Articles

Teacher Involvement in the Development of Function-Based Behaviour Intervention Plans for Students With Challenging Behaviour

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This article examines literature published since 1997 on functional behaviour assessment (FBA) and behaviour intervention plans (BIPs), involving school-based personnel, for children identified as having or being at risk of emotional/behavioural disorder (E/BD) in school settings. Of interest was the level of involvement of school-based personnel in the FBA and BIP processes, intervention efficacy, the social validity of assessment and intervention, and intervention treatment integrity. Results indicate that involvement of school-based personnel in all FBA processes and BIP design was not common practice. FBA-based BIPs were found to be effective in reducing problem behaviours targeted for change for the majority of student participants. Social validity and treatment integrity measures, when reported, were high. Issues of training and barriers to successful application are discussed.

Keywords: functional behavioural assessment, behavioural intervention plans, school-based intervention, training and development

Schools today are charged with providing quality education to a diverse group of students from various cultural, economic, and social backgrounds (Van Acker, Boreson, Gable, & Potterton, 2005). With increasing emphasis on inclusion, a greater number of students with disabilities are now enrolled in general education settings, and are likely to remain in those settings (Ashman & Elkins, 2004). At times, these students will present with challenging behaviours that require specialised programming (Ashman & Elkins, 2004).

Commonly, students with emotional and behavioural disorders (E/BD) present teachers with the some of the most challenging behaviours in general education settings (Carter, Clayton, & Stephenson, 2006). The prevalence of students with E/BD in schools internationally has been reported as 3% to 10% of the population (Beaman, Wheldall, & Kemp, 2007). These figures are similar to those reported in Australian studies of 3% to 6% (Carter et al., 2006). Westwood and Graham (2000, p. 26) suggest that if students with '…very mild and short-term behaviour problems …' were added to the above, the number would be as high as 40%. Given these

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numbers, it is vital that teachers have the necessary behaviour management and programming skills to allow for effective academic and behavioural instruction for all students (Beaman et al., 2007).

Many of the students who display challenging behaviours require individualised interventions to reduce or eliminate inappropriate behaviours, and encourage more appropriate replacement behaviours (Maag & Katsiyannis, 2006). As a part of the process of developing an individual intervention, a behaviour intervention plan (BIP) is commonly developed (Ingram, Lewis-Palmer, & Sugai, 2005). These BIPs should be based on information gathered via evidence-based practices such as functional behaviour assessment (Maag & Katsiyannis, 2006). Functional behavioural assessment (FBA) offers educators an effective assessment process that can guide intervention planning (Barnhill, 2005).

The aim of functional behavioural assessment is to describe the relationship between behaviour, its antecedents, and the controlling consequences (Gresham, 2003). The full FBA process typically involves the use of at least one indirect assessment method such as: interview, review of records, completion of a behavioural rating scale, and adaptive behaviour assessments. When reviewed, the results of these assessment strategies can show trends or patterns of behaviour, clarifying which events are triggers and consequences that maintain the behaviour. This information leads to hypotheses formation based on identified antecedents and functions (Watson & Steege, 2003). Following hypothesis formation, direct assessment methods such as observations, and experimental manipulations should be completed to verify hypotheses (Watson & Steege, 2003).

FBA originated within applied behaviour analysis, a set of principles to explain human behaviour, which has existed for more than 30 years (Gresham et al., 2004). Although originally designed as an assessment to ascertain the function of self-injurious behaviours (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982), the use of FBA has now become more widespread in school settings. In the last decade, FBA has become mandatory in the United States under the 1997 *Individuals with Disabilities Education Act,* when a student's behaviour results in a change of placement, or a suspension of more than 10 days (Van Acker et al., 2005). Since then many excellent instructional texts and articles have been published detailing the processes of FBA in school settings (see, e.g., Barnhill, 2005; O'Neill et al., 1997; Watson & Steege, 2003).

In the last decade, individuals with emotional/behavioural disorders (E/BD) have increasingly received interventions based on FBA. A number of studies have been published that have synthesised and critiqued its use with this population (see, e.g., Fox, Conroy, & Heckaman, 1998; Heckaman, Conroy, Fox & Chait, 2000; Lane, Umbreit, & Beebe-Frankenberger, 1999; Reid & Nelson, 2002; Sasso, Conroy, Stichter, & Fox, 2001). Considering the challenging nature of the behaviours exhibited by this population (Cowick & Storey, 2000), it is critical that effective and procedurally sound plans to reduce both instances and severity of problem behaviours are created (Maag & Katsiyannis, 2006).

A number of researchers have advocated caution about the use of FBA, based on concerns about instrument validity, maintenance and generalisation problems, ethical considerations, and poor implementation integrity (see Gresham, 2003; Reid & Nelson, 2002; Sasso et al., 2001). Some debate continues as to whether FBA actually leads to better plans than non-FBA-based interventions with students with E/BD (Gresham et al., 2004). A number of studies have reported, however, on FBA-based BIPs that have been effective in reducing problems behaviours in school settings (Heckaman et al., 2000; Kern, Hilt, & Gresham, 2004). In Australia, FBA, although not

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mandatory, is seen as a promising practice, and is more likely to be conducted by behavioural specialists and learning support teams when specific behavioural problems are evident (Conway, 2006).

