Behavioral skills training for teaching safety skills to mental health service providers compared to training-as-usual: a pragmatic randomized control trial

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Abstract

Background:

Violence in the healthcare workplace has been a global concern for over two decades, with a high prevalence of violence towards healthcare workers reported. Workplace violence has become a healthcare quality indicator and embedded in quality improvement initiatives of many healthcare organizations. The Centre for Addiction and Mental Health (CAMH), Canada's largest mental health hospital, provides all clinical staff with mandated staff safety training for self-protection and team-control skills. These skills are to be used as a last resort when a patient is at imminent risk of harm to self or others. The purpose of this study is to evaluate the efficacy by comparing two training methods of this mandated staff safety training for workplace violence in a large psychiatric hospital setting.

Methods:

Using a pragmatic randomized control trial design, this study compares two approaches to teaching safety skills; CAMH's training-as-usual (TAU) using the 3D approach (description, demonstration and doing) and behavioural skills training (BST), from the field of applied behaviour analysis, using instruction, modeling, practice and feedback loop. Staff were assessed on three outcome measures (competency, mastery and confidence), across three time points: before training (baseline), immediately after training (post-training) and one month later (follow-up). This study has been registered (ISRCTN18133140, September 6, 2023).

Results:

With a sample size of 99 new staff, results indicate that BST was significantly better than TAU in improving observed performance of self-protection and team-control skills. Both methods were associated with improved skills and confidence. However, there was a decrease in skill performance levels at the one-month follow-up for both methods, with BST remaining higher than TAU scores across all three time points. The impact of training improved staff confidence in both training methods and remained high across all three time points.

Conclusions:

The study findings suggest that BST is more effective than TAU in improving safety skills among healthcare workers. However, the retention of skills over time remains a concern, and therefore a single training session without on-the-job-feedback or booster sessions based on objective assessments of skill may not be sufficient. Further research is needed to confirm and expand upon these findings in different settings.

Introduction

Violence in the healthcare workplace has been a global concern for over two decades. In 2002, a joint task force of the International Labour Office (ILO), World Health Organization, Public Services International, and the International Council of Nurses created an initiative to address this issue (1). One result was the documentation of a high international prevalence of violence towards healthcare workers showing that as many as half or more experienced physical or psychological violence in the previous year (2, 3). Since then, workplace violence has become a healthcare quality indicator and been embedded in the quality improvement initiatives of many healthcare organizations (for example, Health Quality Ontario (4)). Conceptually, it is also reflected in the expansion of the Triple Aim framework to the Quintuple Aim to include staff work-life experience (5).

Despite these efforts, the high prevalence of workplace violence in healthcare persists (6). Two meta-analyses, representing 393,344 healthcare workers, found a 19.3% pooled prevalence of workplace violence in the past year among which 24.4% and 42.5% reported physical and psychological violence experiences, respectively (7, 8). The literature also highlighted that workers in mental health settings were at particular risk (8, 9). An Irish study found that threats and assaults were the prevalent form of violence towards mental health workers (9). Eighty percent of mental health nurses in a Jordanian cross-sectional correlation study reported a violent incident in the preceding 24 months (10). Workplace violence has been associated with negative psychological, physical, emotional, financial, and social consequences which impact staff's ability to provide care and function at work (11, 12). A 7-year, population-based, follow-up study in Denmark highlighted the long-term impact of physical and psychological health issues owing to physical workplace violence (13). Two studies, one in Italy (14) and one in Pakistan (15), have linked workplace violence to demoralization and declining quality of healthcare delivery and job satisfaction among healthcare workers.

Building on these efforts, the ILO published a 2020 report recommending the need for national and organizational work environment policies and workplace training "…on the identified hazards and risks of violence and harassment and the associated prevention and protection measures…." (16, p. 55). Consequently, many countries (17–19) have committed to creating a safe work environment. In Ontario, Canada, the government has provided guidelines for preventing workplace violence in healthcare (4, 20), and our institution, the Centre for Addiction and Mental Health, launched a major initiative in 2018 to address the physical and psychological safety of patients and staff (21). A priority component of this initiative is mandatory training for all new clinical staff on trauma-informed crisis prevention, de-escalation skills, and, in particular, safe physical intervention skills (22, 23).

