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## LITERATURE REVIEW

# The efficacy of positive behavioural support with the most challenging behaviour: The evidence and its implications\*

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### Abstract

**Background** Positive behaviour support (PBS) is behaviour analysis applied in support of people with challenging behaviour. Questions have been raised as to PBS effectiveness, costs, and accessibility.

**Method** Outcome studies meeting specified criteria for PBS were selected for review. All told, 12 outcome studies encompassing 423 cases were included.

**Results** This review showed that PBS was effective with both severe and high-rate behaviour problems, was cost-effective, used a methodology that was easily trained and widely disseminated, and worked in institutional settings in which the most difficult problems are thought to be, as well as in the community.

**Conclusions** The major implication of this review is that practitioners may be obligated to use PBS when faced with the need to develop a plan of support given the ethical principle of using the least restrictive method consistent with the right to effective treatment.

**Keywords:** *positive behaviour support (PBS), efficacy, challenging behaviour*

### Background

Positive behaviour support (PBS) is viewed in this paper, as it is by others (see Anderson & Freeman, 2000; Carr & Sidener, 2002), as the application of the science of applied behaviour analysis (ABA) in the support of people with challenging behaviour. This is analogous to the understanding that organisational behaviour management (OBM) is the application of ABA in the work setting (see the *Journal of Organizational Behavior Management*). Even so, some have questioned whether PBS is different from ABA (e.g., Johnston, Foxx, Jacobson, Green, & Mulick, 2006). Regardless of how it is viewed, PBS has made a major contribution to the support of people with challenging behaviour (see Carr et al., 1999; Horner, 2000).

As an application of ABA, PBS has as its primary focus improving the person's quality of life, as measured by a set of values and as evaluated by the person receiving those services (and their families). This is fundamental to ABA (Baer, Wolf, & Risley, 1968; Wolf, 1978). It is also based on a full understanding

of the non-linear nature of ABA described by Israel Goldiamond (Goldiamond, 1974, 1975), including the emphasis on teaching new behaviours (alternative sets) so that the person does not have to rely on old behavioural repertoires. In other words, as is true of ABA in general, PBS does not use a linear approach that focuses exclusively on A-B-C (antecedent-behaviour-consequence) contingency relationships, nor does it rely exclusively on the manipulation of antecedents and consequences to manage challenging behaviour. Alternatively, as an application of ABA, PBS is a multi-element, non-linear approach designed to achieve a broad range of outcomes (Favell et al., 1982; LaVigna & Willis, 2005a) for people with challenging behaviours. These outcomes include improving the person's quality of life, removing the behavioural barriers that may get in the way of those outcomes, achieving lasting generalisation of both quality of life and behavioural improvements, and accomplishing these outcomes with minimum or no negative side effects.

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PBS has a number of components (see Carr et al., 2002; LaVigna & Willis, 2005a), not the least of which is a comprehensive functional assessment aimed at understanding the meaning or the function of the behaviour from the person's point of view. A PBS plan based on such an assessment includes (a) ecological strategies aimed at removing the mismatches that are found between the person's needs and characteristics and their physical, interpersonal, and service environments (such as by providing a visual daily schedule); (b) positive programming designed to teach a variety of general skills (for example, making a fruit smoothie), functionally equivalent skills (for example, how to say "no" in a more socially acceptable way when asked to do something they don't want to do), functionally related skills (for example, how to make a choice between two available options), and coping and tolerance skills (for example, how to wait patiently); (c) focused support strategies designed to achieve rapid control over the behaviour and to reduce the need for reactive strategies, such as antecedent control (i.e., avoiding those events associated with the higher likelihood of the behaviour and introducing those associated with the lower likelihood) and certain schedules of reinforcement (e.g., the differential reinforcement of other behaviour); and (d) reactive strategies (LaVigna & Willis, 2002) designed to reduce the episodic severity (LaVigna & Willis, 2005b) of the behaviour. PBS that includes all of the above elements is often referred to as "multi-element" (e.g., LaVigna & Willis, 1992; MacDonald, Hume, & McGill, 2010). (PBS also includes the use of procedural reliability checks and other methods derived from OBM to assure treatment integrity; LaVigna, Willis, Shaull, Abedi, & Sweitzer, 1994; LaVigna & Willis, 2005a.)

