



A Validity Study on the Questions About Behavioral Function (QABF) Scale: Predicting Treatment Success for Self-Injury, Aggression, and Stereotypies

Johnny L. Matson, Jay W. Bamburg, Katie E. Cherry

Louisiana State University

Theodosia R. Paclawskyj

Kennedy Krieger Institute and Johns Hopkins Medical School

We investigated the validity of the Questions About Behavioral Function (QABF), a checklist designed to assess antecedent behavior, using a sample of 398 persons with mental retardation and a targeted maladaptive behavior of self-injurious behavior, aggression, or stereotypies. The QABF was used successfully to derive clear behavioral functions for most individuals (84%) across all three target behaviors. Further, subjects with treatments developed from functional assessment (QABF results) improved significantly when compared to controls receiving standard treatments not based on functional analysis. Implications of the present findings for assessing and treating maladaptive behaviors are discussed.

Functional assessment has been described as the most effective tool for successfully individualizing behavioral interventions in persons with mental retardation (Horner, 1989; Repp, Felce, & Barton, 1998). This tool represents a unique combination of basic and applied research and includes procedures that

Address correspondence to: Dr. Johnny L. Matson, Department of Psychology, Audubon Hall, Louisiana State University, Baton Rouge, LA 70803-5501. E-mail: JohnMatson@aol.com

define the relationship between internal or external events and specified target behaviors (Smith & Iwata, 1997; Sprague & Horner, 1995). Functional assessment can include indirect methods such as checklists and observations or direct procedures such as analog sessions. The use of the functional-assessment technology has given mental health professionals the knowledge to predict the most effective course of treatment before program implementation, often resulting in greater generalization and maintenance of treatment effects (Axelrod, 1987; Malott, Whaley, & Malott, 1993).

Until recently, most research in the area of functional assessment involved the technique generally referred to as experimental-analog functional analysis (EFA) (Carr, 1994; Iwata, Dorsey, Slifer, Bauman, & Richman, 1984). The methodology of EFA requires the experimental manipulation of antecedents and/or consequences that are thought to be maintaining maladaptive behavior. Function is then denoted on the basis of consistent responding within specific experimental conditions. EFA has become a highly influential technology within the area of applied behavior analysis and has been used with a number of behavior problems with small samples of two to four people, including self-injury, stereotyped behaviors, dangerous pill taking, disruptive behavior, aggression, property destruction, and multiple behavior problems (Chapman, Fisher, Piazza, & Kurtz, 1993; Grace, Kahng, & Fisher, 1994; Sturmey, Carlsen, Crisp, & Newton, 1988; Vollmer, Marcus, & LeBlanc, 1994).

Although EFA is one of the most widely used technologies in the field of behavior analysis, the design presents users with a number of procedural and psychometric problems (Sturmey, 1995). Experimental functional analyses are extremely time consuming and are not cost-effective. The technology uses multi-element designs in which several experimental conditions alternate rapidly. These sessions usually last 10 to 15 min, with breaks between each session. Blocks of four sessions are scheduled once or twice daily for several days; therefore, one EFA can take several hours daily over a 2- to 3-week period to complete. This time frame, in conjunction with the need for consultation from experts and extensive staff intervention, often makes EFA an inefficient method of assessment for persons with severe behavior problems (Sturmey, 1995).

Another problem with EFA is the technology's lack of acceptable psychometric properties. Although the analog method of functional analysis is commonly used, the extent to which the results obtained from such an assessment are reliable or agree with other methods (i.e., ascribe the same function) has been poorly researched (Martin, Gaffan, & Williams, 1999). Agreement between analog assessment and naturalistic observation are good, but only when restricting the comparison to topographies for which both methods are able to ascribe behavioral function (Emerson, Thompson, Reeves, Henderson, & Robertson, 1995). Toogood and Timlin (1996) compared three different methodologies of functional analysis (experimental, informant/indirect assessment, direct observation) for 121 challenging behaviors displayed by 20 individuals with severe and profound mental retardation. The researchers found that the meth-

odologies varied with regard to the probability of defining function; the informant/indirect assessment was able to ascribe function for 74% of the behaviors assessed, direct observation yielded potential function for 68% of cases, and analog assessment only 41%. Further, the researchers found that the experimental (analog) method failed to ascribe function in 50% of cases tested compared with 11–15% for the informal/interview assessment and 18% for direct observation. Finally, Martin et al. (1999) found the test–retest reliability and convergent validity of experimental functional analysis to be weak to poor. In the Martin et al. study, clinicians using EFA were able to clearly identify less behavioral functions when compared with other methods of functional analysis. Further, the reliability coefficients found for EFA varied dramatically across time periods and conditions.

