fisher, et al. (2003) showed that functional analyses of inappropriate mealtime behavior identified behavioral function for most children. However, follow-up studies should be conducted with a larger group of children with autism to determine if functional analyses identify functional reinforcers for inappropriate mealtime behavior. Piazza, Fisher, et al. and Borrero et al. (2010) showed that the consequences used in analogue functional analyses of inappropriate mealtime behavior were similar to the natural consequences used by caregivers during meals; the social validity of the functional analyses should be extended to caregivers of children with autism. Although Najdowski et al. showed that caregivers of children with autism and food selectivity could be trained to conduct functional analyses of inappropriate

mealtime behavior with high integrity at home, future studies could also assess whether caregivers of children with autism could be trained to implement function-based treatments.

Because a large number of children with autism demonstrate food selectivity, future research should focus on the function of selective eating and methods of treatment. For example, function-based assessments could be conducted to extend the work of Munk and Repp (1994) and Patel, Piazza, Layer, Coleman, and Swartzwelder (2005) to determine how bolus size, food type, texture, flavor, color, shape, and utensils influence feeding behavior. Such function-based assessments could be used to prescribe treatments that manipulate relevant variables (e.g., texture) to expand the variety of foods consumed.

An additional avenue for future research would be to apply the basic literature on conditioned food preferences and aversions (Capaldi, 1996) to the assessment and treatment of selectivity. For example, using the principle of flavor-flavor conditioning, Mueller, Piazza, Patel, Kelley, and Pruett (2004) demonstrated that blending nonpreferred and preferred foods and gradually increasing the proportion of nonpreferred to preferred foods in the blend was effective in increasing the variety of foods consumed by 2 children without autism. This finding was consistent with data from studies on flavor-flavor conditioning that have found that blending a novel flavor with a preferred flavor results in increased preference for the novel flavor. There are several other methods by which flavor preferences and aversions can be conditioned (e.g., Green & Garcia, 1971); future studies could assess treatments that are based on these theories.

The broader literature on autism (i.e., on behavior patterns, behavioral function, and treatment prescription) may provide information that could be applied to the assessment and treatment of the feeding problems of children with autism. For example, these children often

engage in stereotypic or ritualistic behavior, and the extent to which feeding problems are a member of the same response class as stereotypic or ritualistic behavior is unknown. If some topographies of inappropriate mealtime behavior (e.g., packing, expulsion) are maintained by automatic reinforcement, procedures that have been tested with other populations of children with pediatric feeding disorders (e.g., redistribution for packing, Gulotta et al., 2005; representation for expulsions, Girolami et al., 2007) may not be similarly effective. Laud et al. (2009) suggested that effective treatments for pediatric feeding disorders in other populations may not yield the same findings in children with autism because of inherent differences (e.g., genetics) in the two groups.

Because children with autism respond well to routines (Kodak & Piazza, 2008), treatments for pediatric feeding disorders that capitalize on routines should be examined. For example, Patel et al. (2007) presented high-probability demands (three presentations of an empty spoon) followed by a low-probability demand (a spoon with food) to increase the food acceptance of a young child with pervasive developmental disorder. Future studies should replicate and extend those of Patel et al. with a larger group of children with autism.

The results of a number of studies have shown that early intervention is effective in ameliorating the symptoms of autism. Research should evaluate the effectiveness of early intervention of feeding problems, and more important, methods to prevent the emergence of feeding problems. Finally, little is known about how early and ongoing poor diet and nutrition affect the motor, cognitive, and behavioral development of children with autism. This issue is of great importance.

Feeding problems are commonly exhibited by children with autism. Only a few recent studies have examined methods of assessment and treatment of feeding problems exclusively in children with autism. Additional research is

needed to evaluate the effects of (a) commonly used and novel treatments, (b) prevention and early intervention, and (c) poor diet and nutrition on later development.

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