While PBS is ABA in support of people with challenging behaviour, PBS has itself led to new principles and procedures for the field of applied behaviour analysis. For example, LaVigna and Willis (2005b) introduced the new dependent variable "episodic severity," which is defined as a quantified measure of the gravity or intensity of a behavioural incident. This is different from typical measures of severity, which are measures over time versus measures of the severity of individual behavioural episodes. For example, if we chose to measure the episodic severity of tantrum behaviour, we might decide to do so based on duration; that is, how many minutes the tantrum lasted. At baseline, the average duration may have been 2 hours, with a range from 15 minutes to 4 hours, at a rate of 10 tantrums a week (total duration: 20 hours a week). After implementing the behaviour support plan, the average duration may have been reduced to half an hour, with a range from

2 minutes to 45 minutes, at a rate of five tantrums a week (total duration: 2.5 hours a week). This would reflect a reduction in episodic severity, both in terms of the reduced average duration and a reduction in the duration of the longest tantrum, and a reduction in total duration. In contrast, after intervention, we may have reduced occurrence from 10 a week, with a total duration of 20 hours a week, to five a week, with a total duration of 15 hours. This 25% reduction in total duration would obscure the fact that episodic severity went up from an average of 2 hours a tantrum to an average of 3 hours a tantrum. If the rate of problem behaviour is reduced, reductions in episodic severity reflect the fact that severity over time has also been reduced, while reductions in severity over time do not necessarily reflect reductions in episodic severity. That is, episodic severity is a more sensitive measure than severity over time.

Plans that reduce episodic severity are more likely to be socially valid than plans that do not. Further, there are many ways to measure episodic severity. For example, an episode of physical aggression or self-injurious behaviour might be measured on a 5-point scale, with Level 5 meaning someone had to receive medical attention, Level 4 meaning someone needed first aid, Level 3 meaning there was resulting redness or bruising, Level 2 meaning multiple contacts, but without any of the previous outcomes, and Level 1 meaning a one-off contact without any of the previous outcomes. The average level and range each week, for example, would be the quantified measures of episodic severity, with the PBS plan taking responsibility not just for the reduction in the rate of the behaviour but also reductions in the episodic severity of the behaviour.

As stated above, in a PBS plan, the role of a reactive strategy is to reduce episodic severity. Accordingly, another new principle is "resolution," which is defined as the reactive presentation or withdrawal of a stimulus or event that results in a decrease in the *immediate* likelihood of response continuation or escalation. In other words, in a PBS plan, a reactive strategy should "resolve" not "escalate" the behaviour, with "escalation" being defined as the reactive presentation or withdrawal of a stimulus or event that results in an increase in the *immediate* likelihood of response continuation or escalation (LaVigna & Willis, 2005b). Punishment is therefore eliminated from a PBS plan, since it often leads to "escalation," the very opposite of "resolution" (Malott, Whaley, & Malott, 1997). (In contrast to "resolution" and "escalation," which are defined by their *situational* effects, the traditional ABA principles of "punishment" and "reinforcement" are defined by their *future* effects. For example, punishment is defined as the contingent presentation or

withdrawal of a stimulus or event that results in a decrease in the *future* probability of the response.)

While punishment would not be included in a PBS plan, if unavoidable, a restrictive reactive strategy, such as physical management, might be included as a last resort if needed to minimise episodic severity. However, as a last resort, such restrictive and perhaps aversive strategies would only be employed if other nonaversive reactive strategies, such as stimulus change or counterintuitive strategies such as redirecting the person to a preferred activity, did not work to get rapid, safe control over the behavioural episode (LaVigna & Willis, 2002). (In ABA, an aversive event is defined as one that we would ordinarily act to avoid. By that definition, all punitive strategies are aversive, while an aversive strategy is not necessarily punitive, as defined above.)

In recent years, a number of questions have been raised regarding PBS, including questions regarding the efficacy of using an exclusively positive approach to support people with seriously challenging behaviour (e.g., Foxx, 2005; Johnston et al., 2006). These questions have centred around five major assertions; namely, (1) that PBS has not been shown to be effective when the challenging behaviour is particularly severe and/or intense; (2) that PBS has not been shown to be effective with high-rate behaviour; (3) that PBS requires heavily trained specialists and requires particularly specialised expertise; (4) that PBS is exorbitantly and prohibitively expensive; and (5) that PBS has not been shown to be effective in institutional settings. This last assertion is based on the assumption that this is where there are the most severe and/or intense behaviour problems.

This selected literature review looks to see whether or not these concerns are supported by the evidence.

## Method

There were a number of criteria for selecting a PBS study for inclusion in this review. Specifically, the study had to investigate the effects of multi-element PBS plans aimed at producing multiple outcomes as described above. Therefore, excluded from this selected review were studies of isolated focused support strategies aimed simply at reducing the occurrence of target behaviour. (See LaVigna & Donnellan, 1986, for a review of many such strategies that may serve as positive focused support strategies in a PBS plan but as isolated strategies do not represent a PBS plan by themselves.) Also excluded from this review were studies that examined other isolated procedures that could be included in a full PBS plan. Examples

of these would be studies of functional communication training (e.g., Carr & Durand, 1985) as a single independent variable.