As a result of the problems with EFA, researchers and clinicians alike have begun investigating more effective, efficient, psychometrically sound means of ascribing behavioral function (Carr, 1994; Lowry & Sovner, 1991). One method that is receiving increasing attention involves completing behavioral checklist that aid in developing hypotheses about the functions of aberrant behaviors and treatments that decrease the occurrence of the aberrant behavior while increasing adaptive skills to replace that behavior. The Questions About Behavioral Function (QABF) scale is a relatively new, reliable instrument designed to serve just those purposes. In addition to well established interrater and test-retest reliability, the five subscales on the QABF (e.g., escape, attention, nonsocial, tangible, pain-related) have been confirmed via factor analysis (Matson & Vollmer, 1995; Paclawskyj, 1998).

The present research was designed to investigate the validity and treatment utility of the QABF. In Experiment 1, we were interested in the number of persons within each aberrant behavior group that were ascribed clear behavioral functions through use of the QABF protocol. In Experiment 2, we investigated the treatment utility of the QABF by comparing changes in aberrant behavior total scores for persons with treatments based on functional analysis results (via QABF) with changes for persons with a standard treatment protocol (interrupt, block, redirect) that was not based in functional assessment. This research has implications for the assessment and treatment of aberrant behaviors because the QABF could provide researchers and clinicians with a very time-efficient protocol for assessing aberrant behavior functions while helping to select treatments that are likely to be effective.

Experiment 1

The purpose of Experiment 1 was to establish the percentage of individuals whose maladaptive behaviors were ascribed clear behavioral functions through QABF functional analysis. Additionally, we sought to identify the behavioral antecedents that were most common for self-injurious behavior (SIB), aggression, and stereotypies.

TABLE 1
Demographics for SIB, Aggression, and Stereotypies Groups

	Group 1 SIB (<i>n</i> = 118)	Group 2 Aggression (<i>n</i> = 83)	Group 3 Stereotypies (<i>n</i> = 197)
Age	<i>M</i> = 41.24	<i>M</i> = 43.27	<i>M</i> = 40.58
Race			
White	78.3%	66.7%	67.1%
African-American	21.7%	33.3%	32.9%
Gender			
Male	53.6%	56.8%	72.7%
Female	46.4%	43.2%	27.3%
Level of MR			
Severe	6.6%	3.9%	4.5%
Profound	93.4%	96.1%	95.5%
Blind	22.7%	14.2%	22.3%
Deaf	17.8%	21.4%	16.0%
Seizure disorder	25.7%	29.2%	27.5%
Confined to bed or wheelchair	21.3%	7.6%	35.8%
Verbal	45.9%	58.2%	57.6%

M, mean; MR, mental retardation.

METHODS

Participants

A total of 398 individuals from a developmental center in Louisiana were studied. Participants exhibited either SIB, aggression, or stereotypies severe enough to be identified by the habilitation team as needing treatment. Participants were diagnosed with severe or profound mental retardation based on DSM-IV criteria, including deficits in intellectual and adaptive functioning evident before 18 years of age (APA, 1994). Individuals evincing only one aberrant behavior were placed in the group corresponding to that behavior. Individuals exhibiting SIB were placed in Group 1 (*n* = 118), persons with aggression in Group 2 (*n* = 83), and persons with stereotypies in Group 3 (*n* = 197). Individuals diagnosed with more than one of the problem behaviors were excluded to avoid having participants in more than one group. Table 1 contains the demographic data for the groups (by problem behavior).

Interviewers and Informants

Interviewers were professionals with a masters degree in clinical psychology and experience in the area of mental retardation. All persons administering the QABF had been employed by the developmental center for at least 1 month before the assessment interview. Interviewers were trained on the administration and scoring of the QABF by a licensed supervising psychologist or a trained

doctoral student in clinical psychology. The client in question was part of the interviewer's regular caseload; that is, the interviewers knew the clients well and were responsible for the active treatment program for the individuals in question. The interview and scoring process took approximately 30 min to complete.

