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A Personalized System of Instruction for Training Front-Line Staff: A Quality Improvement Project

Le système d'enseignement personnalisé pour former le personnel de première ligne : un projet pour améliorer la qualité des services

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Abstract

The Personalized System of Instruction (PSI) is an evidence-based instructional approach that relies on written instruction, self-pacing, emphasis of concept mastery, and uses proctors (peers or supervisors who have previously mastered content) for evaluation, support and motivation. This study describes the result of a quality improvement project that used PSI methods to train 29 front-line staff employed in government-funded developmental sector group homes on knowledge of behavioural procedures. Following training, outcome measures included testing on staff knowledge of behavioural procedures, quality of staff-client rapport, and perceived level of staff stress. Training was correlated with increases in knowledge of behavioural procedures, but no significant change in quality of rapport or changes in staff-reported stress levels. Satisfaction surveys indicated that training was well received by front-line staff. We discuss the implications of PSI methods for training front-line staff and the feasibility of this instructional method in practical settings.

Résumé

Le système d'enseignement personnalisé (SEP) est une approche d'enseignement basée sur les données probantes qui s'appuie sur des instructions écrites et l'auto-gestion. Cette approche met l'accent sur la maitrise du concept et fait recours à un moniteur (un

pair ou superviseur maitrisant le contenu) pour l'évaluation, le soutien et la motivation. Cette étude décrit les résultats d'un projet visant l'amélioration de la qualité des services ayant utilisé les méthodes du SEP pour former 29 employés de première ligne au sein de foyers de groupe en déficience intellectuelle et troubles du développement, subventionnés par le gouvernement, au niveau des connaissances des procédures comportementales. Les indicateurs comprenaient des tests, administrés avant et après la formation, portant sur les connaissances du personnel sur les procédures comportementales, sur la qualité de la relation client-personnel et sur le niveau de stress perçu. La formation était corrélée avec une augmentation des connaissances des procédures comportementales, mais aucun changement significatif de la qualité de la relation ou du niveau de stress n'a été rapporté par le personnel. Des questionnaires de satisfaction ont indiqué que la formation a été bien reçue par le personnel de première ligne. Nous discutons des implications des méthodes du SEP pour la formation du personnel de première ligne ainsi que la faisabilité de cette méthode d'enseignement dans un contexte pratique.

Mots-clés : déficience intellectuelle, système d'enseignement personnalisé, formation du personnel

Introduction

Individuals living with intellectual and/or developmental disabilities (IDD) often require specialized biomedical, behavioural, and social supports to live safely in community-based settings (Matson, 2019). This may be especially true when they have co-morbid mental health needs or engage in behaviour which puts themselves or others at a risk of harm (e.g., aggression, self-injurious behaviour, property destruction). The front-line staff employed to support individuals with IDDs have a wide range of responsibilities. In addition to providing day-to-day care (e.g., preparing meals, planning activities, administering medications, completing daily documentation), staff are frequently expected to serve as a de facto behavioural treatment team when the individuals they support present with challenging behaviour. Behavioural support procedures are typically designed by a professional formally trained in applied behaviour analysis (ABA) following a period of consultative assessment. Front-line staff are then relied upon to implement, monitor, and report on the outcomes of the treatment which can include multiple components and complex data collection procedures. Unfortunately, front-line staff are often ill-equipped to perform many of these tasks (Wooderson et al., 2014).

With effective training, front-line staff can acquire knowledge-based behavioural competencies (Luiselli et al., 2010), master behavioural assessment and intervention skills (Freeman et al., 2005; Lerman et al., 2011), improve accuracy in data collection (Mozingo et al., 2006), implement treatment procedures more reliably (Belfiore et al., 2008), demonstrate improved confidence in managing challenging behaviour (Gore & Umizawa, 2011; Thackrey, 1987), and successfully implement rapport building procedures with the clients they serve (Lugo et al., 2017). Effective training procedures can also contribute to positive service-user outcomes such as reductions in the frequency of challenging behaviour (Baker, 1998; Crates & Spicer, 2012; Grey & McClean, 2007; McClean & Grey, 2012; McClean et al., 2005) and reduced readmissions to secure inpatient facilities (Hassiotis et al., 2014). Conversely, ineffective training programs may be detrimental to staff-client relationships, waste valuable skill-building opportunities, and negatively impact client quality of life (Reed & Henley, 2015).

