Increasing support staff fluency with the content of Behaviour Support Plans: An application of Precision Teaching

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Abstract

Background

Behaviour Support Plans (BSPs) are at the core of Positive Behavioural Support for challenging behaviour, but non-adherence to BSPs is common. Generally, non-fluent component knowledge prevents learners achieving fluent application and retention of information and we hypothesised that this may apply to staff learning BSPs.

Method

We compared the effectiveness of fluency training (FT) and precision teaching on staff learning of BSPs with staff receiving consultation as usual (CAU), comprising standard support for learning BSPs. All staff completed pre- and post-intervention tests measuring frequency of component skill recall and application of component knowledge (composite skills).

Results

The FT group made and maintained greater gains in component skill recall and achieved higher composite test scores, suggesting greater application of component skills. These effects were associated with moderate effect sizes.

Conclusions

This study offers initial support for the application of fluency training and precision teaching for staff learning BSP content.

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A high quality Behaviour Support Plan (BSP), representing the results of a functional assessment of challenging behaviour is recognised, alongside good contextual fit, as a core component of Positive Behavioural Support (PBS) (Allen, James, Evans, Hawkins & Jenkins, 2005; Carr et al., 2002; Gore et al., 2013; Wing & O'Connor, 2003). Unfortunately, staff working in developmental disabilities services do not always follow the intervention procedures described in a BSP (Albin, Lucyshyn, Horner & Flannery, 1996; Allen, 1999; Allen et al, 2005).

Why is it that staff may not utilise BSPs in practical settings? Difficulties with implementing evidence-based practice is not unique to PBS services and research from implementation science has reported concerns with limited success in transferring best practice into ordinary service settings in general (Palinkas & Soydan, 2012). Implementation of a BSP requires behaviour change within a complex system, which may not occur simply through diffusion, dissemination and training alone (Fixsen, Blase, Naoom & Wallace, 2009). Integration of new ways of working need implementation methods that match the new target behaviour, the team, the context, and provide appropriate support and facilitation for the change (Kitson, Harvey & McCormack, 1998; Michie, M van Stralen & West, 2011; Nilsen, 2015). Indeed, research suggests that we must plan for active implementation, which includes skills training, coaching, feedback, and on-going professional development (Odom, 2009). Identifying and responding to barriers and incentives within the system is also necessary if successful implementation with effective outcomes for people we support are to be achieved (Ogden & Fixsen, 2014).

Within developmental disability services a number of potential barriers to the uptake of behavioural interventions have been reported and include, poor staff knowledge about behavioural theory and techniques (Emerson & Emerson, 1987), poor management support for behavioural interventions (Ager & O'May, 2001), differences between support staff beliefs about the reason that challenging behaviours occurs, and behavioural hypotheses derived from functional assessment (Hastings, 1997; Hastings & Remington, 1994). More specifically in relation to BSPs, Albin et al. (1996) further suggested that a lack of involvement of support staff in the development of the plan, inadequate training in its implementation, lack of belief in the efficacy of proposed strategies, and other systemic issues are also obstacles to effective implementation. Poor plan quality and technical inadequacies are also factors that may contribute to implementation difficulties (Van Acker, Boreson, Gable & Potterton, 2005).

Examples of strategies to improve BSP implementation that may address these potential barriers have included training all staff in the delivery of PBS and involving them in the development of a personalised BSP (Medley, Little & Akin-Little, 2008), improving the quality of the BSP (Browning-Wright et al., 2007), increasing the evidence base of the BSP (Van Acker et al, 2005), and interventions aimed at changing staff beliefs about challenging behaviour (Dowey, Toogood, Hastings & Nash, 2007). Increasing the contextual fit of a BSP through a combination of careful selection of the BSP development team, training in PBS, a thorough understanding of the focal person and the setting and designing interventions which reflect the team's values and beliefs, have also been effective in improving outcomes (Benazzi, Horner & Good, 2006; Dench, 2005).

Staff training has been the foundation of many of these implementation approaches and evidence does suggest that enhanced outcomes for individuals are achieved when PBS training is applied to all personnel within a system (Horner, Sugai, Todd & Lewis-Palmer,

2000). However, Van Acker et al. (2005) suggest that staff training alone is insufficient to embed new interventions, and staff may require multiple opportunities for practice, modelling, coaching, feedback and support in real environments with real individuals to improve the development and implementation of a BSP (see also, Chandler, Dahlquist, Repp & Feltz, 1999; Scott, Nelson & Zabala, 2003). This need for "a culture of support" (Bambara, Gomez, Koger, Lohrmann-O'Rourke and Xin, 2001) with feedback for direct support staff on an on-going basis echoes the implementation science literature that describes effective implementation not as a one off event, but as an ongoing process (Ogden & Fixsen, 2014).