As there is a high demand for FBAs, especially in the United States and insufficient experts or consultants to carry them out in a timely fashion, training of practitioners is an emerging concern (Quinn et al., 2001; Van Acker et al., 2005). Internationally the demand for training is increasing (LaVigna, Christian, & Willis, 2005). To address the skill shortage many experts have been involved in training school-based personnel in FBA, including whole states (Van Acker et al., 2005), and school districts (Crone, Hawken, & Bergstrom, 2007; Scott, Liaupsin, Nelson, & McIntyre, 2005). These experts have identified a number of issues around training that need to be addressed (Crone et al., 2007; Van Acker et al., 2005), including questions about the ability of school-based personnel to conduct complex FBAs independently (Sailor et al., 1999–2000; Scott & Nelson, 1999). There are also reservations about FBA 'efficiency' in school settings if these were to be carried out by school personnel, given the existing workloads of general educators (Scott, Bucalos et al., 2004).

This article seeks to review the recent empirical research on the involvement of school-based teams or personnel in the application of FBA and intervention planning for students with, or at risk of E/BD. It was of interest to determine (a) the level of participation of school-based personnel in the FBA process and intervention design, as reported in the literature (b) the efficacy of those FBA-based interventions, (c) the acceptability of FBA and related BIPs to personnel in school-based teams, (d) the ability of school-based personnel to implement the interventions with integrity, (e) the training and support school-based personnel received in order to conduct the FBA process, and (f) the barriers to successful application of FBA in school settings that were identified in the literature.

Method

Relevant studies were located by carrying out searches of the ERIC, PsycINFO, and Metalib databases, from the present to 1997, using combinations of the following descriptors: *functional behavioral assessment, FBA, functional assessment, functional analysis, challenging behavior, emotional disturbance, emotionally disturbed, seriously emotionally disturbed, behavior disorders* and *descriptive assessment.*

In addition, the contents pages (from 2002 to 2007) of the following journals, likely to publish research on FBA in schools were examined: *Behavioral Disorders, Journal of Applied Behavior Analysis, Journal of Behavioral Education, Journal of Emotional and Behavioral Disorders, Journal of Positive Behavioral Interventions, Education and Treatment of Children, Preventing School Failure, Psychology in the Schools, School Psychology Quarterly, School Psychology Review, Teaching Exceptional Children.* The reference lists from the studies located were examined to ensure that all relevant studies had been found.

Studies were included in this review if (a) the study was empirical and published in a peer-reviewed journal; (b) the participants had a diagnosis of E/BD, Serious Emotional Disturbance (SED), or other health impairment which included Attention Deficit Hyperactivity Disorder (ADHD), Oppositional Defiance Disorder (ODD), Conduct Disorder (CD), or were defined as at risk of one of these diagnoses (some studies included multiple participants where only some participants met these criteria, where this occurred only information about those participants that met these

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criteria were included); (c) participants did not have an intellectual disability; (d) a functional behaviour assessment or a functional analysis was conducted; (e) the study was conducted in a school or preschool setting rather than clinical setting; (f) school-based personnel involvement included more than just participation in an interview; and (g) school personnel were either general or special education teachers, teacher aides (paraprofessionals) and/or behaviour consultants regularly based at the school.

Each of the selected studies was read and categorised by school type (preschool, elementary, or middle), school setting (general education classroom, partial integration, or segregated classroom), and level of school personnel involvement in functional assessment procedures. The level of involvement of school-based personnel was scored out of 5, with 1 point scored for school-based personnel involvement in each of the following: indirect assessment, hypothesis formation, data collection, BIP formation, and, participation in the experimental manipulation phase. If school-based personnel involvement was not clearly stated, no score was allocated for that category.

Reliability

The first author and an independent reviewer separately scored each article for the level of involvement of school-based personnel. An agreement was counted if the two raters recorded involvement in the same FBA process category. Percentage agreement was calculated as per Kazdin (1982, p. 54), where

$$\% \text{ agreement} = \frac{\text{total number of agreements} \times 100}{\text{total agreements} + \text{disagreements}}$$

Percentage agreement calculations for each category were as follows: indirect assessment 95.6%, hypothesis formation 100%, data collection 95.6%, BIP formation 91.3%, and experimental manipulation 100%.

The efficacy of intervention was determined by comparing baseline to intervention data reported in the results sections of selected the studies. Commonly, studies included the dependent variables of task engagement and disruptive behaviours.

Social validity ratings provided by school-based personnel were judged as present or absent. Social validity was commonly measured via questionnaires where a series of questions each with a Likert-type scale of agreement or acceptability were answered by respondents. Where results were reported as a numerical score out of the total possible maximum score, they were converted to a percentage for later comparison, and to obtain a mean percentage rating score. Treatment integrity measures were also judged as present or absent, and were reported in studies as percentages. A mean treatment integrity score was calculated.