In spite of the potential benefits of treatments based upon ABA (Beavers et al., 2013; Heyvaert et

al., 2012; MacNaul & Neely, 2017), formal staff training programs on the use of behavioural procedures are not common in organizations that support adults living with IDDs (Emerson et al., 2000; Harchik & Campbell, 1998). This may be attributed to the challenge of training large groups of staff in a timely and cost-effective manner. The (a) expense involved in training (e.g., trainer fees, venue costs, staff time, travel), (b) time and administrative resources involved in providing coverage for staff (who are typically hired to work only when clients are present) to attend training, and (c) inability of a single trainer to deliver individual performance-based feedback and follow-up for each staff member, have been recognized as significant barriers for training in developmental care agencies (Page et al., 1982). As a result of these financial and logistical obstacles, staff training programs are often provided through didactic instructor led in-service workshops, often in a central location away from the residence with limited or no systematic follow-up in application (Wooderson et al., 2014). This practice can result in minimal change in staff knowledge, a poor transfer of staff skills from the workshop to the support setting (Smith et al., 1992), and a lack of positive client outcomes (Hassiotis et al., 2018). A staff training system that addresses the resource limitations that exist within developmental sector organizations is a necessary starting point.

The Personalized System of Instruction (PSI) developed by Keller (1968) is an instructional program for adult learners that consists of five essential characteristics (Fuller, 2005). First, the pace of instruction is individualized so that each learner moves through course materials only when they are prepared to do so. In typical course- or workshop-based training programs, learners move through content as a collective, based on a predetermined timeline which advances whether or not each individual learner has demonstrated competency or understanding of the materials. Second, PSI learners must master 100% of the content before moving onto consecutive units. This differs from many traditional educational programs, in which learners may pass a course or unit without completing all tasks and while making a number of errors, as long as their weighted mean performance is above a lowest-acceptable score (e.g., 60% or higher to pass). Third, meetings with learners in PSI-based programs are used primarily to increase motivation and to reinforce learner progress, rather than to disseminate information in a didactic fashion as in lectures or workshops. Fourth, *proctors* (typically peers or supervisors who have demonstrated mastery of content) are the main point of contact for learners, rather than expert instructors. Finally learning units are broken down to be accessible, have clear written objectives, and are organized to ensure that content flows in a logical sequence so that learners have the prerequisite skills necessary to master subsequent material.

There are several potential benefits of PSI: (1) there is very little use of punishment or coercive teaching approaches which could lead to learner avoidance or resentment (e.g., negative feedback for poor performance); (2) feedback and reinforcement are immediately available following evaluation; (3) the use of written materials and soliciting support from peers may more closely resemble situations that adult learners will encounter in their careers; (4) learning can occur in the actual work setting where the knowledge and skills will be used, rather than an artificial location convenient to accommodate training; and (5) the amount of resources required may be considerably reduced as the reliance on repeated exposure to an expert trainer and external venue is removed.

PSI has been successfully employed to teach a wide variety of content, including topics in post-secondary psychology, chemistry, physics, and engineering (Brothen & Wambach, 1998; Cracolice & Roth, 1996; Kulik et al., 1974), increasing declarative knowledge of behavioural

assessments (Hu & Pear, 2016), increasing health-related fitness knowledge (Prewitt et al., 2015), completing pharmacy calculations (Lacroix et al., 2014), and methods to conduct treatment procedures for children with autism spectrum disorder (Pedreira & Pear, 2015). However, despite this success, no research has examined the utility of PSI in training front-line staff that support adults with developmental disabilities in community settings.

The present study evaluates the outcomes of a pilot quality improvement project that sought to enhance the skill and knowledge-based competencies of front-line staff supporting adults living with IDDs presenting with challenging behaviour (e.g., aggression). Using a PSI methodology, we trained direct care staff from different residential programs in the application of procedures commonly found in behavioural treatment plans. Our primary outcome measure included testing staff knowledge of behavioural procedures. As secondary measures, we investigated quality of staff-client rapport as indicated by front-line staff, self-reported level of staff stress before and after training, and satisfaction with the training approach.