However, the effects of such training, especially for managing aggressive behaviour, are only partially understood. A 2015 systematic review on training for mental health staff (24) and a more recent Cochrane review on training for healthcare staff (25) reported remarkably similar findings. Both noted the uneven evidence (due to methodological issues, small numbers of studies, inconsistent results) which made definitive conclusions about the merits and efficacy of training difficult. The more consistent

impacts found by Price and colleagues (24) were improved knowledge and staff confidence in their ability to manage aggression. There was some evidence of improved de-escalation skills including the ability to deal with physical aggression (26, 27) and verbal abuse (28). However, these studies were limited because they used unvalidated scales or simulated, rather than real-world, scenarios. For outcomes such as assault rates, injuries, the incidence of aggressive events, and the use of physical restraints, the findings were mixed or difficult to generalize due to the uneven evidence.

Similarly, Geoffrion and colleagues (25) found some positive effect of skills-training on knowledge and attitudes, at least short-term, but noted that support for longer-term effects was less sure. The evidence for impacts on skills or the incidence of aggressive behaviour was even more uncertain. They also noted that the literature was limited because it focused largely on nurses. They concluded, “education combined with training may not have an effect on workplace aggression directed toward healthcare workers, even though education and training may increase personal knowledge and positive attitudes” (25, p. 2). Among their recommendations were the need to evaluate training in higher-risk settings such as mental healthcare, include other healthcare professionals along with nurses, and use more robust study designs. In addition, the literature evaluating training procedures focussed on self-reported rather than objective measures of performance.

The present study sought to address these gaps by comparing two approaches to teaching safety skills for managing aggressive patient/client behaviour. The setting was a large psychiatric teaching hospital; the sample was drawn from all new clinical staff attending their mandated on-boarding training; and we used a pragmatic randomized control trial design. Our control intervention was the current training-as-usual (TAU) in which trainers “describe”, “demonstrate”, and “do” but without objective performance measurement. Our test intervention was behavioural skills training (BST) (29, 30) drawn from the field of applied behaviour analysis (31). BST is a performance- and competency-based training model that uses an instructional, modeling, practice, and feedback loop to teach targeted skills to a predetermined performance level. Checklists guide the instructional sequence and the determination of whether or not the predetermined performance threshold has been reached. Considerable evidence indicates that BST can yield significant improvement in skills post-training, over time, and across different settings (32–34). It has been used to train a wide range of participants, including behavior analysts, parents, and educators, to build safety-related skills and manage aggressive behavior (32, 35, 36).

Methods

As previously described (37), our objective was to compare the effectiveness of TAU against BST. Our null hypotheses were that these methods would not differ significantly in:

1. Observer assessment of self-protection and team-control physical skills.
2. Self-assessed confidence in using those skills.

Study participants were recruited from all newly-hired clinical staff attending a mandatory two-week orientation. Staff were required to register beforehand for a half-day, in-person, physical safety skills

session. They were randomized to a session at the time of registration, and the sessions were then randomized to TAU or BST. All randomization was performed by RB using GraphPad software (38). On the day of training, informed consent for study participation was obtained privately from each attendee. The trainers and session attendees were thus unaware of who was or was not in the study. Recruitment began January 2021, after ethics approval, and continued until September 2021 when the target of at least 40 study participants completing all assessments for each training condition was reached. The target sample size was chosen to allow 80-percent power to detect a medium to large effect size (39).

Both methods taught the same 11 target skills for safely responding to patients/clients that may exhibit harm to self or others (e.g., aggressive behaviour) during their hospital admission. These skills, defined by the hospital as mandatory for all newly hired staff, included six self-protection and five team-control (physical restraint) skills (see Appendix A). Each target skill had defined components and a specific sequence in which they were taught as outlined on performance checklists (see Appendix B for a checklist example).