Judgments about the presence or absence of active training and development were made by reviewing the methods section of each study. For training to be judged as present, studies needed to explicitly state that training had been delivered in FBA or data collection. Where no reference to training was made, it was recorded as 'not specified'. Researcher involvement was also determined by reviewing the method section of each paper. Studies were coded as collaborative if collaboration was explicitly described or if the majority of FBA processes carried out involved researcher assistance. Studies were coded as consultative if consultation was explicitly described, or if training occurred, followed by trainees completing the FBA processes independently.

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TABLE 1

FBA Studies Included for Review

Study	Students number, age, diagnosis	School stage	School setting	School personnel involvement in FBA score	Social validity score %	Treatment integrity score %	FBA training component	Involvement of researcher/ expert
Blair, Umbreit, & Bos (1999)	4 students, aged 4–5 years, at risk for SED	Preschool	Regular pre school	4	90.7 97.5	95 98	—	Collaborative consultation
Chandler, Dahlquist, Repp, & Feltz (1999)	4 students, , aged 3–6 years at risk for BD	Preschool	At risk group	3	—	—	2 × 8 hrs , on FBA, ongoing support	Consultation after training
Ervin, DuPaul, Kern, & Friman (1998)	2 students, aged 13 and 14 years, ADHD and ODD	Middle school	Segregated E/BD	4	94.3 89.3	81.8 100	—	Collaborative consultation
Ervin, Kern, Clarke, DuPaul, Dunlap, & Friman (2000)	3 students, aged 11 & 14 years, ADHD and ODD	Middle school	Segregated E/BD	5	—	77.8 97.8 100	—	Collaborative consultation
Hoff, Ervin, & Friman (2005)	1 student aged 12 years ADHD and ODD	Middle school	General education within Boys' Town	4	91.7	—	—	Collaborative consultation
Kamps, Wendland, & Culpepper (2006)	2 students aged 7 years, at risk BD	Elementary	General education	4	—	—	—	Collaborative consultation
Kennedy et al. (2001)	3 students aged 6–8 years, ADHD and at risk BD	Elementary	General Education Partial Integration	5	—	—	—	Collaborative and consultative model
Kern, Delaney, Clarke, Dunlap, & Childs (2001)	2 students aged 11 years, E/BD and ADHD, E/BD	Elementary	Segregated E/BD	3	—	—	—	Some collaboration

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TABLE 1 (cont.)
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Study	Students number, age, diagnosis	School stage	School setting	School personnel involvement in FBA score	Social validity score %	Treatment integrity score %	FBA training component	Involvement of researcher/ expert
Kern, Delaney, Clarke, Dunlap, & Childs (2001)	2 students aged 11 years, E/BD and ADHD, E/BD	Elementary	Segregated E/BD	3	—	—	—	Some collaboration
Ingram, Lewis-Palmer, & Sugai (2005)	2 students aged 12 years, at risk BD	Middle school	General education	2	6/7 for best interest	92	—	Some collaboration
Lane, Weisenbach, Little, Phillips, & Wehby (2006)	2 students aged 7 years, at risk E/BD	Elementary	General education	5	83 80	95 95	6 Hours FBA training and ongoing support	Trained then collaborative consultation
Lo & Cartledge (2006)	2 students aged 9 years, ADHD, ADHD and SED	Elementary	Partial integration	4	Positive response	—	—	Collaborative consultation
Maag & Larson (2004)	1 student aged 11 years, E/BD	Elementary	General education	4	100	—	5.5 hrs on FBA including practice and feedback.	Trainers then consultation model
March & Horner (2002)	3 students aged 12 & 13 years, at risk BD	Middle school	Partial integration Special education	3	7 or more out of 10 for 4/5 teachers	—	—	Some collaboration and consultation
Murdock, O'Neill, & Cunningham (2005)	7 students aged 12–15 years, BD	Middle school	Partial integration	3	—	—	Basic FBA to staff and FAOF to TAS*	Some collaboration and consultation
Newcomer & Lewis (2004)	3 students aged 9 and 11 years, OHI, at risk ED & BD	Elementary	General education	5	Positive ratings	—	—	Collaborative consultation

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TABLE 1 (cont.)
FBA Studies Included for Review

Study	Students number, age, diagnosis	School stage	School setting	School personnel involvement in FBA score	Social validity score %	Treatment integrity score %	FBA training component	Involvement of researcher/ expert
Penno, Frank, & Wacker (2000)	3 students Aged 13 & 14 years, BD, ADHD, BD and ADHD	Middle school	Segregated SED	4	—	100 100 100	—	Collaborative consultation
Radford & Ervin (2002)	1 student Aged 13 years, ADHD	Elementary	Partial integration	3	Averaged 6/7	100	—	Collaborative consultation
Schill, Kratochwill, & Elliot, (1998)	10 students Aged 4–5 years, at risk BD	Preschool	Regular preschool	4	82.0	90 (medium –high integrity)	—	Collaborative then consultation
Stage et al. (2006)	2 students Aged 5 and 15 years, ADHD	Elementary Middle school	General education Partial integration	3	71.1 80	—	Trained consultants in assesments & administration	Some collaboration
Stahr, Cushing, Lane, & Fox (2006)	1 student Aged 9 years, ADHD	Elementary	Segregated E/BD	4	90	—	—	Collaborative consultation
Umbreit & Blair (1997)	1 student Aged 4 years, at risk E/BD	Preschool	Regular pre school	5	90	—	—	Collaborative consultation
Wright-Gallo, Higbee, Reagon, & Davey (2006)	2 students Aged 12 & 14 years E/BD	Middle school	Segregated E/BD	3	—	—	—	Collaborative consultation

Note: Where studies did not include data or information, a dash (—) has been placed in the cell.