Method

Participants and Setting

The training was offered to front-line staff working in eight developmental sector group homes in Ontario, Canada. The staff supported adults with IDD, comorbid mental health needs (dual diagnoses), and challenging behaviour. Participation was voluntary and offered to all staff working in each home. We enrolled 53 front-line staff across the homes, and 29 total front-line staff completed all aspects of the investigation (i.e., pre-test, all training modules, post-test). Front-line staff completed training modules within their respective group homes during their regularly scheduled work hours. Detailed participant demographic data such as gender, age, or length of employment was not collected as part of the pilot project. Qualifications for front-line staff include a minimum of 3-6 months of experience, vulnerable-persons criminal record clearance, a valid driver's license, and preference for certification or college-level diploma in a relevant field (developmental service worker, child youth worker, behavioural science).

Procedures

First, customized training manuals were developed by adapting the Quality Behavioral Competencies™ curriculum developed by Quality Behavioral Solutions™. The manuals were based on (a) the instructional approach of PSI (Buskist et al., 1991; Keller, 1968; Kulick et al., 1979); (b) research describing foundational behavioural concepts and procedures (Ayllon & Azrin, 1968; Cowdery et al., 1990; Fisher et al., 1992; Mace et al., 1988; Skinner, 1969; Whitman et al., 1971); and (c) previous demonstrations of hierarchical methods of staff training (Page et al., 1982). The training manuals included eight modules (in consecutive order): (1) reinforcement, (2) reinforcement delivery, (3) differential reinforcement, (4) conditioned reinforcement, (5) behavioural momentum, (6) preference assessment, (7) delivering effective instructions, and (8) graduated guidance. Each of the eight modules followed a similar format, including: rationale for the skill being taught, a procedural description, succinct procedural steps, a positive example of the application of the skill, a negative example (i.e., incorrect application of the skill), a list of practical considerations, and several vignettes describing situations in which

the skill might be applied. Adaptations included the addition of examples and vignettes which might be familiar to adult developmental services (e.g., supporting an adult with self-care activities). Anecdotally, staff reported that each module required between 15-20 minutes to review, and an additional five minutes to practice and demonstrate the skills with the proctor. Each module included the competency checklists which staff could review prior to being evaluated on mastery. Competency was evaluated on each staff's vocal description, roleplay, and in situ performance of the skill. The vocal competency required staff to verbally describe the procedure to the proctors and to identify critical components and important considerations related to the procedure (e.g., describe the steps involved in delivering reinforcement). The roleplay competency required the staff to demonstrate the skill with the evaluating proctor representing a client identified within the vignettes provided. The in-situ competency required the staff to demonstrate the skill while working directly with a client within the home with the evaluating proctor observing and scoring a competency checklist. All modules, except the first (reinforcement), included evaluation of all three competencies (i.e., vocal, roleplay, in situ). The reinforcement module only consisted of a vocal competency.

Second, PSI proctors were identified in each group home agency, and consisted of either the house supervisor or a behaviour therapist who received specific instruction on the training content, as well as how to support their staff through completing the PSI modules. During a two-day in-person workshop, proctors were trained on the content of the manuals, how to assess staff progress through each module, and how to identify when a module was completed to mastery. Proctors were trained using a behavioural skills training approach (Parsons et al., 2012), which included verbal and written instruction, followed by skill modelling, roleplay rehearsal, and performance feedback. Proctors were instructed to provide praise when staff successfully demonstrated the skills. If staff made an error during evaluation, proctors were instructed to immediately interrupt the attempt, provide verbal instruction, model the correct response, prompt staff to rehearse the skill again, provide feedback on their performance, and then allow an opportunity to be evaluated again.

Third, front-line staff were provided with the training manual and encouraged to work through the series of eight modules at their convenience over a 4-month period. Front-line staff were instructed to read the modules in sequence and to seek out proctors when they were ready to be evaluated. Staff were required to master each competency-based module before moving on to the next module. For example, they could not proceed to the role-play evaluation of the behavioural momentum module until they had demonstrated a flawless performance in the vocal evaluation of that competency and could not move on to the next sequenced module until all three competencies had been mastered in the preceding module. Finally, program supervisors were encouraged to lead brief motivational meetings weekly to discuss progress, and to identify barriers and solutions to completing modules. Staff that had completed all modules at the 4-month mark (n = 29) were provided with a certificate of completion.