Informants were those persons providing answers to the QABF questions (direct support staff). Only those direct support staff who had worked with the client for over 6 months and reported that they were familiar enough with the client to answer specific questions regarding problem behaviors were included in the study. Informants were either the client's home manager (charge staff) or the client's group leader.

Materials

QABF. The QABF is a 25-item questionnaire designed to identify the variables maintaining problem behavior (social attention, escape, tangible reinforcement, physical discomfort, nonsocial reinforcement) in persons with mental retardation (Matson & Vollmer, 1995). It is scored on a 4-point Likert scale from 0 (never) to 3 (often). If an item does not apply to the behavior in question, the N/A option may be endorsed. Two summary statistics are obtained from the QABF: item endorsement (max = 5) and total score (max = 15). The QABF is scored by summing the number of item endorsements in each subscale and summing the severity of the endorsements for each of the subscales to arrive at 5 subscale scores (item endorsement and severity). Coefficient α and Guttman split-half reliability coefficients for the QABF were excellent ($r = .86$ and $r = .91$, respectively (Matson et al., 1996). In later research, the QABF was shown to have very good test-retest and inter-rater reliabilities ($r = .87$ and $r = .79$) (Paclawskyj, 1998). A factor analysis of the QABF yielded five factors whose labels correspond to the subscales of the measure, accounting for 76.1% of the variance shared by test items (Paclawskyj, 1998).

Procedure

QABFs were administered at the developmental center. Before the interview, the purpose and rationale for the assessment was explained to the informant. The interviewers requested that the informant ask questions throughout the assessment if necessary. All items were read aloud by the interviewer, and explanation and clarification of specific items was provided as needed. Administration and scoring time averaged 30 min per client.

RESULTS

We conducted analyses to establish the percentage of individuals in each of the maladaptive behavior groups with a clear behavioral antecedent on the QABF. Clear behavioral functions (defined as subscales with a minimum score

TABLE 2
Prominent Antecedents and Severity Scores for Each Group

	Group 1 SIB	Group 2 Aggression	Group 3 Stereotypies
Percent of group identified with clear antecedent	83%	74%	93.3%
Prominent antecedents	Nonsocial (45%) Escape (36%)	Attention (38.7%) Escape (35.3%)	Nonsocial (93.3%)
Severity scores for prominent antecedents (means)	Nonsocial ($M = 6.36$) Escape ($M = 8.22$)	Attention ($M = 4.89$) Escape ($M = 6.16$)	Nonsocial ($M = 11.66$)

M = mean.

of 4 of 5 possible endorsements on a subscale with no other subscales containing significant endorsements) were found for 84% of the total sample. Additionally, we evaluated the antecedents that were the most prominent for each aberrant behavior and the average total scores for each of the most prominent antecedents. For the SIB group, the two most prominent antecedents were nonsocial and escape. The nonsocial antecedent yielded the highest average total score in the SIB group (mean = 6.36, standard deviation = 5.37). The aggression group also yielded two significant antecedents, attention and escape. The highest average score in the aggression group was found for the escape antecedent (mean = 6.16, standard deviation = 5.04). The final group, persons evincing stereotypies, yielded only one significant antecedent, nonsocial. The total score for the nonsocial antecedent was the largest in the analyses (mean = 11.66, standard deviation = 3.97). Percent of sample with a clear antecedent, prominent antecedents, and severity scores for each of the aberrant behavior groups appear in Table 2.

DISCUSSION

The results of Experiment 1 support the past findings about the primary functions of maladaptive behaviors (Applegate, Matson, & Cherry, in press; Repp et al., 1988). For example, Iwata et al. (1994) found that SIB was maintained by both nonsocial and escape factors. Treatments addressing deficits in communication skills as well as manipulations to increase environmental stimulation seem warranted in these cases. Stereotypies were also maintained by nonsocial contingencies (automatic reinforcement). This finding is consistent with other researchers and indicates the need for appropriate environmental stimulation as a portion of treatment protocols (Applegate et al., in press). Conversely, aggression seems to be externally driven and under the control of the environmental factors such as attention and escape. These data have important treatment implications, as protocols addressing social and communication skill building in conjunction with various environmental manipulations that can

account for the externalizing nature of the antecedents seem warranted. Unfortunately, these are not common practice in most community settings and developmental centers where the focus tends to be on behavior suppression via psychotropic medications (e.g., chemical restraint) or intrusive behavioral programming alone.