Results

Participants

The literature search identified 23 studies, with 62 participants, for inclusion in this review. The results are presented in Table 1. Most studies were conducted in the USA, with one study from Canada (Symons, McDonald, & Wehby, 1998). Students ranged in age from 4 to 15 years. Boys were most commonly the participants in the studies, with 42 boys, compared to only 6 girls (the gender of 14 participants was not specified).

Settings

Four studies were conducted in preschools, 11 in elementary classrooms, and 8 in middle school settings (one study contained both an elementary and a middle school student). Of the 23 studies included in this review, 11 were conducted solely in general education settings, 6 in partial integration settings, and 9 in segregated classrooms for students at-risk of or with E/BD diagnoses. Partial integration settings were classes that educated students with special needs that were located within general education school settings. The studies by Kennedy et al. (2001), March and Horner (2002), and Stage et al. (2006) had multiple participants, where at least one of the students experienced partial integration, and therefore they have been included in the data analysis for both partial and general education settings.

School-Based Personnel Involvement in the FBA Process

School-based personnel were involved, in varying degrees, in the five categories of FBA involvement. School-based personnel were involved in three or more of the five FBA process categories in 22 out of the 23 studies (95%), but in only 5 (22%) studies were they involved in all of the five processes (see Table 1). Seven studies contained missing data, with 5 of the 7 missing information about the BIP involvement process.

A comparison of involvement in the processes by school level is presented in Figure 1. When involvement across the five processes was averaged, preschool personnel were

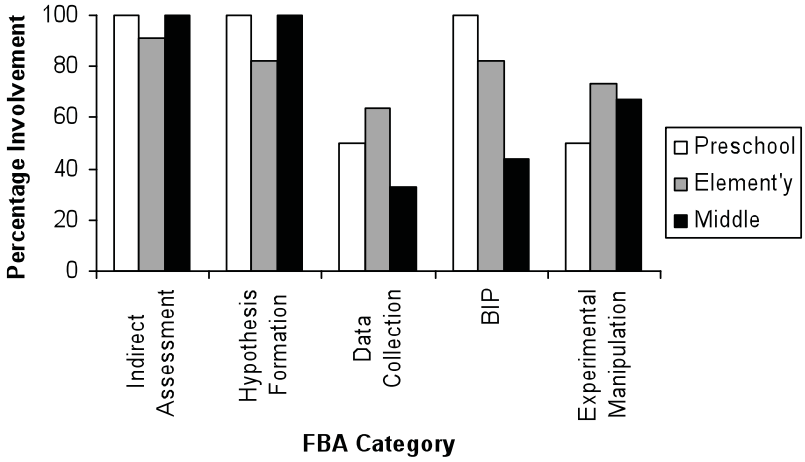


FIGURE 1

Personnel involvement in FBA processes by school stage.

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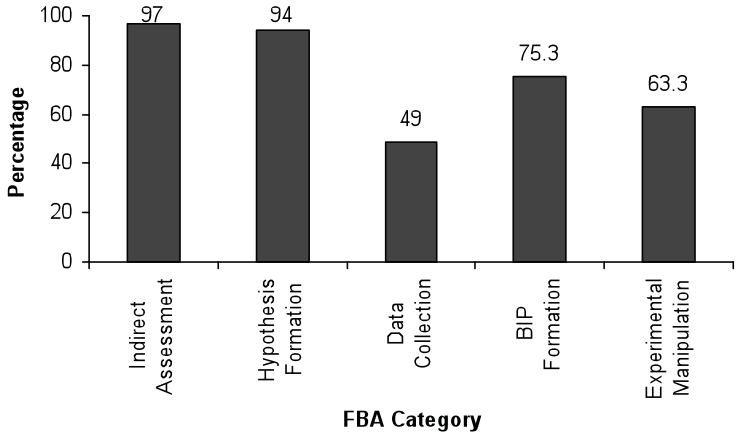


FIGURE 2
Overall personnel participation in FBA processes

involved in 80% of the overall processes, elementary personnel in 78.4%, and middle school personnel in 68.8% of the processes. Preschool personnel had the highest participation in three out of the five FBA process categories. Elementary and middle school personnel had the highest participation in two categories each, with elementary personnel involvement showing least variation across the categories (64–91%) compared to middle school personnel's high variation across the five categories (33–100%).

Highest participation by school personnel was in indirect assessment and there was least variation by school level in the level of participation. BIP formation varied the most by school level. Figure 2 provides a summary of overall school-based personnel participation in FBA processes, with most involvement in indirect assessment (22 studies), closely followed by hypothesis formation (21 studies), BIP formation (17 studies), experimental manipulation (15 studies), with the lowest category for involvement being data collection (12 studies). Of the 15 studies that conducted experimental manipulations, only 2 conducted the traditional functional analysis in highly controlled conditions as developed by Iwata et al. (1982), with the remaining studies manipulating salient environmental variables.