Dependent Variables and Measures

Prior to training, a pre-test package consisting of a behavioural procedures knowledge questionnaire, a quality of rapport questionnaire (McLaughlin & Carr, 2005), and a stress measure (Lovibond & Lovibond, 1995) was provided to front-line staff during team meetings within each group home. Completion of the pre-test package was voluntary, with responders

remaining anonymous through a participant-generated code used to match pre-tests to post-tests. After the training period (four months after the initial meetings), the knowledge of behavioural procedures questionnaire, quality of rapport questionnaire, and stress measures were re-administered. At this time, an additional staff satisfaction questionnaire was administered to evaluate the social validity of the training program.

The knowledge of behavioural procedures questionnaire was an 8-question multiple choice quiz developed by the authors and based on the content of training; each question covered one of the skills to be taught (see Appendix A).

The Quality of Rapport Scale (McLaughlin & Carr, 2005) measures staff self-report of relationship quality with the individuals they work with using a 6-point Likert-type scale. A rating of 0-1 indicates a very unsatisfying relationship with clients, 2-3 a neutral relationship with clients and 4-5 indicating a highly satisfying relationship with clients.

To assess stress levels, we used the seven stress-related items of the Depression Anxiety Stress Scales (DASS21; Lovibond & Lovibond, 1995), which are "sensitive to levels of chronic non-specific arousal" and assess "difficulty relaxing, nervous arousal, and being easily upset / agitated, irritable / over-reactive and impatient" (Bados et al., 2005, p. 679).

The social validity satisfaction questionnaire in the post-training package consisted of four questions on a 4-point Likert-scale, with options ranging from strongly disagree and disagree to agree and strongly agree. Questions asked staff if (a) they believed that the training had improved their practice, (b) if the self-paced format with course booklets worked well for them, and (c) if they enjoyed participating in the training initiative (see Appendix B).

Data Analysis

To evaluate differences across pre- and post-test measures, we conducted a two-tailed nonparametric Mann-Whitney U test and generated corresponding *z* scores. Significance levels were set at 0.05 and a normal distribution was assumed. This method was used to examine both improvements and decrements in staff skills following training.