Experiment 2

The purpose of Experiment 2 was to assess the value of QABF predictions of function for selecting effective treatments. Experimental and control conditions were therefore devised for SIB, aggression, and stereotypies. Members of the experimental groups were those with behavior treatment plans designed from the results of QABF functional analysis. Controls were those individuals with standard treatment plans consisting of interrupting, redirecting, and blocking maladaptive behaviors. These treatment plans were not derived from results of functional analyses.

METHOD

Participants

Participants were 180 individuals drawn from the original total sample ($N = 398$). Individuals with treatment plans derived from the results of functional assessment were selected from the facility's implementation database to identify those persons with implemented treatment plans based on QABF results. Each of the groups (SIB, aggression, stereotypies) was then separated into a 30-member treatment group and 30-member control group to conduct analyses (6 total groups). The center was in the process of preparing functionally driven plans, but no particular priority for clients with aberrant behavior was established; therefore, group assignment was achieved through a quasi-random sampling method.

Procedure

Treatment efficacy of the QABF was evaluated by including only individuals with a clear behavioral antecedent from the QABF. Clear antecedents were defined as four out of a possible five-item endorsement on one of the QABF subscales with no other elevations of that magnitude present on the assessment (all other elevations 2 or below) (Martin et al., 1999). Treatment group members had behavioral plans driven by QABF functional analysis (e.g., aberrant behaviors maintained by attention would include training of appropriate communication skills; aberrant behaviors maintained by nonsocial factors [automatic reinforcement] would include environmental enrichment and social skills training). Controls in each group were those with standard treatment protocols consisting

of interrupting, blocking, and redirecting an occurrence of maladaptive behavior. Once treatment and control groups were established within each maladaptive behavior group, difference scores were derived for each individual based on behavioral data (pretest – post-test = difference score). For the treatment groups, pretest was defined as the maladaptive behavior total (frequency) for the last month of baseline data collection before treatment implementation, and post-test was defined as the frequency of maladaptive behaviors after the sixth month of treatment implementation. The definition of pretest for the control groups was the frequency of the maladaptive behavior 6 months before the study, and the definition of post-test was the behavior total (frequency) for the month preceding data collection for the study.

RESULTS

The experimental groups for each of the maladaptive behaviors (SIB, aggression, stereotypies) improved significantly over the 6-month observation period. Means, standard deviations, and graphs depicting overall changes in maladaptive behavior for each of the treatment and control groups derived from the SIB, aggression, and stereotypies categories appear in Figures 1–3.

Separate one-way analyses of covariance with group (treatment vs. control) as the independent variable, difference score (pretest behavior total – post-test behavior total) as the dependent variable, and pretest scores as the covariate were conducted. The first analysis of treatment data were for the SIB group and yielded a significant group effect, [$F(2, 57) = 18.32, p < .001$] (see Figure 1). Participants in the SIB experimental group experienced a 66% decline in the rate of self-injurious behavior, while the SIB control group had their frequency of SIB reduced by only 21%. The second analysis of treatment data were for the aggression group and also yielded a significant group effect [$F(2, 57) = 59.87, p < .001$] (see Figure 2). A 59% decrease in aggression was produced for aggressive clients with treatment based in QABF functional analysis, whereas aggression in the control group decreased by only 19%.

The final analysis, for the stereotypies group, was significant [$F(2, 57) = 78.45, p < .001$] (see Figure 3). Stereotypies were decreased by 54% for individuals in the experimental group, whereas only a 15% decrease was found for controls. Each treatment and control group for the three categories experienced reduced frequency of maladaptive behavior with the onset of treatment. However, in each instance, marked gains were greater where the QABF results were used to design the intervention.

DISCUSSION

The development of treatments to train adaptive skills and decrease aberrant behaviors is the primary focus of mental health specialist in the field of developmental disabilities (Frea & Hughes, 1997). In this study, individuals

	PRETEST	POST-TEST
SIB		
Treatment group	$M = 17.93$ (SD = 15.56)	$M = 7.93$ (7.38)
Control group	$M = 22.3$ (SD = 20.26)	$M = 17.67$ (19.45)