Studies were excluded from this review that may have been self-described as investigating positive approaches but which included aversive consequences as punishment. Specifically, any study that included a punishment strategy was not selected. That is not to say that an aversive procedure could not be used as a last resort reactive strategy to minimise episodic severity (e.g., Berkman & Meyer, 1988), but that it wasn't used as a behaviour reduction, punitive consequence. Finally, PBS studies were excluded from this selected review that did not address severe behaviour problems; for example, noncompliance in children in response to adult requests or even tantrum behaviour if it did not include serious self-injury or physical aggression. In summary, only those studies were included that investigated a range of outcomes as a result of fully developed PBS plans including ecological, positive programming and focused support proactive strategies and nonaversive reactive strategies to reduce episodic severity, with the use of possible aversive reactive strategies for that purpose used only as a last resort. Nevertheless, these categorical labels and the term "multi-element" itself were not necessary for inclusion if the description of the different elements in the support plan was sufficient for determining that these criteria were met.

A number of strategies were employed to identify published studies that could be selected as meeting these criteria. These included selecting published studies known by the authors as meeting the criteria; a review of the articles cited in those studies; an email request to many of the authors of those studies and leaders in the field of PBS asking them to identify such studies; and finally a review of all of the studies published since 1985 in certain journals thought to be likely forums for such articles. (This included the *Journal of Applied Behavior Analysis*, the *Journal of the Association for Persons with Severe Handicaps*, the *Journal of Intellectual & Developmental Disability*, and the *Journal of Positive Behavior Interventions*.) The earliest year selected was 1985, since up until then research investigating positive approaches only explored the effects of individual strategies rather than the effects of PBS, multi-element plans.

Based on the criteria described above, 12 published studies were selected for this review. Some involved single subject, multiple baseline designs and some even involved controlled group comparison studies. Many also involved case study applications, which allowed valid inferences to be drawn regarding efficacy since they met Kazdin's (1981) Type 3 criteria for drawing such inferences. These criteria were

considered met by the studies reviewed since (1) objective data were collected on multiple behaviours; (2) continuous assessment was carried out during baseline, intervention, and follow-up phases; (3) the behaviours treated had long-standing histories and were of the type that would not ordinarily improve without direct, effective intervention; and (4) all the case studies collectively involved the application of PBS with hundreds of people of varying ages, diagnoses, functioning levels, personal backgrounds, and countries of origin.

In the following pages we will address the five questions related to the efficacy of PBS as described above, with reference to the articles selected for this review. It should be noted that no questions have been raised about PBS focus on quality of life outcomes but merely on the outcomes regarding the target behaviour itself.

## Results

### *Is PBS effective with very severe behaviours?*

The first question that has been raised regarding PBS is whether it is effective with behaviours that are very severe. Perhaps one of the first PBS outcome studies ever published was the Donnellan, LaVigna, Zambito, and Thvedt (1985) study. Foxx (2005) suggested that while the behaviour problems addressed in this study were characterised as severe, they "... obviously were not" (p. 300). This is in spite of the fact that all 16 of the cases studied were at imminent risk of institutionalisation; five involved serious self-injury or physical aggression, and others involved property destruction, extreme tantrums, inappropriate sexual behaviour, etc.

However, as further evidence that the behaviours addressed in the 1985 study were serious, we provide in the following previously unpublished excerpts from some of the participating clients' files:

... he became so assaultive and unmanageable that he had to be placed in a psychiatric hospital for two weeks.

... deep concern over the effects of their son's (assaultive) behaviour on his younger sister's physical safety.

... head butting.

... this client spent 90% of her waking hours at home in a straight jacket and/or locked in a wheelchair.

... the mother had to lock herself in the garage or bathroom to prevent herself from incurring severe bodily harm.

We will let the readers judge for themselves whether or not the behaviours addressed in this

PBS outcome study were severe, but this is hardly the only example.

Although the ethical practice of ABA requires the least restrictive method be used, referrals for PBS services often involve people whose problems are serious and for whom a punitive approach had been tried and failed. One such study involved "health and life threatening" self-injurious behaviour "... resulting in frequent hospitalizations, extensive tissue damage, serious malnutrition, and drastic weight loss" (Berkman & Meyer, 1988, p. 77). This case study involved an adult man and spanned a nearly 3-year period in which support was initially provided in an institutional setting using aversive consequences and then in community settings using PBS. The multi-element PBS plan that was described and that was ultimately provided in the final phase of the study did not involve any punishment. The plan included ecological strategies (e.g., community placement); positive programming strategies (e.g., communication and other skills training); focused support strategies (e.g., antecedent control, i.e., introducing "novel settings and situations as well as those that were associated with low rates of negative behaviour," Berkman & Meyer, 1988, p. 80); and reactive strategies (e.g., verbal redirection, with physical management only being employed if verbal feedback and redirection did not interrupt the self-injury). The results showed that self-injury was essentially eliminated with a PBS plan. Compared with baseline rates, which involved self-injury with tissue damage for up to 20 times a day, after PBS treatment, the mean occurrence was at "near 0 levels" (Berkman & Meyer, 1988, p. 84).