Results

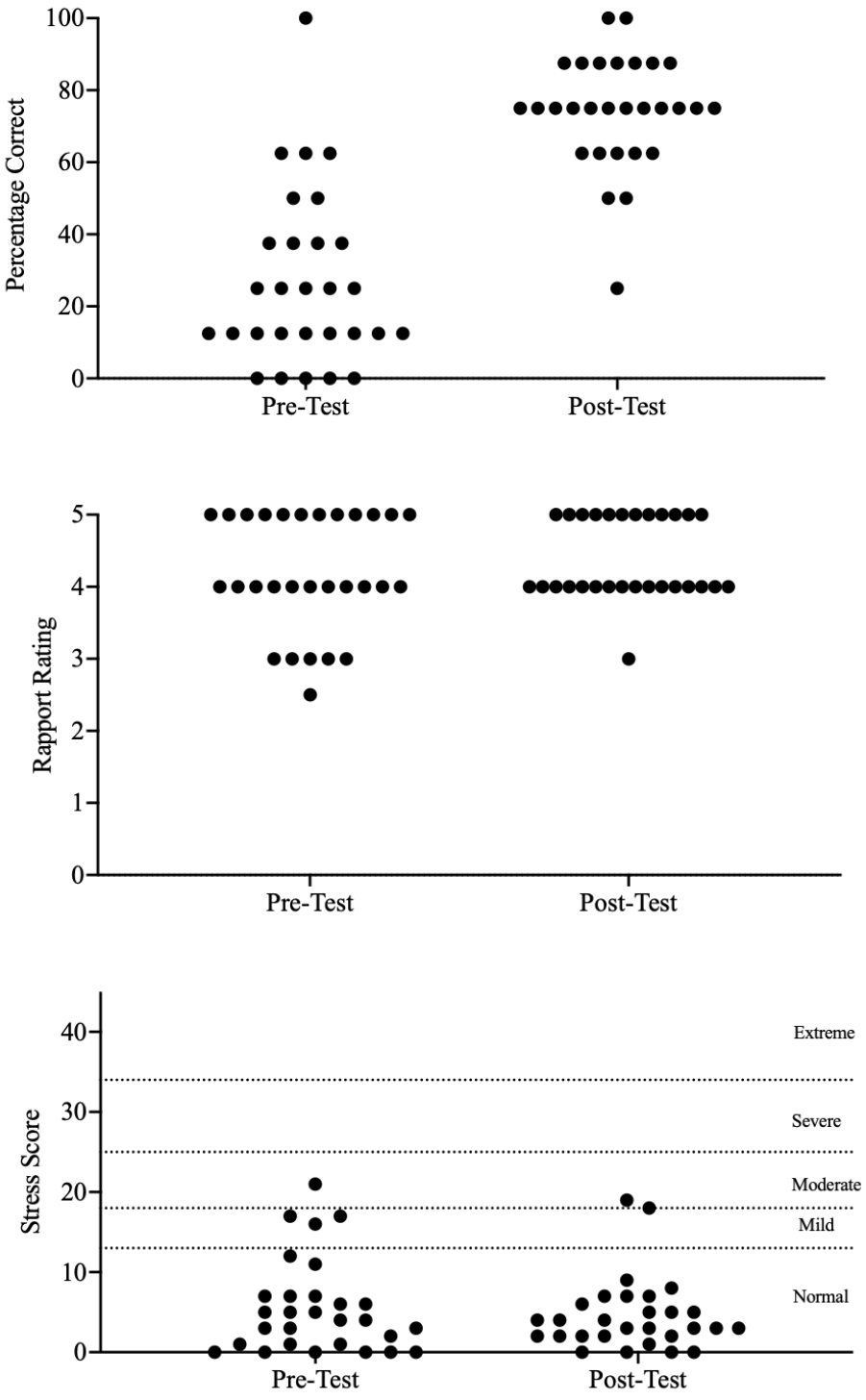
Twenty-nine front-line staff completed all eight modules to mastery and submitted all pre- and post-test data. Figure 1 (top panel) displays pre- and post-scores for the knowledge quiz. We observed significant differences in knowledge of behavioural principles following completion of the training. Median percentage correct scores in pre- and post-test were 25% and 75%, respectively; the distributions in the two groups differed significantly ($U = 55$, $n1 = n2 = 29$; $z = -5.67622$; $p < .00001$, two-tailed).

Figure 1 (middle panel) displays pre- and post-scores for staff self-report of relationship quality with the individuals they work (i.e., rapport). Median scores in pre- and post-test were 4.0 and 4.0, respectively; the distributions in the two groups was not significant ($U = 377.5$, $n1 = n2 = 29$; $z = -0.66093$; $p = .50926$, two-tailed).

Figure 1 (bottom panel) displays pre- and post-scores of staff self-report of stress as indicated by

the DASS21 scale. Median scores in pre- and post-test were 4.0 and 3.0, respectively; the distributions in the two groups was not significant (U = 401.5, $n1 = n2$ = 29; z = 0.2877; p = .77182, two-tailed).

Figure 1. *Pre- and Post-test scores on staff's knowledge of behavioural procedures (top panel), self-report of staff-client rapport (middle panel), and self-report of stress (bottom panel)*



Following completion of the training, staff were queried about their experience and satisfaction with the PSI method to learn about behavioural procedures. When asked if they believed that the training had improved their practice, the majority staff agreed or strongly agreed (89.66% of sample). When asked if the self-paced format with work booklets worked well for them, the majority staff agreed or strongly agreed (65.51% of sample). Finally, when asked if they enjoyed participating in the training initiative, the majority of staff agreed or strongly agreed (86.21% of sample). Collectively, these results suggest the training had good social validity and was liked by the majority of participants.

Discussion

We sought to evaluate the feasibility of a staff training program delivered across multiple community-based settings using a PSI methodology. Our primary outcome measure produced significant results: staff knowledge of behavioural procedures increased following training. When combined with the appropriate organizational supports, staff training programs that target a knowledge of behaviour principles and the mastery of skills related to the implementation of behaviour analytic procedures can lead to significant gains in the treatment of challenging behaviour (Courtemanche et al., 2014), which in turn contributes to improved quality of life for both the individuals served and their caregivers (Gerber et al., 2011; Tierney et al., 2007). Methods based on PSI may provide a practical and easy-to-implement knowledge-based training for front-line staff who support adults with developmental disabilities in group home settings. As far as we are aware, this is the first study to examine the use of the PSI method to train front-line staff supporting adults with developmental disabilities in group home settings on behavioural procedures.