Existing solutions to overcoming the problem of support staff non-adherence to BSPs may however have missed a potentially significant dimension of behavioural teaching practice that could support BSP implementation. That is, maybe support staff are not fluent with the content of a BSP, and this knowledge disfluency acts as a barrier to effective application. Within the behavioural education literature, "fluency" (accurate performance at appropriate speed) has been used as an indicator of skills that have been mastered (Binder, 1996); this has also been termed "automatic responding" (Haughton, 1972), "automaticity" (Bloom, 1986), or second nature performance (Binder, 1990). All of these concepts indicate confident performance without hesitation even in the presence of distraction (Binder, 1984).

Fluency training is often used within a precision teaching approach. Precision teaching is a system for precisely defining, measuring, recording and analysing behaviour in order to facilitate learning (Kubina & Yurich, 2012). Precision teaching has been described in detail elsewhere (see for example, Beverley, Hughes & Hastings, 2009; Kubina & Yurich, 2012; Lindsley, 1995; White, 1986). Five key outcomes are associated with fluent performance: retention, endurance, stability, application and adduction (Johnson & Layng, 1996; Johnson & Street, 2012). When learners are responding fluently they demonstrate skills and knowledge with greater endurance over time, less deterioration with distraction and are

more likely to apply and combine these skills in more complex settings (Binder 1993; 1996).

In one study, Bucklin, Dickinson and Brethower (2000) compared the effects of fluency training with accuracy training alone on college students' ability to retain and apply learned component skills in an untrained composite task. Findings demonstrated that fluency training produced a higher number of correct responses per minute (rate) for component and composite skill performance, both immediately after training, and after a 16-week follow-up. This study is important for a number of reasons. First, it demonstrated that fluent component skills supported more fluent acquisition of related but untrained composite skills—this maybe crucial in clinical settings where staff need to perform within complex situations. Second, for staff working with people exhibiting low frequency but high impact challenging behaviour, the skills required during incidents may be seldom used, but nonetheless, unhesitant and accurate responding from staff is critical when these events do occur; the Bucklin et al. study suggested that fluency training could contribute to accurate recall of knowledge over longer periods without practice.

The aim of the present study was to explore the application of precision teaching with fluency training with staff working in community residential environments where they have to implement BSPs. We investigated whether this approach could increase staff accurate acquisition and retention of behavioural strategies in a BSP compared to "consultation as usual" (i.e., typical support for staff given a new BSP for a person within their care).

Method

Ethical approval

The research was approved by the xxx (name removed for blind review) University Research Ethics and Governance Committee. Written agreement from employing community-based service providers was sought prior to approaching individual staff to be involved in the study. A participant information sheet was given to each staff member prior

to obtaining informed consent in writing.

Participants and setting

Five staff teams working with individuals with developmental disabilities and severe challenging behaviour (including a total of 25 individual staff) participated in the research. One staff member withdrew after the pre-test phase (see later for Procedure). Staff teams were employed by three community based service providers within a region of North East England. Each of these organisations provided services for adults with moderate/severe intellectual disabilities and challenging behaviour requiring 24-hour support in small supported living services with no more than four individuals living together.

Of the five individuals with developmental disabilities three were female and two male. Their ages ranged from 26 to 46 years. Two had diagnoses of autistic spectrum disorder, one Down syndrome, one Williams syndrome and one had no specific diagnosis other than general developmental disability. All had lived in their current services for more than one year. All had significant difficulties with communication. Challenging behaviours included verbal aggression (all five individuals), physical aggression (four), destruction/damage to property (four) and self-injury (one). Frequency of challenging behaviour was at least weekly, increasing to daily at times, for all individuals

Staff teams were assigned to either the fluency-training/Precision Teaching group (FT; n = 14 staff, three staff teams) or the consultation as usual group (CAU; n = 10 staff, two staff teams). Table 1 provides a description of the demographic characteristics of staff in each group. In addition to the information provided in Table 1, two staff within the FT group had English as their second language.