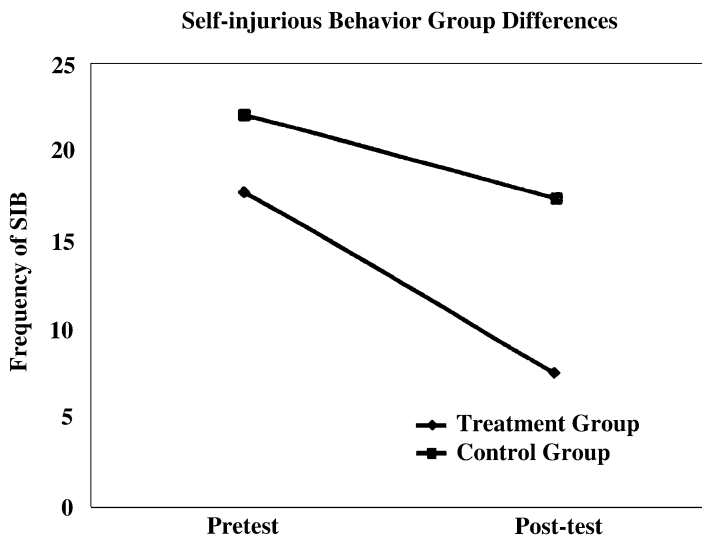


FIGURE 1. Means (M), standard deviations (SD), and graphs for SIB treatment and control groups.

with treatments driven by QABF functional analysis improved significantly more (lower frequency of aberrant behavior) when compared with persons with standard treatments not driven by functional analysis. These data are compelling in that this is by far the largest sample size in a functional analysis study for any of the three target behaviors studied. Additionally, assessments and treatments were conducted in the clients' naturalistic environments with the facility direct care and professional staff only in charge of implementing the treatment plan. In most EFA research, studies are in highly controlled settings with much higher staffing ratios than are available in community and developmental center settings. Thus, the results may be replicated easily in most applied settings.

The findings in Experiment 2 demonstrate the need for functional analysis protocols such as the QABF in the development of behavioral treatments. The

	PRETEST	POST-TEST
Aggression		
Treatment group	<i>M</i> = 21.07 (SD = 14.29)	<i>M</i> = 8.63 (8.01)
Control group	<i>M</i> = 25.17 (SD = 15.33)	<i>M</i> = 20.37 (14.11)

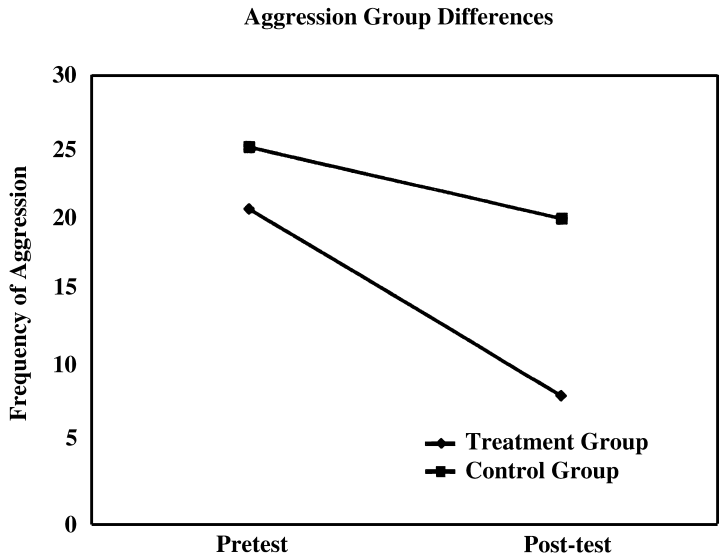


FIGURE 2. Means (*M*), standard deviations (*SD*), and graphs for aggression treatment and control groups.

QABF was helpful for identifying those factors maintaining aberrant behaviors, thus allowing those reinforcing contingencies to be removed through behavioral suppression procedures. More importantly, though, the QABF aids professionals in developing adaptive behaviors to replace the problem target behavior (i.e., communication skills for those acting out to acquire attention or escape task demands; environmental interaction for those evincing maladaptive behaviors for nonsocial purposes). Considering the severe nature of these problems, the prediction of effective treatments has very important ethical and practical treatment implications.