Efficacy of FBA-Based BIP Interventions By School Level

For preschool students, the results of FBA-based interventions in all four studies showed reductions in problem behaviours and nonengagement. In the Schill et al. (1998) study, effect sizes for FBA-based interventions were compared to non-FBA-based interventions. A larger effect size for the 10 FBA cases was reported than for the 9 non-FBA cases, although no significant difference between the effect sizes was found.

In studies in elementary schools, the dependent variables commonly measured were task engagement (on/off task) and disruptive behaviours. Only Radford and Ervin (2002) specifically assessed aggression reduction, and the reported percentage of negative responses by the target student to negative peer approaches dropped markedly after intervention. Disruptive behaviour was the target for reduction in 7 of the 11 (72%) of studies, while 6 of the 11 (55%) studies measured improvement in task engagement.

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Decreases in disruptive behaviours were reported for 12 of the 13 elementary school participants (92%). The largest reduction reported was for one participant in the Symons et al. (1998) study where inappropriate comments dropped from 100% to 40% of intervals when FBA-based interventions were implemented. Only one participant increased his rate of problem behaviours per hour, possibly due to only partial implementation of the planned intervention and factors outside the school (Kennedy et al., 2001). Task engagement increases were reported in 6 studies, with all nine participants showing improvement. Most participants increased their on task behaviour by at least 15%, and one participant by as much as a 70% in Kern, Delaney, Clarke, Dunlap, & Childs (2001).

In studies conducted in middle school settings, as in elementary settings, the main behaviours targeted for change were task engagement and disruptive behaviours. Reductions in disruptive behaviours were reported in six of the eight (75%) middle school studies. Decreases in disruptive behaviours occurred for 10 of the 11 (91%) participants with decreases of intervals containing problem behaviour of four participants in the range of 40–60% of intervals. The exception was for one participant in the Stage et al. (2006) study, where her inappropriate behaviours actually increased in the general education setting possibly due to a lack of treatment integrity.

The dependent variable of task engagement was reported in four of the eight middle school studies (50%). All eight participants increased in their task engagement measures, with the largest increase in intervals with task engagement being 89% due to increased teacher proximity (Ervin et al., 2000). Correct academic responses were also measured by Penno, Frank and Wacker (2000), as accuracy as well as the number of academic responses required improvement. Increases in accuracy from 20–70% (approximately) occurred following FBA-based intervention.

Acceptability of the FBA Process by School-Based Teams

Social validity measures are measures of how acceptable the FBA process was to school-based personnel, and can give some indication as to whether the process would be likely to be repeated in the future (Blair, Umbriet & Bos, 1999). Some measure of social validity provided by school-based personnel was reported in 17 of the 23 studies (74%). Of the 8 studies that reported a total rating, the average percentage score received was 88.3% (range 71.1–100%), indicating a high level of acceptability of the FBA process in school settings. The other 9 studies reported positive teacher attitudes or scores to some of the questions in the surveys.

Integrity of Implementation of the Interventions by School-Based Personnel

Treatment integrity or fidelity is a measure of how accurately the intervention strategy was implemented by school-based personnel. Eight studies (35%) reported treatment integrity data. Three of these were self-reported data, with the remainder calculated by researchers. Treatment integrity scores when reported ranged from 77.8–100%. Treatment integrity in general was above 80%.

Training Received by School-Based Personnel to Conduct the FBA Process

A training component in FBA was reported in only five (22%) of the studies (see Table 1). Training ranged from a basic overview of FBA to allow for teacher involvement in hypothesis formation (Murdock, O'Neill & Cunningham, 2005) to more explicit training in FBA processes conducted over two 8-hour sessions

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(Chandler, Dalquist, Repp, & Feltz, 1999). Two studies reported ongoing support on a weekly basis for the duration of the study (Chandler et al., 1999; Lane, Weisenbach, Little, Phillips, & Wehby, 2006).

Data collection training was delivered in two studies. In the Symons et al. (1998) study, teachers were trained in scatterplot data collection, and, in Murdock et al. (2005) a paraprofessional was trained to collect data using the Functional Assessment Observation Form (FAOF) developed by O'Neill et al. (1997).

Involvement of Researcher/Expert in the Study

Of the 23 studies, 7 described their support as 'collaborative', where researchers assisted school-based personnel in conducting the various phases of FBA and in BIP development. Another 13 studies also used this method of support but did not explicitly state their model of support. Two studies (9%) used a consultation model, with teachers expected to conduct the FBA processes after initial training with minimal input from experts. Five studies had both collaborative and consultative aspects.

Barriers to Successful Application of FBA in Natural Settings

Fourteen studies (61%) reported issues that presented barriers to the successful application of FBA in school settings. Barriers raised by authors in their discussions included problems with treatment integrity in the implementation of intervention strategies, the lack of behavioural theory (knowledge of applied behaviour analysis) of school-based personnel, problems in manipulation of experimental conditions and data collection, poor teacher attitudes to the FBA process, and the time and resources needed to undertake the entire FBA process.