None of the staff had previous knowledge of precision teaching or fluency training, and the BSPs were new to all staff during the research.

Table 1. Characteristics of Staff in the Two Study Groups

Staff characteristics		Study Group	
		FT	**CAU**
N		14	10
Gender	Male	3	3
	Female	11	7
Age Range (years)	≤ 19	1	0
	20-30	4	2
	31-40	3	2
	41-50	4	2
	≥ 51	2	4
Developmental disability (DD) experience (years)	≤ 3	6	3
	3-5	1	1
	≥ 5	7	6
Other care experience (years)	None	9	5
	< 3	2	2
	3-5	0	1
	> 5	3	2
Training background (by type)	Basic induction only	4	1
	General care qualifications	10	10
	DD professional qualifications	4	4

Research Design

A quasi-experimental design was used, including a non-equivalent control group with pre-test to post-test measurement. Random allocation into the experimental and control conditions was not possible because the research team had no influence over referrals received or the availability of staff teams. Opportunity sampling was undertaken as teams fulfilling the inclusion criteria became available and individual staff gave consent.

Overview of Intervention

Behaviour support plan (BSP) development. Each staff team separately attended a 3-hour bespoke BSP development session, which focused on an individual with severe challenging behaviour within their setting. This involved completing a functional assessment process and agreeing effective behavioural interventions based on that assessment. The information gathered for, and during this session was collated by the first author into a BSP focused on the person with challenging behaviour being supported.

Understanding and learning the BSP. Teams were allocated to receive clinical consultation as usual (CAU) from the first author, or to receive fluency-training/Precision Teaching (FT). Following allocation, and after typically 3-4 weeks following the initial BSP development session, all staff teams attended a second individual three-hour follow-up workshop focused on the person with challenging behaviour they supported. The individualised BSP was presented and discussed, points of understanding clarified, and any technical behavioural concepts (e.g. reinforcement, stimulus control) were taught to staff as required. Staff in the CAU group were asked to learn the content of their person's BSP over the following four weeks and they were given a printed copy of the BSP. No further specific advice was given to staff about the learning method they should use. This method reflected the typical support provided to staff teams by the PBS services locally.

In addition to the standard follow-up workshop, staff in the FT group received one-hour of instruction in fluency training. Staff were expected to learn flashcards by undertaking three one-minute practice sessions daily for four weeks, using a flashcard procedure known as SAFMEDS (Say Aloud Fast Minute Every Day Shuffle) (see Claypool-Frey, 2009; Graf & Lindsley, 2002; Vieitez, 2003). Each flashcard had a short statement from a behavioural strategy that was a part of the BSP printed on one side and the answer/missing word(s) on the reverse (examples are available on request from the corresponding author). Progress in learning the flashcards was to be recorded on score sheets and the data plotted on a Standard Celeration Chart (SCC) (Lindsley, 1971). The SCC displays rate of correct and incorrect scores and over a few days produces a "learning picture". These learning pictures can indicate whether learning is progressing adequately and provides information about what strategies may improve learning if required. Practice sessions continued daily until staff had reached and maintained their fluency aims. Following this training, copies of the BSP were

not made available to the staff in the FT group – instead the BSP content was available to them only in the form of the flashcards.

Materials and apparatus

A specific BSP was written for an individual service user in each community residential setting regardless of experimental condition. One hundred and twenty unique flashcards, measuring 9 x 4 cm in size, were produced for all three FT staff teams using the individual information from each BSP. Equal numbers of flashcards ensured similar amounts of information being learned by each FT team. Cards were divided into two packs for ease of learning. Pack 1 contained concepts/strategies relating to description/function of the challenging behaviour and preventative strategies. Pack 2 contained concepts/strategies relating to functionally equivalent behaviours and reactive strategies. Flashcards were also produced for the two BSPs prepared for the CAU staff. However, apart from the testing points in the research design, staff were not provided with access to these flashcards.

Digital timers were used to time practice drills. Data recording sheets for the FT group were used and included an anonymous identifier, date, the number (1 or 2) of the flashcards pack being practiced, the aim, correct and incorrect scores obtained for each practice drill, length of practice drill, and any other comments. Staff were trained to record their best scores for each day on a SCC, and these data provided feedback to the staff member about their learning.

A data-recording sheet was also given to each CAU staff member. They were asked to record their anonymous identifier, the time they spent learning the BSP, and any information they could about their learning method. For example, staff were asked to record whether they were reading and re-reading the BSP, writing down individual strategies from the BSP, or using other strategies.