	PRETEST	POST-TEST
Stereotypes		
Treatment group	$M = 36$ (SD = 18.11)	$M = 16.73$ (13.22)
Control group	$M = 34.9$ (SD = 15.7)	$M = 29.77$ (16.22)

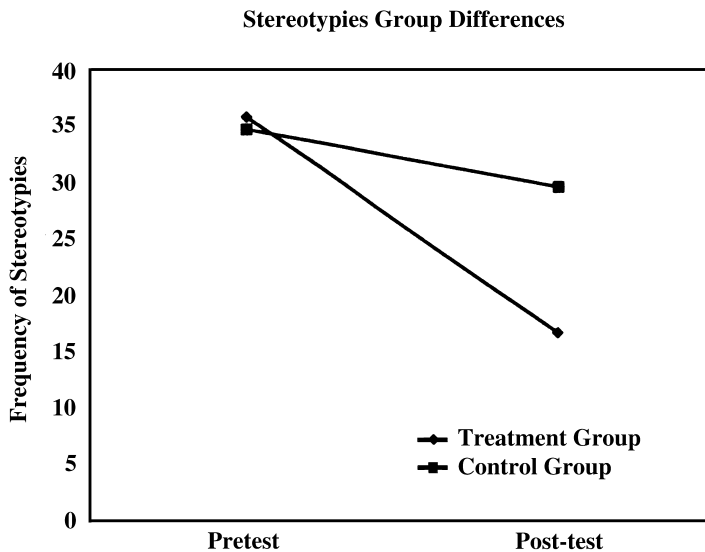


FIGURE 3. Means (M), standard deviations (SD), and graphs for stereotypes treatment and control groups.

GENERAL DISCUSSION

Functional analysis technology is important in ameliorating aberrant behavior (Malott et al., 1993). The QABF is one viable instrument for assessing the antecedents/functions of maladaptive behaviors. The QABF was used successfully to identify behavioral antecedents for most individuals in the sample (84%) and supplied information about the severity of the maladaptive behavior in question. Additionally, we were able to use the instrument to demonstrate its efficacy in treatment development, as individuals with treatment protocols based in functional analysis improved significantly when compared with controls with standard treatments not based on functional assessment.

Although much of the research conducted on functional analyses has focused on the experimental/analog methodology, there is a need for more efficient and reliable methods of conducting functional analyses (Horner, 1994). Experimental analyses are time-consuming, costly, and frequently yield results lacking reliability and validity (Martin et al., 1999; Sturmey, 1995). Further, analog analyses have not proven effective in assessing low frequency behaviors (Whitaker, 1993). There are also a number of ethical issues associated with eliciting aberrant behaviors such as those noted in this study. The QABF seems to be an improvement in each of these areas. The instrument can be administered and scored in half an hour by mental health specialists trained by supervising psychologists. Additionally, the instrument has demonstrated very good reliability and validity in preliminary analyses (Paclawskyj, 1998). Finally, the behavior checklist format of the QABF allows for the assessment of low-frequency behaviors because the behavior does not have to be elicited and observed for decisions about behavioral antecedents to be made.

In closing, the utility of the QABF has been well demonstrated here and elsewhere (Applegate et al., in press; Matson et al., 1996; Paclawskyj, 1998). However, we advocate the use of the instrument as only one portion of larger functional assessments that include evaluations of intellectual and adaptive abilities, social and communication skills, and symptoms of psychopathology. Assessments including each of these components should be the cornerstone of effective treatment development.

REFERENCES

- American Psychiatric Association. (1994). *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV). Washington, DC: American Psychiatric Association.
- Applegate, H., Matson, J. L., & Cherry, K. E. (In press). An evaluation of functional variables affecting severe problem behaviors in adults with mental retardation. *Research in Developmental Disabilities*, 20.
- Axelrod, S. (1987). Functional and structural analyses of behavior: Approaches leading to reduced use of punishment procedures? *Research in Developmental Disabilities*, 8, 165–178.
- Carr, E. G. (1994). Emerging themes in the functional analysis of problem behaviour. *Journal of Applied Behavior Analysis*, 27, 393–399.
- Chapman, S., Fisher, W., Piazza, C. C., & Kurtz, P. F. (1993). Functional assessment: A treatment of life-threatening drug ingestion in dually diagnosed youth. *Journal of Applied Behavior Analysis*, 26, 255–256.
- Emerson, E., Thompson, S., Reeves, D., Henderson, D., & Robertson, J. (1995). Descriptive analysis of multiple response topographies of challenging behaviour across two settings. *Research in Developmental Disabilities*, 16, 301–329.
- Frea, W. D., & Hughes, C. (1997). Functional analysis and treatment of social-communicative behavior of adolescents with developmental disabilities. *Journal of Applied Behavior Analysis*, 30, 701–704.
- Grace, N. C., Kahng, S. W., & Fisher, W. W. (1994). Balancing social acceptability and treatment effectiveness of an intrusive procedure: A case report. *Journal of Applied Behavior Analysis*, 27, 171–172.
- Horner, R. H. (1989). Recommendations based on community support for people with develop-