In another study involving serious self-injurious behaviour, a wide range of aversive procedures had been used unsuccessfully. This case (LaVigna & Willis, 1992) involved a 17-year-old boy with autism and hearing loss. The target behaviour was self-injury, which included striking his head or nose with his fist or against another object. Before being referred for an assessment and a plan of support, he had been treated in another setting. In that treatment setting, the behaviours were initially addressed through aversive consequences, including bare-bottomed smacks, water squirts, pinches, and the like. Over time, the consequences only escalated the problem. As a result, after more than a year of such treatment, on 1 day alone he received 177 bare-bottomed smacks. (This agency still provides services, but has moved from using bare-bottomed smacks to using contingent shock.) The PBS plan developed for this boy did not involve any punishment. In fact, physical intervention was not even necessary to protect him from self-injury. The plan included ecological



strategies (e.g., that all staff be fluent in sign language); positive programming strategies (e.g., teaching him how to cope with and tolerate performing important but non-preferred activities); focused support strategies (e.g., antecedent control, i.e., giving him access to his self-restraining devices when he requested them [which he could get in and out of on his own without any staff assistance and which were gradually faded out]); and reactive strategies (e.g., signed redirection). The results showed that self-injury was successfully eliminated using PBS. The study was particularly significant given that, although it appeared to be the treatment of choice, before PBS services, his prior placement justified punishment as a “last resort” strategy and it not only failed to solve the problem but also contributed to its exacerbation.

In another published case study, LaVigna, Willis, and Donnellan (1989) described a person for whom a systematic, consistently applied aversive procedure (namely, overcorrection) was ultimately unsuccessful in controlling very serious episodes of physical aggression. Using a PBS approach, the problem of physical aggression was resolved. While PBS was able to eliminate physical aggression, questions remained as to whether or not the outcomes achieved through the PBS plan were durable. Accordingly, a 20-year follow-up was carried out looking at all the episodes of physical aggression that occurred in 2004, more than 20 years after the original intervention. Specifically, with family consent, information was gathered

from a number of sources for the entire year. This included a thorough review of the case file, with special scrutiny being paid to special incident reports, progress reports, change of shift logs, etc., staff interviews, and direct client observation and interactions. Based on these sources of information, the total number of episodes of physical aggression were calculated and added onto the originally published cumulative record shown in the 1989 paper.

Figure 1 shows that after 20 years physical aggression was still absent from this man’s repertoire. It is important to note, however, that while focused support, positive programming, and reactive strategies were no longer necessary, his team reported that key ecological strategies remained important for maintaining physical aggression at zero rates. These ecological strategies included having a 15-minute visual schedule to help this person understand what was going to happen each day and using an “active listening” style (Gordon, 1971) when interacting with him.

While the studies cited above report findings for a relatively small number of case studies, there have been studies in which a PBS approach has been investigated with many individuals who exhibit severe and challenging behaviour. In one study carried out in Ireland, McClean et al. (2005) reported the effects of PBS in 138 Type 3 case study applications (see earlier description of Type 3 criteria that allow valid inferences). Although they were not able to describe the details of each of these 138 plans,