Outcome Measures

A supervised test of *component* skills was administered pre and post-training intervention and at 6 weeks from baseline to both FT and CAU groups. Each staff team were tested with their own specific component test made up of 30 flashcards from Pack 1 and 30 from Pack 2 for their client's BSP. Each flashcard had one concept or strategy (one component) from the person's BSP printed on it. The test involved all staff completing three, one- minute timings using their flashcards and their best score was used to give a measure of the number of correct/incorrect answers per minute. This provided baseline data, and tested later fluency and retention.

A written *composite* test (specific to each client/service) was also completed, after 4 and 6 weeks from baseline. The composite test involved staff identifying a number of correct concepts/strategies (i.e., components) from the BSP in response to six written scenarios (examples of incidents) relevant to each individual service user. This test was designed to investigate the ability of staff to apply their component knowledge into novel scenarios (composite skills) relevant for the person they supported. The composite test was not administered at baseline as staff did not know the BSP at that point. Table 2 shows an example of a composite test for one staff team.

Composite skill performance was assessed by scoring the number of BSP strategies correctly identified by the staff member. Correctly identified strategies were those from the BSP that would be relevant to the scenarios presented. "Correct" answers to each scenario were prepared by the first author by matching elements within the example incident to appropriate strategies within the individual's BSP. Correct answers were, therefore, specific to the person being supported and staff would have needed to utilise their knowledge of concepts/strategies (components) from the person's BSP to be able to answer the questions. These correct answers were used as a scoring guide for the composite test.

Table 2. Example of a Composite Test for one Staff Team

Composite Test for X (Fluency Group) – 4 weeks

Identifier:	**Time to complete test:**
Test Instructions	
• Using your knowledge of the behaviour support plan, write down as many strategies as you can for each of the following scenarios.	
• They **do not** need to be written down exactly as you have learnt them from the flashcards.	
• Remember to include strategies **you should use** as well as those **you should not.**	
• Do not worry about the order or sequence of strategies.	
• Complete all 6 scenarios.	
• Record the amount of time you spent completing the scenarios at the top of the form.	
Scenarios	
1. X and staff are in the lounge with the other residents watching a DVD. X starts to make loud, nasty comments to another client. She then insults a staff member.	
2. X is going out to buy a birthday card and some crisps. When she is in the supermarket she says, "me thirsty – me drink" and wants to have a drink in the café. This is not something you have planned. She becomes quiet and uncommunicative.	
3. X is in her bedroom on her own in the afternoon. Staff enter her bedroom & X shows them she has picked her foot and it is bleeding. She is quiet and uncommunicative.	
4. It is 9.30pm and X is hovering in her bedroom doorway. She is quiet, head down and uncommunicative. When asked if she is OK, she responds, "Don't know".	
5. It is 10.30am and staff are busy completing personal care and other essential tasks with other residents. X asks a staff member if they will make her a cup of tea.	
6. Two different staff on duty are asking X to help tidy up her papers and books. She does not want to.	

All 4-week composite tests were independently scored using the pre-prepared correct answers for each scenario, by the first author and a clinical colleague with training in PBS. Inter-rater agreement between the two scorers was calculated by dividing the number of agreements for each scenario by the sum of agreements and disagreements, and multiplying that number by 100. Overall initial percentage agreement for the 4-week composite tests ranged from 50 – 100% with a mean of 81%. Where misunderstandings and/or discrepancies in scoring occurred, these were resolved through consultation between the two raters and a consensus decision made about final scores. The second rater scored twelve of 24 6-week composite tests, with 100% agreement achieved.

Procedure

Following attendance at a BSP development session for their client, all participants were asked to complete the demographic questionnaire. Following the second workshop (when the BSP was shared with each staff team), staff in the CAU group were given a paper copy of their client's BSP and were asked to learn the content over a four week period. Staff were asked to record the amount of time spent learning the BSP on the data-recording sheet.

After the second workshop, the FT group received fluency-training instruction. The trainer explained fluency-training procedures and modelled a practice sessions using the multiplication tables for the number 7 as flashcards. The flashcards procedure (SAFMEDS) was then described and a written procedure provided to each participant. Staff were instructed to practice using their flashcards (starting with Pack 1) three times daily for one minute. Prior to commencement of each 1-minute practice, staff members were instructed to gather their flashcards, recording sheets, SCC, and timer. Staff were told to shuffle the cards, set the timer for one minute, and answer as many flashcards as possible in the time. Each card was to be read/answered out loud quickly, the cards "passed" if answers were not known, and this process was to continue for one minute. Correct responses were placed in a

pile to the staff member's right and incorrect responses in a separate pile to the left. All scores were recorded onto score sheets and best daily scores transferred onto their SCC.