Summary of Results

Twenty-two studies reported the participation of school-based personnel in at least three of the five FBA process. Involvement in the FBA process was highest in preschools, followed by elementary and middle school. School personnel were most likely to be involved in indirect assessments and least in observational data collection.

All preschool students' behaviours showed improvement from the FBA-based BIPs implemented. All elementary (except one) and middle school students (except one) benefited from FBA-based interventions when implemented with high integrity.

Social validity data was reported in almost three-quarters of the studies, with school-based personnel involved in FBA, intervention planning and delivery, rating the acceptability of the process highly.

Slightly more than a third of studies reported treatment integrity scores. When data was reported in studies, percentage scores were high except for one study where treatment integrity was below 80%. Not all treatment integrity data was determined through researcher observation, with three studies using teacher self-assessment.

Training in FBA processes was only specifically included in 5 of the 23 studies. Researcher involvement in 21 of the 23 studies was via collaboration for the FBA processes, with only two studies using a consultative model. Barriers to successful application of FBA were reported in 14 studies and could be separated into six main categories. Many barriers were related to the lack of knowledge of behavioural theory and experience of the school-based personnel involved in data collection, and analysis.

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Discussion

Although FBA is now regarded as the assessment tool of choice for students with challenging behaviours (especially in the United States), it has received critical attention in the past decade with regards to its use with individuals with E/BD (Gresham, 2003). One concern has been the ability of school-based personnel to conduct the FBA process with efficiency, skill, and independently without expert assistance (Scott, Bucalos et al., 2004). It would appear that concerns over the ability of school-based personnel to independently implement FBA processes and intervention planning are warranted.

When school-based personnel were involved in FBA processes and in BIP generation and implementation, reductions in student challenging behaviours occurred. Previous efficacy reviews of behavioural intervention for students with E/BD based on FBA and designed without teacher participation show similar encouraging results (see Heckaman et al. 2000; Lane et al., 1999; Reid & Nelson, 2002). Behavioural interventions based on FBA conducted by school teams have been shown to be effective for students with a range of disabilities (apart from E/BD) (Ervin et al., 2001).

In the studies included in this review, involvement of school-based personnel in all the FBA processes was far from commonplace, regardless of school level or setting. Few studies reported school-based personnel involvement in all of the FBA processes. All studies reporting the involvement of school-based personnel were conducted with expert collaborative assistance. This finding may represent a realistic approach to the inclusion of class teachers and other school personnel in FBA. Benazzi, Horner, and Good (2006) advocate a collaborative approach to FBA and suggest that school-based teams require knowledge about the student and setting, as well as behavioural theory knowledge to ensure problems with contextual and technical issues are minimised. Researchers in the studies reviewed provided the behavioural theory knowledge, and school-based personnel, the contextual knowledge. This collaborative model is similar to that reported in the Scott, Bucalos et al. (2004) review of FBA in general education settings, where researchers 'intentionally involved' teachers to make FBA a more collaborative process. It is encouraging that most studies in this review had school-based personnel involvement in three or more of the processes reviewed, which suggests experts in behavioural theory are drawing on teachers' knowledge of students and school contexts.

School-based personnel involvement was highest for the passive indirect assessment. This is to be expected as interviews with teachers, teacher aides and other school personnel familiar with students are part of a standard FBA (Barnhill, 2005). Teacher involvement in hypothesis formation (resulting from indirect assessment data) was also high. Perhaps this is because hypothesis formation may be completed outside of class time, is not too time consuming, and, is relatively easy to complete with expert collaborative assistance (Ellingson, Miltenberger, Stricker, Galensky, & Garlinghouse, 2000). Independent completion of indirect assessment and subsequent hypothesis formation process was used in one study (Maag & Larson, 2004) study where the teacher used a self-guided interview to create hypotheses. This process is advocated by Larson and Maag (1998), as it removes the need for an expert interviewer and consultant. It is important to note, however, that potential problems with instrument validity have been raised with regard to indirect assessment techniques (Gresham, 2003; Sasso et al., 2001), and therefore they should not be solely relied upon in hypothesis formation (Quinn et al., 2001).

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The majority of studies involved expert collaboration in the hypothesis formation process. Larson and Maag (1998) suggested that teachers can create hypothesis statements independently, but may benefit from indirect assistance via systematic protocols such as the Functional Assessment Hypothesis Formulation Protocol (Larson & Maag, 1998) to identify the functions of problem behaviour. Ellingson et al. (2000) caution that prior experience in FBA and some training in behaviour analysis may be required to form hypotheses when the functions are more complex, such as when behaviours are multiply maintained.

School-based personnel were least involved in the FBA process of observational data collection. Direct observational data is important in FBA as it assists in the validation of hypotheses (Larson & Maag, 1998), and in the quantification of the dimensions of the problem behaviour (Conway, 2004). The low level of involvement of school-based personnel in the collection of direct observational data in the studies included in this review is similar to the non-systematic data collection figure of 49% reported by Van Acker et al. (2005). Van Acker et al. reviewed behaviour support plans designed by school-based teams. Overall, low levels of data collection by school-based personnel are not surprising. An outside observer is needed to record detailed data while a student's teacher is actually involved in teaching, so this limits potential observers and data taking within school settings. When observational data was collected by classroom teachers or paraprofessionals on student behaviours during baseline observations or during the experimental manipulation phase, scatterplot, anecdotal, frequency, or duration recording methods were frequently used. The study by Symons et al. (1998) showed that teachers could collect data via simple scatterplots during ongoing routines for individual students, and other authors have noted that these strategies are more easily conducted during ongoing teaching routines (Gunter, Callicott, Denny, & Gerber, 2003) Previous research has also uncovered negative teacher attitudes to data collection (Gunter et al., 2003).