The two methods differed in how these sequences were administered. For BST, checklists guided the training sequence (instruction, modeling, rehearsal and feedback) and indicated to the trainer when successful performance was reached and thus when the trainee was ready to move on to the next skill (30) (see Appendix C for BST sequence). In BST, common practice is to define success as up to three correct, consecutive executions (40). In our study, the trainers ensured 80% correct performance of each skill at least once and aimed for up to 5 times in a row before moving on to the next skill. In contrast, while TAU included elements of modeling, practice, and feedback, it did not systematically assess skill acquisition nor impose any specific level of success before proceeding to the next skill.

Measures.

There were three outcome measures, two observer-based assessments of skill acquisition (competence and mastery) and one self-reported confidence measure. These were assessed at three time points: immediately before training (baseline), immediately after training (post-training), and one month later (follow-up). Descriptive information (professional role, department) was provided by the hospital for all registrants. The research team estimated the kind of patient contact (direct, less direct, rare/low) based on the combination of professional role and department. For confidentiality reasons, the hospital did not provide information on registrant personal characteristics (e.g., age, gender/sex), and, for the same reasons, we did not collect this information for the study. Participants were also asked at baseline and follow-up how many events they encountered in the previous month that required the use of these skills. This information was collected because of our interest in testing a post-hoc hypothesis that those who had actual experience would score higher than those who did not.

All assessments were carried out following a standardized protocol. To ensure that registrants remained blinded to which colleagues were in the study, each registrant's skill acquisition was assessed privately by a research team member at baseline and post-training using the performance checklists. Only assessments for those consenting to participate were videotaped. Study participants were then asked to

return one month later for a follow-up assessment which was also videotaped. Videotapes were scored using the BST checklists by trained observers who were blind to the participant's training method using the checklists developed for this study and also used in the BST session. As described previously (37), interobserver agreement (IOA) was routinely evaluated throughout the study with the final value being 96% across the 33% of the performance assessment videos scored for the IOA calculation.

Skill acquisition outcomes were calculated using the checklist-based observer assessments of the videotapes. The percentage of correctly executed steps for each target skill was established. Then, these percentages were averaged across the six self-protection target skills and across the five team-control target skills to create competence scores. Finally, a predefined threshold of 80% was applied to the competence scores to determine which participants met the mastery threshold (41, 42).

Statistical analysis.

R software was used to generate descriptive statistics (frequencies, percentages) and test our hypotheses (43). Generalized linear mixed models (GLMM) were used to test nested main and interaction effects using likelihood-ratio chi-square statistics for the post-training and follow-up results as there were no baseline differences. GLMM was also used to evaluate BST-TAU differences at the three study time points (44, 45). For the BST-TAU comparisons, we used Cohen's d as a guide for evaluating the practical significance of the differences for the continuous measures (competence, confidence). We used Cohen's suggested thresholds (46) of 0.2, 0.5, and 0.8 for small, medium, and large effect sizes conservatively by applying them to both the point estimates and 95% confidence intervals. Thus, for example, a Cohen's d where the confidence interval went below 0.2 would be interpreted as non-meaningful. For the categorical measure of mastery, we used BST-TAU risk ratios. Confidence intervals for all effect size measures were obtained using bootstrapping. Independent-samples t-tests were used for the post-hoc analyses and, along with chi-square tests, to compare the completers and non-completers.

Results

One hundred ninety-nine staff consented to participate in the study out of a total of 360 session attendees (55%). Of these, 108 (54%) had been randomly assigned to a BST session and 91 (46%) to a TAU session. Half (n=99) completed assessments at all three time points (44 % TAU; 55% BST). These 99 (hereafter 'study completers') constituted 28 percent of all session attendees.