Practice with the flashcards continued daily until participants reached and maintained their fluency aim ($\geq$ 30 correct with no more than 2 incorrect per minute) across three successive attempts. They then moved onto the next pack of cards and completed the same procedure. Staff were told to re-test fluency in packs of cards where they had already reached their fluency aim by completing a practice drill with that pack once a week. The FT learning period lasted for four weeks. FT staff teams were not given a copy of the BSP in any format other than flashcards, thus using only this learning method.

Regular telephone contact with the researcher was offered for all staff, to ensure procedural adherence and to offer coaching and support. Due to staff time constraints, most contact was limited to once weekly text message conversations. In addition, two staff in the FT group requested face-to-face support on one occasion to consider ways to increase their fluency.

On completion of four week fluency training or CAU, all staff completed supervised component tests and a composite skills test. All recording sheets and SCCs were collected. All flashcards and BSPs were retrieved after this four week post-intervention data collection point to prevent further practice. Retention of both component and composite skills was retested again after a further two weeks.

Results

Mixed 2 (intervention group: FT vs. CAU) x 3 (time: pre-intervention, post-intervention [4 weeks post-baseline test], follow-up [6 weeks post-baseline test]) ANOVAs were used to examine the effectiveness of the FT intervention on the component test. The dependent variable was a count of correct responses per minute and these data are displayed in Figure 1.

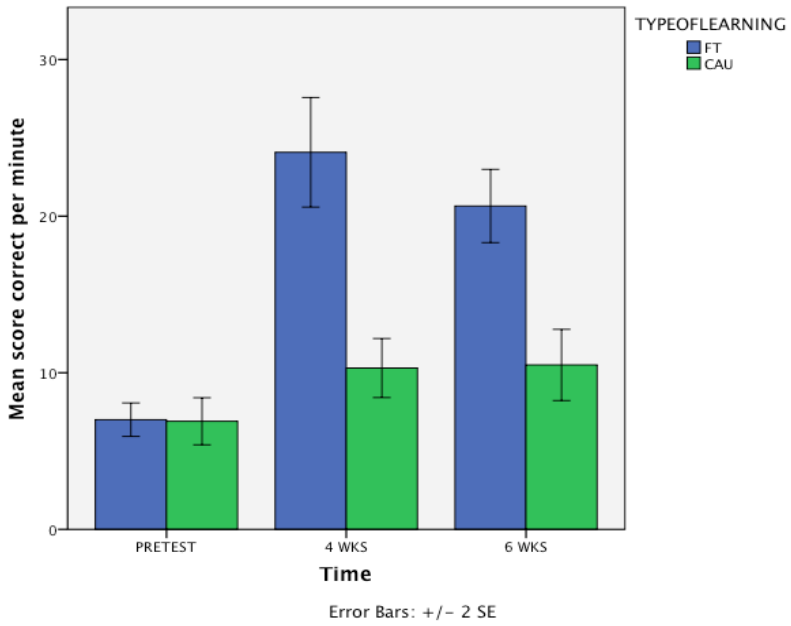

Figure 1. *Mean correct scores per minute in the component test for the FT and CAU groups at pre-test, 4-weeks and 6-weeks.*

For the mean number of correct responses per minute, there was a significant intervention group effect F (1, 22) = 34.70; $p < .001$; $\eta^2 = .61$ (a moderate effect size), a significant main effect of time F (2, 44) = 78.78; $p < .001$; $\eta^2 = .78$ (a large effect size), and a significant intervention group x time interaction F (2, 44) = 32.62; $p < .001$; $\eta^2 = .60$ (a moderate effect size). The data in Figure 1 suggest that this interaction effect relates to a better performance in the FT group compared to the CAU group at the four-week post-intervention test point and again two weeks later at the retention test point. This pattern of findings was confirmed with a follow-up one-way repeated measures ANOVA across time for both groups, and a series of post-hoc independent samples and paired samples t tests. The two groups' correct scores did not differ at baseline t (23) = .244, p = .809, but the FT group had higher mean correct scores than the CAU group both at 4 weeks t (22) = 6.18, p < .001 and 6 weeks t (22) = 6.01, p < .001. The scores of both the FT group F (2, 26) = 85.17; <