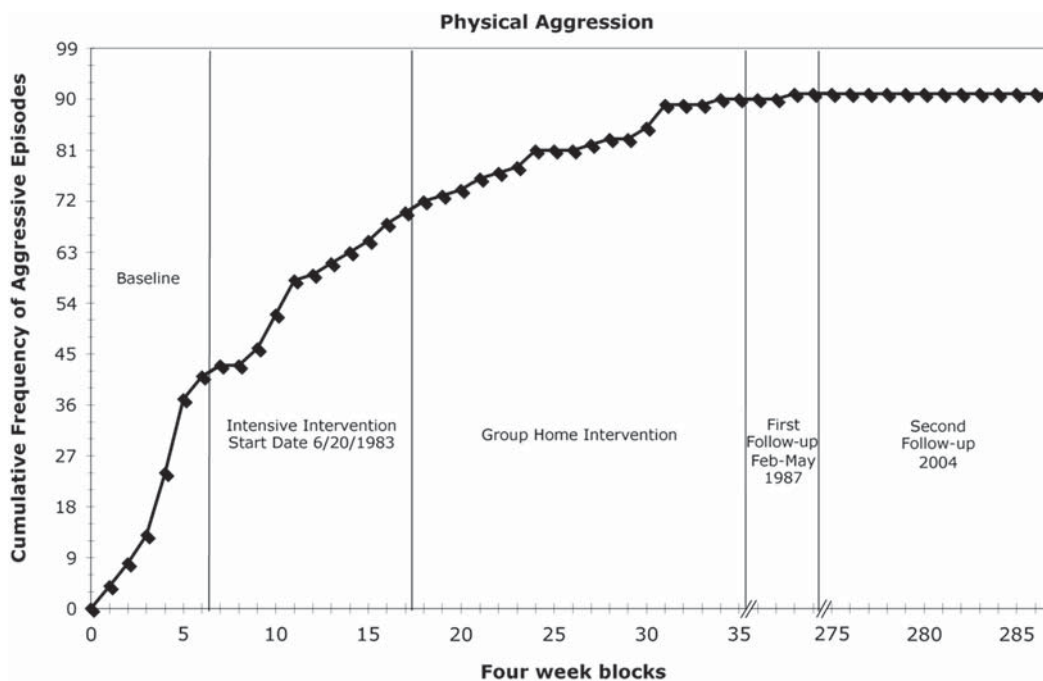


Figure 1. Results of the 20-year follow-up study.

they did explicitly state that each case employed the “multi-element model of positive behavioural support [and that each behaviour plan included] at least one element from each of the four components of the model” (McClellan et al., 2005, p. 344). Many of the individuals included in the study exhibited the most serious forms of physical aggression toward others (67 clients, i.e., 49% of the sample) and self-injurious behaviours (31 clients, i.e., 22% of the sample) serious enough to cause tissue damage. Overall, 77% of the total group made substantial improvement, with more than a 70% reduction in the occurrence of the targeted behaviour through intervention and follow-up.

Grey and McClellan (2007) reported a control group comparison study in which 30 clients received services based on the PBS model and a matched group of 30 did not. Of the 30 in the first group, 21 had serious aggression or self-injurious behaviour. Of the 30 in the control group, 23 had these problems identified as their problem behaviour. At the start of the study, no significant differences between the two were observed in the frequency or severity of challenging behaviour. The primary finding of this study was that clients receiving services based on PBS showed significant reductions in challenging behaviour, including the most serious behaviours, while those in the control group did not.

In yet another Irish study, McClellan, Grey, and McCracken (2007) used a single subject, multiple baseline across subjects design to evaluate the effectiveness of PBS for five individuals considered to have challenging behaviour at the highest levels of severity (i.e., involving serious tissue damage such as broken bones and/or deep lacerations and wounds). These behaviours were either in the form of physical aggression toward others or self-injury. The five were also assessed as having the most challenging behaviour in their home region. In each case, implementation of services based on PBS was associated with the elimination of the target behaviour with gains being maintained over the 2 years of data recording.

Although there were only a small number of studies that met the criteria for being selected for this review (see also the additional studies discussed in subsequent sections), it is encouraging to see evidence that appears to support the position that PBS may be used to successfully reduce or eliminate the occurrence of serious challenging behaviours. More studies investigating this approach are needed of course.

While PBS has been shown to reduce the occurrence of severe challenging behaviours over time, PBS may also be used to reduce the severity of individual episodes; that is, to reduce episodic severity. To address the severity of behaviour challenges, PBS has

explicitly included reactive strategies for the purposes of rapid safe situational management of challenging behaviours (e.g., LaVigna & Willis, 2002, 2005a). Recently, as described earlier, however, LaVigna and Willis (2005b) introduced a methodology for quantifying the episodic severity of individual occurrences of problem behaviour for the purpose of measuring the effectiveness of reactive strategies in the safe management of challenging episodes of behaviour.

An example of this was reported by MacDonald, Hume, and McGill (2010) (from Scotland). On an 8-point severity rating scale, the baseline measure of the episodic severity for aggression before PBS treatment was an average of 6 and for self-injury an average of 4.5. After treatment, averages were 2.7 and 2.5, respectively. These pre- and post-treatment measures of episodic severity show not only that they were addressing severe and challenging behaviour but that the PBS support plan that was implemented significantly reduced the episodic severity of the behaviour.

One last point can be made on the question of whether PBS can successfully be used to support people with exceptionally severe and challenging behaviour. There are some people for whom an approach that doesn't rely on consequences may actually have an inherent advantage. For example, some people with traumatic brain injury (TBI) may have such impaired short-term memory and poor impulse control that any consequential strategy may be limited in what it can accomplish on its own. In such cases, a non-linear approach which avoids aversive consequences (that may trigger higher levels of episodic severity) and which capitalises on antecedent control and counterintuitive reactive strategies (LaVigna & Willis, 2002) may be necessary for successful results. (See Rothwell, LaVigna, & Willis, 1999, and Willis & LaVigna, 2003, for two examples of PBS used in support of people with TBI.)

#### *Is PBS effective with high-rate behaviours?*

The second question that has been raised regarding the efficacy of PBS is whether or not PBS is effective with high-rate behaviour. The question itself is interesting, since the literature is lacking in reports of very low rate and intense behaviour. Most published studies showing the effects of punishment on problem behaviour have in fact looked at high-rate behaviour. This may be the inadvertent side effect of the need to show changes rapidly over time for publication purposes. It is comforting to know, however, that one of the implications of questioning the efficacy of PBS with high-rate behaviour is the correlate that PBS has demonstrated efficacy with low-rate behaviour,

as is substantiated by many of the studies cited in this review. But the question remains: Is PBS effective with high rate behaviour? Again, there are some studies to support this conclusion.