The more complex Functional Assessment Observation Form (FAOF) developed by O'Neill et al. (1997) that is commonly used by experts was only reported to be used by teachers in Kennedy et al. (2001), and in Murdock et al. (2005). The latter identified the need for more training in behavioural theory to enable school personnel to use the FAOF correctly. Larson and Maag (1998) advocate the use of third-party observers for the FAOF, which suggests only school personnel with time to act in such a role would be suitable observers. Scott, Bucalos et al. (2004) also suggest that specialists may be more willing and better suited in time and experience to conduct direct observations and hypothesis testing rather than classroom teachers who have the least time, and experience in behavioural function.

School-based personnel involvement in BIP formation appeared to decline as students got older. Missing data about involvement in intervention planning, particularly for middle school personnel involvement may affect this conclusion. When school personnel were involved in BIP formation, all but two studies reported expert collaborative assistance in selecting interventions to match the behavioural function identified.

Although a collaborative approach is advocated for intervention planning to increase the social validity of BIPs (Maag & Katsiyannis, 2006), most school-based teams do not have access to researchers proficient in behavioural theory such as occurred in the studies reviewed. The lack of knowledge of behavioural theory of school-based teams was evident in a recent study of BIPS designed by school teams (Scott et al., 2005). It was found in this study that there was often a lack of connection between the identified function of a problem behaviour and the intervention strategies chosen in the BIPs created by school-based teams. This occurred even though the school teams had

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received 6 hours of training in FBA. A similar finding was reported by Newcomer and Lewis (2004) who noted that the teacher's lack of expertise in intervention design could have affected the efficacy of the intervention.

All of the studies that included experimental manipulations to confirm the hypothesis statements carried out the manipulations under the guidance of experts. This finding is consistent with previous research on functional analysis conducted in school settings for this population (Quinn et al., 2001). Even with this guidance, some teachers had difficulty manipulating conditions during assessment and this lead to confusing results (Ervin et al., 2000). The literature on students with intellectual disabilities and autism does contain studies where teachers have conducted experimental manipulations with reliability and fidelity (Stichter, 2001), so the possibility of teachers effectively carrying out this form of assessment should not be dismissed.

Although experimental manipulations are important in validating hypotheses, there are concerns about their use in school settings (Scott, McIntyre, Liaupsin, Nelson, & Conroy, 2004). It is considered unethical to intentionally provoke serious aggression or other extreme behaviours within a school setting, and thus experimental approaches may not be appropriate (Heckaman et al., 2000; Kern et al., 2004; Radford & Ervin, 2002). Stichter (2001) points out, however, that lengthy observation of the contexts of extreme behaviours and the use of ineffective interventions also expose practitioners to risks of extreme behaviour. Carefully manipulated conditions with clear safeguards may be more desirable in some situations (Stichter, 2001). In the studies reviewed that did not conduct experimental manipulations, the results obtained from FBA-based interventions would seem to support the original hypotheses. At the same time, however, any relationship between behaviour and environmental variables deduced from indirect and observational assessments without manipulations, can only be considered correlational rather than causal (Doggett, Edwards, Moore, Tingstrom, & Wilczynski, 2001; Watson, Ray, Sterling-Turner, & Logan, 1999).

Almost three-quarters of the studies included some measure of social validity. This measure is important, as it has been found that school-based personnel are unlikely to embrace new procedures such as FBA unless they deem them to be worthwhile, effective, acceptable, and nonintrusive (Reid & Nelson, 2002). The high satisfaction ratings and positive comments reported in the literature would suggest that school-based personnel find the process acceptable. Of particular interest was the high satisfaction rating given by the teacher in the Maag and Larson (2004) study. This teacher was one of the few who conducted most of the assessment and intervention processes independently after training.

In the eight studies where treatment integrity was reported, it was very high. The percentage of studies in this review reporting integrity data (35%) was lower than that reported in the reviews by Ervin et al. (2001) and Heckaman et al. (2000) where procedural integrity data was reported in 57% of cases for students with various disabilities and in 54% of studies respectively. This review would support Ervin et al.'s (2001, p. 205) findings that '… experimenters rarely determined whether steps involved in the FA process were systematically followed'. The lack of treatment integrity measures casts some doubt on whether interventions were carried out with consistency and proficiency, and thus it is uncertain whether or not the interventions were in fact responsible for the changes in dependent variables measured (Heckaman et al., 2000). Results, when reported for the studies reviewed, would seem to indicate that school-based personnel can implement intervention strategies with a high level of integrity, given expert collaboration and support.