- mental disabilities and destructive behavior. In: *Treatment of Destructive Behaviors in Persons with Developmental Disabilities* (NIH Publication No. 91-2410, pp. 64-69). Bethesda, MD: National Institutes of Health.
- Horner, R. H. (1994). Functional assessment: Contributions and future directions. *Journal of Applied Behavior Analysis*, **27**, 401-404.
- Iwata, B. A., Dorsey, M. F., Slifer, K. J., Bauman, K. E., & Richman, G. S. (1984). Toward a functional analysis of self-injury. *Analysis and Intervention in Developmental Disabilities*, **2**, 1-20.
- Iwata, B. A., Pace, G. M., Dorsey, M. F., Zarcone, J. F., Vollmer, T. R., Smith, R. G., Rodgers, T. A., Lerman, D. C., Shore, B. A., Mazaleski, J. L., Goh, H. L., Cowdery, G. E., Kalsner, M. J., McCosh, K. C., & Willis, K. D. (1994). The functions of self-injurious behavior: An experimental epidemiological analysis. *Journal of Applied Behavior Analysis*, **27**, 215-240.
- Lowry, M., & Sovner, R. (1991). The functional significance of problem behavior: A key to effective treatment. *The Habilitative Mental Healthcare Newsletter*, **10**, 59-62.
- Malott, R. W., Whaley, D. L., & Malott, M. E. (1993). *Elementary Principles of Behavior* (2nd ed.). Englewood Cliffs, NJ: Prentice Hall.
- Martin, N. T., Gaffan, E. A., & Williams, T. (1999). Experimental functional analyses for challenging behaviour: A study of validity and reliability. *Research in Developmental Disabilities*, **20**, 125-146.
- Matson, J. L., & Vollmer, T. R. (1995). *User's Guide: Questions About Behavioral Function (QABF)*. Baton Rouge, LA: Scientific Publishers, Inc.
- Matson, J. L., Vollmer, T., Paclawskyj, T., Smirolodo, B., Applegate, H., & Stallings, S. (1996). Questions about behavioral function (QABF): An instrument to assess functional properties of problem behaviors. Poster presented at the 22nd Annual Convention of the Association for Behavior Analysis, San Francisco, CA.
- Paclawskyj, T. (1998). Questions about behavioral function (QABF): A behavioral checklist for functional assessment of aberrant behavior. Unpublished dissertation.
- Repp, A. C., Felce, D., & Barton, L. E. (1988). Basing the treatment of stereotypic and self-injurious behaviors on hypotheses of their causes. *Journal of Applied Behavior Analysis*, **21**, 281-289.
- Smith, R. G., & Iwata, B. A. (1997). Antecedent influences on behavior disorders. *Journal of Applied Behavior Analysis*, **30**, 343-375.
- Sprague, J. R., & Horner, R. H. (1995). Functional assessment and intervention in community settings. *Mental Retardation and Developmental Disabilities Research Reviews*, **1**, 89-93.
- Sturmey, P. (1995). Analog baselines: A critical review of the methodology. *Research in Developmental Disabilities*, **16**, 269-284.
- Sturmey, P., Carlsen, A., Crisp, A. G., & Newton, T. (1988). A functional analysis of multiple aberrant responses: A refinement and extension of Iwata et al.'s methodology. *Journal of Mental Deficiency Research*, **32**, 31-46.
- Toogood, S., & Timlin, K. (1996). The functional assessment of challenging behaviour: A comparison of informant-based, experimental, and descriptive methods. *Journal of Applied Research in Intellectual Disabilities*, **9**, 206-222.
- Vollmer, T. R., Marcus, B. A., & LeBlanc, L. (1994). Treatment of self-injury and hand mouthing following inconclusive functional analyses. *Journal of Applied Behavior Analysis*, **27**, 331-344.
- Whitaker, S. (1993). The reduction of aggression in people with learning disabilities: A review of psychological methods. *British Journal of Clinical Psychology*, **32**, 1-37.