.001 and the CAU group F (2, 18) = 15.97; p < .001 changed significantly over time. In the FT group, mean correct scores increased between baseline and post-intervention t (13) = 9.36; p < .001, and reduced between post-intervention and follow-up t (13) = 4.00; p = .001. In the CAU group, mean correct scores also increased between baseline and post-intervention t (9) = 4.22; p = .002, but there was no change between post-intervention and follow-up t (9) = .429; p = .678.

A mixed 2 (intervention group: FT vs. CAU) x 2 (time: post-intervention vs. follow-up) ANOVA was used to examine the composite test (the application of component knowledge to test scenarios) scores. As expected, given that these data could only be gathered from post-test onwards, there was a significant main effect of intervention group F (1, 22) = 17.26, p < .001; η^2 = .44 (reflecting higher scores in the FT group, and a moderate effect size), but no main effect of time F (1,22)= .988, p = .331 and no intervention group x time interaction F (1,22) = .228, p = .638. Mean percentage correct scores for the composite test are shown in Figure 2.

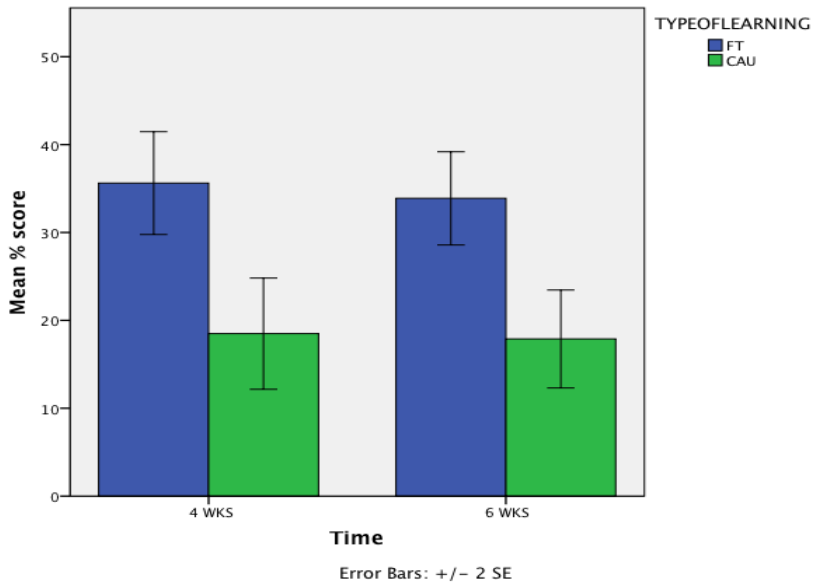

Figure 2. Mean percentage correct scores in the composite test (application of component skills) for the FT and CAU groups at 4 and 6 weeks.

These group level findings were also reflected in the individual staff data. For example, all 14 staff in the FT group improved from baseline to 4 weeks. For all but two staff, their scores at follow-up suggested that post-intervention fluency levels were not fully retained although follow-up scores were higher than baseline scores for all staff. In the CAU group, the gains in fluency were much smaller and also there is a lack of a clear overall pattern with some improving slightly between post-intervention and follow-up and some not.

Individual staff data also supported a strong main effect of intervention group in the statistical analyses. For example, at post-intervention 50% of the FT staff group had a higher score than the highest scoring staff member in the CAU group.

Figure 3 illustrates the use of the SCC to record learning for one staff member in the FT group. Following completion of the pre-test, this staff member began Pack 1 by completing three timings per day and recording the best daily score. There are no gaps in the data, indicating that timings were completed when the staff member was both on and off work shift. The data show a "jaws-type" learning picture with the number of incorrects decreasing as the number of corrects increases. For the staff member shown in Figure 3, on day eight of practice, they implemented a change to their learning approach in response to a deceleration (reduction in rate of change) in the number of corrects achieved over three days. By implementing a pre-timing practice, their learning began to accelerate (increase) again until their aim was met. A similar learning picture is seen for Pack 2, although an improving learning picture, with a steady acceleration of corrects, did not warrant any change to their learning approach.