For example, in the LaVigna and Willis (1992) Type 3 case study, the self-injurious behaviour was occurring approximately 50 times per hour when the PBS plan was initiated. Upon full implementation of the PBS plan, self-injurious behaviour had "... essentially been eliminated" (p. 147). In the MacDonald, Hume, and McGill (2010) study, the target behaviours were occurring multiple times a day before implementation of the plan. The authors conclude that PBS can lead "... to decreases in challenging behaviour and increased participation in activity" (p. 6). In the McClean et al. (2005) report of 138 Type 3 case studies, of the 67 people who exhibited serious physical aggression, 7 of them exhibited this behaviour hourly and 18 daily. Of the 31 people who exhibited self-injury, 6 did so hourly and 15 did so daily. As described above, there was an overall 70% reduction in rates of problem behaviour occurrence. In the Grey and McClean (2007) control group comparison study, 30 subjects were selected for the PBS treatment group largely based on the high rate of their identified target behaviour, which was matched by the high rate of target behaviour exhibited by the control group that also consisted of 30 individuals. For this study, frequency was scored on a 6-point scale, with 1 representing *never* and 6 representing *hourly or more often*. "Taken collectively, there was a reduction to 22% of baseline for the [PBS] group at first quarter and a further reduction to 11% ... at the second quarter" (p. 12).

While some of these publications add to the Type 3 literature base, some are single subject, multiple baseline and control group comparison studies. One of the Type 3 criteria, however, that allows the drawing of valid inferences is the variability; that is, the differences in the target behaviours being addressed. The fact that PBS appears to have efficacy for low-rate behaviour, high-rate behaviour, and everything in between may be an indicator of its robustness more than would be reflected in an intervention approach that only showed effectiveness with either just high-rate behaviour or just-low rate behaviour.

#### *Does PBS require highly trained and experienced specialists?*

Another concern some may have is that PBS requires heavily trained specialists and requires particularly specialised expertise. One of the implications of this assertion is that the requirement of highly trained and experienced specialists would put PBS out of

the reach of most individuals who might need behavioural support, given the presumed relatively small number of highly trained and experienced specialists available in the field. This is an interesting question to be raised since one of the features that has been praised about PBS, even from those that have raised concerns (e.g., Johnston et al., 2006), is the outstanding job PBS has done with training and in the dissemination of this approach.

Effective training in and dissemination of PBS is certainly one of its hallmarks. This may partly account for its dramatically increasing visibility and use in the field. It may also be said that while university-level courses may be the traditional way people have learned about and studied ABA, non-university-based courses may have widened the pool of people who have access to training in PBS in particular. These courses are not merely disseminating information, they are often competency-based and criterion-referenced on topics such as the assessment and analysis of severe and challenging behaviour (e.g., LaVigna, Christian, Liberman, Camacho, & Willis, 2002). This practicum course aims at giving the participants the skills needed to meet defined criteria in carrying out a comprehensive functional assessment and in developing a multi-element PBS plan, including the use of nonaversive reactive strategies aimed at reducing episodic severity.

Gary Radler (Hudson, Wilken, Jauernig, & Radler, 1995a) provides an example of the impact this training has had. Based on the competency-based, criterion-referenced training he received in a non-university-based course, he established a statewide system of regionally based teams for the treatment of challenging behaviour in Victoria, Australia. The 3-year outcome study reported results for 134 participating individuals. While individual behavioural data was collected and graphed for all of the participants and showed overall positive results, outcomes were also measured through Goal Attainment Scaling (GAS; Kiresuk & Sherman, 1968) and consumer satisfaction data. Specifically, the GAS data indicated that the mean level of success for PBS was 75.6%. Consumer satisfaction data indicated that service users were "very happy" with the outcomes.

The above paragraphs indicate that practising professionals can be trained to use PBS to achieve good client outcomes, but the impact of training is even further magnified by "trainer of trainers" models. For example, in one published report, data indicated that first-generation trainees could be trained to train second-generation trainees as well as the first generation had been trained (LaVigna, Christian, & Willis, 2005). This 2005 outcome study involved training a team of national trainers for the Specialist



Education Services (SES) in New Zealand. In the first phase of the study, 36 first-generation professionals were trained in PBS. These were psychologists or others working in a comparable professional capacity within the Behavioural Services Units of SES throughout the country. From this first group of trainees, a team of national trainers was selected and trained to train others; specifically, a group of 23 SES professionals represented the second generation of trainees trained by the national training team. Training outcomes were evaluated by scoring trainees' comprehensive functional assessments and recommended support plans against validated and defined criteria (Ballmaier, 1992; LaVigna, Christian, & Willis, 2005) including 140 separate points of evaluation. Based on this measure, there was no significant difference in the quality of assessments and plans written by those trained directly by the primary trainers and those trained by the national training team. Consumer satisfaction was also comparable between the two groups.