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The level of training in FBA and intervention design required by school-based teams dealing with students with E/BD is uncertain. Initial training in FBA and BIP formation was delivered over 1 or 2 days as in Chandler et al. (1999), Lane et al. (2006), Maag and Larson (2004), and Murdock et al. (2005). Scott et al., (2005), in their analysis of barriers to school-based FBA, found 1-day training on its own to be insufficient, and recommended further support via practice and feedback using realistic examples. Additional training and ongoing support over 4 months was provided in Chandler et al. (1999). In the Lane et al. (2006) study, an additional 1 hour per week was spent training teachers in FBA matrix, decision models, data collection, and, intervention design and implementation. The teams from the Chandler et al. (1999) study were reported to continue to use FBA with novel students after initial training. Where explicit training was not described, expert collaboration with school-based personnel may have provided incidental training in FBA processes. Responses to social validity questions confirming a willingness to continue to use FBA were promising such as in Symons et al. (1998), and could be an indication of future intent, but were no guarantee that the process would be continued, or done with the same integrity, without ongoing collaborative support from experts.

The studies included in this review identified a number of barriers to the successful application of FBA and related planning and intervention in school settings. Poor implementation integrity of experimental conditions was commonly reported. Teachers were reported to have difficulty controlling or delivering attention to students targeted for intervention in Ervin et al. (1998) and Ervin et al. (2000). Some teachers themselves expressed a lack of confidence in their ability to conduct experimental manipulations independently in the future (Newcomer & Lewis, 2004), and this concern was shared by some researchers (Scott, Bucalos et al. 2004).

The lack of knowledge of FBA and general behavioural theory of some school-based personnel was also considered as a barrier to application. Training in behavioural theory for key personnel could address a number of barriers identified in the research. First, the selection of appropriate interventions matched to function would be improved, reducing the tendency of exclusionary strategies to be selected for escape maintained behaviours (Sasso et al., 2001; Scott, McIntyre et al., 2004), and lessen confusion when multiply maintained behaviours occur. Second, an understanding of FBA and behavioural theory might decrease negative teacher attitudes to the FBA process and inclusion, and reduce the use of the 'refer and remove' model for managing students with E/BD reported in the literature (see Hendrickson, Gable, Conroy, Fox, & Smith 1999). Third, data collection and analysis may be optimised (Ervin, DuPaul, Kern, & Friman, 2001). Lastly, increased knowledge could increase the contextual fit of interventions selected for natural settings.

The final barrier to application of FBA processes and BIP formation in school settings is time. School-based personnel need time to meet, collect and analyse data, manipulate experimental variables, create BIPs, and implement effective strategies. The time taken to conduct the entire FBA BIP process was reported by Schill, Kratochwill and Elliot (1998) to average 58 days, with behavioural consultants involved heavily in the data collection and planning process. To compensate for the time and effort involved in the FBA and BIP process, it has been suggested that school administrators need to offer support by releasing personnel to attend training and regular meetings with consultants who can assist with initial data interpretation and team leadership until competency is displayed (Hendrickson et al., 1999; Vaughn, Hales, Bush, & Fox, 1998). This acknowledgment by

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school administrators of the effort and importance of the process may reduce team attrition (Crone et al., 2007), and increase teacher 'buy-in' of the process.

Although barriers to successful application exist, there appears to be viable solutions to make the FBA/BIP process efficient and palatable to school-based personnel. Collaboration, training, and the realistic allocation of processes to those best suited and qualified seems the logical means of ensuring its continued use in schools for students with or at risk of E/BD.

Conclusion

This review supports the growing evidence base that FBA-based BIPs can be effective interventions in school settings for students with, or at risk for E/BD. Further, there is some evidence that school-based teams may be able to carry out both FBA and BIP development with appropriate training and expert assistance, at least in the initial stages. When school-based personnel worked collaboratively with support from experts in FBA and behavioural theory, sound BIPs based on FBA were created. These BIPs were found to be acceptable to teachers and paraprofessionals, and were implemented with high integrity. Substantial reductions in challenging behaviours, for the majority of students with or at risk of E/BD, were reported.

It appears that, typically at the present, teachers are involved in FBA through indirect assessment and through some collaboration around hypothesis statements. The teacher of the child with behaviour problems would almost automatically be involved as an informant for indirect assessment strategies, Teachers and school-based personnel are less likely to be involved with direct data collection. Typically this direct data collection would involve observation of teacher/child interaction, so classroom teachers are automatically excluded from these processes. There were some reports of school-based personnel collecting observational data, and teachers may be able to collect data through scatter-plots and frequency counts.

School-based personnel were least likely to be involved in the design of experimental manipulations to confirm hypotheses developed. This appears to be the area where teachers most need training and support, both in the underpinning behavioural theory and in the actual strategies for safely carrying out informative manipulations. More research into the involvement of school-based personnel in FBA and intervention planning and implementation needs to be carried out. Research that addresses the most effective strategies for training school-based teams to independently complete FBAs and BIPs is needed. There needs to be some clarification of the most effective and most time-efficient strategies for carrying out these processes within schools. It is likely that in some circumstances, school teams will need to collaborate with experts, and the forms this collaboration and support should take also needs investigation. There is no doubt that FBA-based interventions are likely to be effective and that school-based personnel can contribute to FBA-based intervention learning and implementation.

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