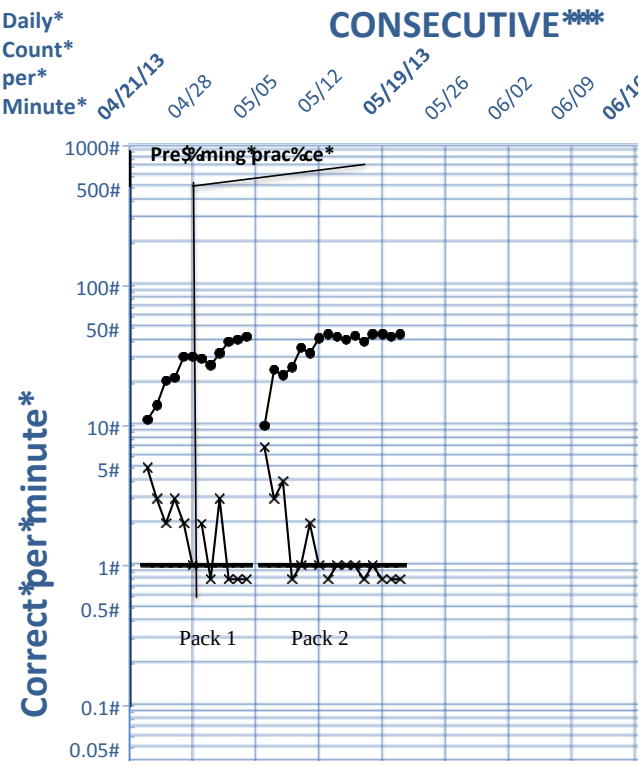

Figure 3. A section from a daily per minute standard celeration chart showing the best daily scores for one participant from the FT group for Pack 1 and Pack 2.

Discussion

The aim of this study was to evaluate the effectiveness of precision teaching with fluency training with support staff as a method of increasing acquisition and retention of component knowledge in a BSP and the application of that knowledge in a composite skill (unlearned scenarios depicting incidents of challenging behaviour). Results indicate that this approach was effective, with the FT group showing greater increases in rate of component knowledge recall compared to the CAU group after intervention and at follow-up (associated with a moderate effect size). The FT group was also able to apply this knowledge with greater percentage correct scores in the composite test, and maintained this higher

performance at follow-up (also a moderate effect size). Given the moderate effect size in favour of the FT intervention group on both outcome measures, these differences after a short period of training can be seen as potentially clinically meaningful.

There was no statistically significant differences between the two group's component knowledge mean scores at the pre-test stage. As expected, the mean correct scores for both groups improved after 4 weeks, although gains for the FT group were significantly higher than for the CAU group. In line with other studies (Hughes, Beverley & Whitehead, 2007), it was anticipated that the FT group's retention of component skill knowledge would be maintained at higher rates compared to the CAU group at 6 weeks. Retention is an expected outcome of fluent performance and is the ability to maintain knowledge over time without the learner having opportunities to practice. Results confirmed greater retention, with the FT group recalling 50% more information compared to the CAU group. However, there was some loss of component knowledge recall. This was statistically significant compared to the CAU group who did not appear to have a similar reduction. The CAU participants' increases in component knowledge during intervention were small compared to the FT group, and retention of information may have resulted from practice effects through repeated testing.

Binder (1996) suggests that greater fluency in component skills is more likely to lead to improved application in unlearned composite skills (see also, Johnson & Street, 2012). The FT group's higher scores in the composite test offer preliminary evidence consistent with this view. In addition, the FT group retained their greater application of knowledge at follow-up, suggesting that more fluent component skills may aid retention in both component and composite skills (Binder 1993; 1996; Bucklin et al., 2000).

Individual data suggested that those participants who achieved the highest frequencies in component tests tended to score highest on the composite test. For the highest scoring FT participant this was 54% (4 weeks), improving to 56% (6 weeks). In comparison, the highest

scoring CAU participant in the component test achieved composite test scores of 34% (4 weeks) and 30% (6 weeks). This tendency for higher composite scores to follow higher component scores remained a consistent trend across both groups and has been evidenced in previous research (Hughes et al., 2007). These data support the view that better application of knowledge is achieved through gaining higher frequencies in component skills. However, it must be noted that this study did not match for the number of practice opportunities in the two conditions so it is feasible that exposure and not rate of response is the crucial factor. Similarly, it could be concluded that the FT group were trained for the test situations as they were familiar with the flashcard wording during their fluency practice. However, the CAU group also had access to the same wording of strategies written in the BSP but the test results suggest they were unable to recall and retain this information to the same degree. Furthermore, the FT group showed greater ability to apply their BSP knowledge in the composite test which neither they or the CAU group had opportunities to learn. The need to implement a BSP consistently is a core element of PBS and we need to be confident that staff know the content of a BSP and can apply this when needed, sometimes in novel situations. The poor recall and retention for the CAU group suggests further consideration is required to help staff learn behavioural strategies; it is difficult to see how staff maybe expected to implement the appropriate strategy in a crisis situation for example, when they don't know these strategies.