These training and dissemination efforts suggest that PBS is not so specialised that only a small number of highly trained and experienced specialists can be expected to use this approach successfully. The work of McClean and colleagues (McClean et al., 2005) in Ireland appears to take this even further. After their own PBS training, they set out to train and coach direct service staff to do functional assessments, develop multi-element PBS plans, and to implement those plans consistently and successfully. This was evaluated through the combined results of 138 Type 3 case studies. They showed that not only can professionals be trained to assess, plan for, and support individuals with severe behaviour problems using PBS, but also direct service staff can be trained and coached to do this as well. This finding was replicated in the control group comparison study reported by Grey and McClean (2007).

These published studies suggest, therefore, that professionals and direct service staff can learn to effectively use PBS through training, regardless of whether it is first- or second-generation training. While university programs such as the Tizard Centre at the University of Kent in the United Kingdom may always be the primary source of professional training in the field, it is encouraging to see that non-university-based training may also play a major role.

It was also demonstrated recently that people can learn to use PBS effectively by reading the literature. Hassiotis and colleagues (Hassiotis et al., 2009) evaluated the outcomes of specialist teams taught to use a PBS approach based on reading the literature, citing many of the studies referred to above. In a randomised, single-blind, controlled group study

involving 63 clients, 32 assigned to standard treatment only and 31 assigned to standard treatment plus PBS services, they found that the provision of PBS services was more effective in improving challenging behaviour than standard treatment alone "... and may have financial advantages over standard treatment" (p. 1278).

*Is PBS prohibitively more costly than traditional services?*

It has been argued that PBS may be exorbitantly and prohibitively costly. On the contrary, the general finding of the studies that have evaluated the cost-effectiveness of PBS appears to show that this approach is cost-effective and that this finding is particularly robust given the four very different service systems in which these analyses were carried out (i.e., in addition to the 2009 study in England cited above, these have been in the United States, Australia, and Ireland).

The 16 Type 3 case study evaluations in the Donnellan et al. (1985) study involved individuals, all of whom had been referred and were on a waiting list for institutional placement because of their challenging behaviour. At the time, PBS intervention cost an average of only US\$6,000 per person. This compared to US\$45,000–US\$60,000 per year (in California) for State Hospital placement at the time. Hudson, Jauernig, Wilken, and Radler (1995b) carried out a formal cost-benefit analysis of this service delivery model as it had been applied to the 134 Type 3 cases in their (1995a) 3-year outcome study. Even taking into account the minority of cases with unsuccessful outcomes, their conclusion was that the PBS provided by the regional intervention teams was very cost-effective. Finally, two studies in Ireland (McClean et al., 2005; Grey & McCracken, 2007) reached similar conclusions. In the 2005 study, summarising PBS outcomes for 138 Type 3 case studies, the authors suggest that the significantly higher costs associated with institutionalisation could be largely avoided with the relatively lower costs of training direct service staff to provide PBS services in mainstream (community-based) service settings. More to the point, Grey and McClean (2007) found that the total cost for services for the 30 individuals who received PBS services was £418,492 before service provision, compared to total costs of £301,596 following the introduction of PBS services after 18 months. This represented a savings of almost 28%. While not every study reviewed here carried out a cost analysis, every one that did, covering the vast majority of interventions reported, found PBS to be cost-effective.

*Can PBS work in institutional settings?*

The implications of this question is that people who live in congregate living, institutional, or hospital settings are there at least partly because their problem behaviour is significantly more severe than for people living in the community. In fact, the literature cited above showed the successful application of PBS in both community and institutional settings. In the Berkman and Meyer (1988) study, the first three phases of support were provided in an institutional setting. The final phase of support was provided in the community. The most dramatic reductions in self-injury occurred during the final phase; that is, in the community. This raises the question as to whether people who have the most serious behaviours are placed in institutions or whether there is something about institutions that contributes to problem behaviour. Sorting this out would be a useful area for future research.

In the Hassiotis et al. (2009) study, standard treatment included inpatient units "... available for service users with mental illness or challenging behaviour who require admission" (p. 1279). In the Grey and

McClellan (2007) study, approximately two thirds of the 60 individuals resided in institutional settings, whereas almost 50% of the 138 individuals receiving PBS services in the McClellan et al. (2005) study were in institutions. For the individuals in institutions that didn't show significant progress in the 2005 study, the authors suggested that this may have more to do with the characteristics of institutions rather than the severity and complexity of the challenging behaviour. As mentioned above, this would be an important focus for future research.