With respect to our secondary measures, we observed no difference in staff reports of quality of rapport with clients or perceived stress from working in the group home environment. This may not be particularly surprising given that our training was designed to improve staff knowledge, and not address rapport-building or stress outcomes. Although we may have hoped to observe a positive change in staff's rating of their perceived rapport with clients due to an increase in knowledge and competencies in reinforcement delivery, such did not occur. This may be partially explained by the high self-report ratings of rapport at pre-test, with most staff rating highly satisfying relationship with clients at both pre- and post-testing periods. It is possible that this subjective method of obtaining rapport information may not be ideal when asking staff about their relationship with clients (i.e., it may be uncommon for front-line staff to suggest they are not well liked by the clients they work with). Moreover, this finding is not particularly surprising given that the types of skills that front-line staff acquired during the PSI training, and those that have to do with rapport building are distinct (i.e., although a front-line staff may have increased knowledge of behavioural procedures, this does not necessarily translate to qualitative aspects of rapport building). We also did not observe an increase in staff stress which may have been anticipated with the addition of the training program to their typical work expectations. That is, participating in the PSI training was an additional responsibility requested of front-line staff, in addition to their typical job responsibilities. Nonetheless, future researchers might consider PSI methods targeting multiple skill domains of front-line staff in group homes (e.g., knowledge plus stress). Alternatively, it is possible that PSI when combined with other approaches to address

staff behavior (e.g., cognitive behavior therapy, acceptance and commitment therapy) may have a greater impact on individuals who work in group home settings.

Although participating in the training served as another task for front-line staff, the majority of participants responded favourably to the training format and perceived a positive impact on their practice. This suggests PSI as a practical way to deliver knowledge and skill-based behavioural training to large groups of staff working in community-based residential settings is likely to have good social validity. The outcome of this social validity questionnaire combined with the significant outcomes and short time period in which the training was conducted (i.e., 4 months), suggests that PSI may be an approach to staff-training that is effective, efficient, and acceptable.

The individualized and self-paced nature of the PSI approach makes it amenable to a wide range of staff skill levels, capable of incorporating many content areas and theoretical perspectives, and susceptible to post-training generalization and maintenance. Future researchers may investigate the potential for PSI to address other training needs within human services such as medication administration, dietary preparation, and workplace safety procedures. Because the current study used a single-group pretest-posttest evaluation method as part of a quality improvement initiative, testing bias, maturation, and other external variables may have impacted our results. As such, future research should include an empirical evaluation of the training with a single-subject or between-group design, as well as incorporating procedural fidelity measures, objective outcome data (in place of staff self-report), and long-term follow-up probes (i.e., measures of skill maintenance).

Training initiatives that fail to recognize the influence of organizational processes and resource limitations will often have little impact on staff performance (Cullen, 1988). Likewise, content provided through workshop style didactic training is also unlikely to lead to performance changes in actual work settings (Smith et al., 1992) or to promote positive client outcomes (Hassiotis et al., 2018). PSI may be a practical resource for typically underfunded developmental service agencies as it may remove some of the logistic and financial constraints that come with organizing external training events for large numbers of point-of-care professionals. As staff do not have to leave their shifts or locations to engage in the training and or evaluation, it may also be a more cost- and human-resource efficient approach as opposed to trainings conducted in workshop settings outside of the workplace, which may require staff schedule back-filling. Further, practicing the skills in the setting where they are to be used and recruiting “in-house” proctors, may have a positive impact on the transfer and maintenance of those skills within the natural environment.

Once developed, manualized PSI training courses targeting skills relevant to the settings, agencies, and staff needs can be distributed across a large employee base covering wide geographic areas with relative ease, making them a practical solution for strained services. In a sector with limited resources that employs a large number of paraprofessional staff to provide direct services and supports to individuals living with complex behavioural health needs, a training methodology that is feasible, flexible, and delivered where staff work may be a step towards responsible program and policy development that promotes safe and meaningful community living.