From the results, it is clear that all but one FT staff member (who withdrew from the study after the pre-test) made significant gains in their rate of accurate performance in component skill knowledge. Whilst we cannot conclude that this increased rate of performance is a direct result of fluency training (given the lack of a randomised design), it is likely that daily practice contributed to this change. Our data show that many staff made a commitment to daily flashcard practice even when not on a work shift. This motivation to

learn the flashcards is a clear strength of this study and the low attrition rate could support the feasibility and potential social validity of this approach. This reflects Michie et al. (2011) in that an effective implementation strategy requires methods that match the target behaviour, population and context. Clearly, further research is needed to assess whether greater recall, retention and application in test situations are then generalised into implementation in practice settings.

A further benefit of fluency training reported in the literature is the shorter duration of the training programme (Binder & Sweeney, 2002). Staff in both groups were given 4 weeks to learn a BSP. The FT group spent an average of 78 minutes over 26 days compared to the CAU group who reported 134 minutes over 4.8 days. Whilst these data are self-reported, they suggest that short but consistent daily practice may be more acceptable to staff and lead to a more efficient learning method than longer periods of time over fewer days. The overall time spent learning flashcards was shorter (even after including time for fluency training instruction), and could offer a method of enabling staff to learn at their own pace using their preferred learning approach, but ultimately providing a quicker method of training.

In addition to implementation time, the practical utility of fluency training needs to be considered in terms of cost and materials. Staff often report limited time available for reading information when on work shift and releasing care staff to attend training is often problematic. Flashcards allow staff to learn information at a time and location that is convenient to them. Materials were cheap to produce, required no specialist equipment and can be re-used indefinitely in a particular setting for refresher training if required. Given that fluency training is associated with greater retention, endurance, and application of knowledge (Binder, 1996), the need for repeated training and refresher courses could be minimized. This study suggests that short practice sessions can offer an effective, inexpensive and easily administered procedure to help staff learn the basic components of a BSP.

There were several limitations to this study. Firstly, it involved small numbers of staff learning BSPs. There is a need to replicate this type of staff training as it may represent an efficient and procedurally straightforward way to improve the ability to recall and retain behaviour support plan information. Secondly, we did not match flashcards for number of words per card or complexity of information for each team. However, the average number of words per card was similar and each pack contained the same number of cards. These differences were unavoidable given the bespoke nature of each BSP. Some staff reported cards with more words or with complex information were harder to recall. Complexity or unfamiliarity of terms on flashcards or in BSPs in general is an important factor and consideration is needed to match information to the staff teams' skills if we are going to utilise BSPs as effective tools in PBS.

A further constraint in this study was reliance on self-report in both groups regarding adherence to the FT or CAU procedure. No independent procedural fidelity checks were undertaken due to researcher time constraints. It is therefore not possible to verify the amount of time or methods used to learn the information or prepare for tests. However, the researcher supervised all tests and the higher scores for the FT group indicate recorded data were an accurate reflection of daily flashcards practice. The control group utilised "usual learning methods" to learn their BSP, but data are not available about the type of learning experience or opportunities for practice. Likewise, there was no measure of progress for the CAU group during the 4-weeks to provide evidence of engagement with the material. It is, therefore, difficult to make direct comparisons between the two groups. These variables need to be controlled for in future research.

Despite the limitations of this study, this method of increasing staff fluency with the content of a BSP resulted in staff being able to recall, retain and apply more information than staff using standard methods to learn a BSP. The data corroborate the view that effective use

of new practice requires an implementation method, which supports the change process (Michie et al., 2011) and does not simply rely on diffusion and dissemination alone (Fixsen, 2009). Further research is required, however, to ascertain whether fluent staff knowledge improves implementation of the BSP is practical settings and increases positive outcomes for individuals with challenging behaviour.

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