The above literature review is summarised in Table 1 and shows the concerns around which there were relevant findings.

**Discussion**

This review was very selective in identifying studies for inclusion. The reasons for this included wanting to evaluate PBS in its purest multi-element form rather than to look at individual components. The data from these relatively few studies suggest that PBS appears to hold up against the five concerns

**Table 1. Summary of studies reviewed**

PBS outcomes studies	No. of cases	Severity	Rate	Specialist	Cost	Institutions
Donnellan et al. (1985): 16 Type 3 PBS case studies with project funded to prevent institutionalisation.	16	X	X	-	X	X
Berkman & Meyer (1988): One more Type 3 case study starting with ineffective restrictive/punitive plan in an institution and ending with effective PBS plan in the community. Serious self-injury.	1	X	X	-	-	X
LaVigna et al. (1989): Another Type 3 PBS case study with man for whom effects of overcorrection did not last. PBS plan was effective. 20-year follow-up data presented showed lasting results. Serious physical aggression.	1	X	-	-	-	-
LaVigna & Willis (1992): Another Type 3 PBS case study in which punishment had been tried and failed. Serious self-injury.	1	X	X	-	-	-
Hudson et al. (1995a, 1995b): Two reports covering 134 Type 3 PBS case studies of state-wide Behaviour Intervention Support Teams in Victoria, Australia.	134	X	X	X	X	X
Rothwell et al. (1999): Another Type 3 PBS case study in institutional setting. Traumatic brain injury.	2	X	-	-	-	X
Willis & LaVigna (2003): Another Type 3 PBS case study. In community setting. Traumatic brain injury.	1	X	-	-	-	X
McClellan et al. (2005): 138 Type 3 PBS case studies in a nongovernmental agency in Ireland with assessment, planning, and intervention carried out by direct service staff.	138	X	X	X	X	X
Grey & McClellan (2007): Control group comparison PBS study in Ireland with 30 people in each group.	60	X	X	X	X	X
McClellan et al. (2007): Multiple baseline across subjects PBS study in Ireland involving 5 individuals.	5	X	X	X	-	X
Hassiotis et al. (2009): Control group comparison study in the UK with 31 people receiving PBS.	63	X	X	X	X	X
MacDonald et al. (2010): Type 3 PBS case study in Scotland with formal measures of episodic severity for self-injury and physical aggression.	1	X	X	-	-	-
Total number of cases	423					

Note. X = relevant findings.

that have been raised. However, the multi-element plans make it difficult if not impossible to understand which components contribute to which outcomes. This would be a challenging but useful area for future research. Among other things, it might help identify which strategies are essential for successful outcomes and which are optional, as well as how they may combine, even synergistically, to produce the desired outcomes.

Another question not addressed in the studies reviewed is based on the fact that the components of a multi-element plan cannot be practically implemented simultaneously. Future research could explore the optimum sequence of implementation.

As mentioned above, another set of questions for future research has to do with the extent that institutional settings may themselves contribute to the severity of problem behaviour. This area of research may have implications for where services are provided in support of individuals with these problems.

Finally, a new area of research may explore the effectiveness of nonaversive reactive strategies for reducing episodic severity. For example, it would be valuable to show empirically that non-linear principles and procedures of ABA can allow the resolution of a behavioural event at low levels of episodic severity by interrupting it with a preferred activity, without reinforcing that behaviour. Such non-linear principles could include, for example, making that same event available to the person at other times, non-contingently, and increasing the environmental density of other unrelated preferred activities (Diorio & Konarski, 1989).

## Conclusions

While this review has included only a limited number of outcome studies evaluating the efficacy of the multi-element PBS model, as shown in Table 1, the results for literally hundreds of individuals who received services in different countries around the world appear to support the conclusion that the model is effective. Specifically, PBS appears to be effective for the most severe problems (as well as less severe problems), for high-rate behaviour (as well as low-rate behaviour), and for behaviour problems exhibited by people who live in institutional settings (as well as for people who live in the community). Further, it appears to be a cost-effective approach that can be widely taught and disseminated to all people working in the field, including direct service workers. Since these conclusions are based on so few studies, future research is needed to further validate these findings. It is hoped that future research will also increasingly include formal outcome measures

of episodic severity and explore the explicit use of nonaversive reactive strategies to reduce and eliminate restraint, seclusion, and other restrictive “duty of care” strategies needed to keep people safe from harm and injury.

The major implication for practitioners of ABA regards a guiding ethical principle for the field; that is, to use the least restrictive method consistent with the right to effective treatment (Van Houten et al., 1988). This is promulgated both by the Behaviour Analyst Certification Board (<http://bacb.com/>) and the Association for Behavior Analysis International (<http://www.abainternational.org/>). As suggested above, PBS appears to be procedurally effective, cost-effective, and easily accessible to everybody working in the field of challenging behaviour.

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