Key Messages From This Article

People With Disabilities. When staff have greater knowledge of behavioural procedures, they can better support you in reaching your goals.

Professionals. Behavioural competency training using a Personalized System of Instruction method may be well-suited to training needs in community service settings.

Policymakers. The Personalized System of Instruction may be a practical and cost-effective approach to training large groups of front-line staff and may lead to positive outcomes for individuals with disabilities when used to teach behavioural competencies.

Messages clés de cet article

Personnes ayant une incapacité. Lorsque le personnel a une meilleure connaissance des procédures comportementales, ils peuvent mieux vous accompagner dans l'accomplissement de vos objectifs.

Professionnels. La formation aux compétences comportementales à l'aide d'une méthode telle que le système d'enseignement personnalisé pourrait convenir aux besoins de formation dans le contexte de services communautaires.

Décideurs. Le système d'enseignement personnalisé peut être une approche pratique et efficiente pour former des grands groupes d'employés de première ligne et peut mener à des résultats positifs pour les personnes ayant une incapacité lorsqu'il est utilisé pour enseigner des compétences comportementales.

Ethics and Conflict Statement

The authors certify that they have no affiliations or arrangements that might constitute a conflict of interest related to the subject matter of this study.

Author Contributions

LB and GB designed and executed the pilot, analyzed and graphed data, and collaborated in the writing and editing of the final manuscript; RM and VS collaborated in the analysis of data and writing of the final manuscript. DL developed the training manuals, delivered proctor training, and contributed to the completion of the final manuscript.

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APPENDIX A. Knowledge of Behavioural Procedures Questionnaire

1. If criticizing a client every time he says a curse word increases the frequency of his cursing, criticism may be a _____.

a. Punishment
b. Negative Reinforcer
c. Positive Reinforcer
d. Differential Reinforcer of Alternative Behaviour (DRA)

2. Why is it important to provide immediate praise when a client complies with a request?

a. Delayed praise may make it less likely the client will follow future instructions.
b. The client may not be able to process the praise if it is delayed.
c. The client may require sensory input to understand the prompt.
d. Reinforcers that are delayed may become negative reinforcers.

3. Behavioural momentum is a technique that can be used to…

a. Reinforce adaptive behaviours while extinguishing maladaptive behaviours.
b. Encourage a client to do something they may not like to do.
c. Identify client preferences and potential reinforcers.
d. Support a functional behaviour assessment.

4. When delivering reinforcement, the following three elements are important…

1. Delay, Intensity, Topography
2. Magnitude, Clarity, Objectivity
3. Immediacy, Distinctness, Variability
4. Processing Time, Receptive Ability, Reinforcement Value

5. A _____ is a special kind of reinforcer which may have been originally meaningless to the individual but is effective because it has been repeatedly paired with other reinforcers.

a. Conceptual Reinforcer
b. Tertiary Reinforcer
c. Modulated Reinforcer
d. Conditioned Reinforcer

6. Because every individual is different and because everyone likes different things, it is important to conduct _____ to identify which items, activities, or interactions may be reinforcing for each person.

a. Preference Assessments
b. Behavioural Analysis
c. A-B-C Assessment
d. Scatterplot Assessment

7. Graduated Guidance includes:

a. Gradually repeating prompts and giving time to process
b. Gradually increasing the intensity of prompts
c. Gradually providing a clearer and clearer description of the task
d. Gradually increasing the volume of verbal prompts over time

8. Withholding attention from problem behaviour and providing reinforcement to other more appropriate behaviours may be an example of…

a. Momentum based intervention
b. A Different Alternatives to Reinforcement Procedure
c. A Differential Reinforcement Procedure
d. A Selective Reinforcement Procedure

APPENDIX B. Satisfaction Questionnaire

Please rate the extent to which you agree with each statement:
1. The training has improved my practice as a direct care professional o Strongly Disagree o Disagree o Agree o Strongly Agree
2. The format of training (self-paced with work booklets) worked well for me. o Strongly Disagree o Disagree o Agree o Strongly Agree
3. I have enjoyed participating in this initiative o Strongly Disagree o Disagree o Agree o Strongly Agree