Among the non-completers, 53 had been assigned to BST and 47 to TAU. Eight were classified as incomplete because of technical software issues when video-recording one of their assessments and one (the first participant) because the IOA process prompted substantive changes to the assessment checklist. The primary reason for the remaining non-completers was missing the follow-up assessment (91 individuals: 50/53 BST, 41/47 TAU) largely due to difficulties scheduling a non-mandatory event during the pandemic (e.g., units restricting staff from leaving because of clinical staff shortages or patient outbreaks, staff illness).

Descriptive information for the expected degree of patient contact and for hospital department is shown in Table 1 for study participants (completers, non-completers), non-participants, and the total group of session attendees. When comparing study participants who were completers versus non-completers, there were higher percentages of non-completers who had direct patient contact (97 vs 94%), were nurses (48 vs 37%), or worked on inpatient units (64 vs 58%). Similarly, when compared to all session attendees, study completers had lower proportions of direct contact with patients and of nursing staff.

Table 1: Expected Patient Contact and Department Types for Study Participants, Non-Participants, and Total Session Attendees

Characteristic	Study Participants (n=199)		Non-Participants (n=161)	Total Session Attendees (n=360)
	Completers n=99	Non-Completers n=100		
Expected Patient Contact (%)				
Direct	94	97	96	96
Nurse	37	48	47	44
Security	6	5	3	4
Other	51	44	47	47
Less Direct	4	3	3	3
Rare/None	2	0	1	1
Department Type (%)				
Inpatient	58	64	51	56
Outpatient	9	9	14	11
Both	30	26	33	30
Hospital Admin	2	1	1	1

Figure 1 depicts the self-protection and team-control competence scores for the study completers (left and right sides, respectively). The hypothesis-testing results showed a significant difference by training Method (self-protection: chi-square=34.46, 1 df, p<.001; team-control: chi-square=50.42, 1 df, p<.001).

There was also a significant decline between post-training and follow-up (Time) for both skill categories independent of Method (self-protection: chi-square=81.29, 1 df, p<.001; team-control: chi-square=56.51, 1 df, p<.001), and a significant Method-by-Time interaction independent of Method and Time for team-control skills (chi-square=17.41, 1 df, p<.001). BST-TAU comparisons showed no difference at baseline for either type of skill (not shown). However, BST was significantly better than TAU at both post-training (self-protection: Cohen's d=1.45 [1.02, 1.87], large ES; team-control: Cohen's d=2.55 [2.08, 3.02]; large ES) and follow-up (respectively – Cohen's d=0.82 [0.40, 1.23], small ES; Cohen's d=0.62 [0.21, 1.03], small ES). For both methods, competence scores dropped between post-training and follow-up although not to the original baseline levels.

Figure 1: Mean Observer-rated Competence in Self-Protection and Team-control skills across three time points by TAU and BST

Insert Figure 1 about here

The skill mastery results for the study completers are shown in Figure 2. The mastery patterns paralleled the competence patterns in that BST was significantly better than TAU (self protection: chi-square=28.82, 1 df, p< .001; team-control: chi-square=72.87, 1 df, p<.001). There was also a significant Time effect independent of Method (self-protection: chi-square=27.54, 1 df, p<.001; team-control: chi-square=33.03, 1 df, p<.001). There were no significant interactions for either type of skill once the effects of Method and Time were accounted for. BST-TAU comparisons showed no difference in percent achieving Mastery at baseline (not shown) but large risk ratios at both post-training (self-protection: 13.43 [4.01, >1000]; team-control: 31.24 [8.45,>1000] and follow-up [self-protection: 12.30 [1.58, >1000]; team-control: 30.60 [6.75. >1000]).

Figure 2: Percent of Participants Achieving Mastery[1] in Self-Protection and Team-control skills across three time points by TAU and BST

Insert Figure 2 about here

Confidence scores for the study completers are shown in Figure 3. The only significant main effect was for Time (self-protection: chi-square=57.15, 1 df, p<.001; team-control: chi-square=43.25, 1 df, p<.001). For both skill categories, the scores increased between baseline and post-training and then dropped at follow-up but not to the original baseline levels.

Figure 3: Mean Self-rated Confidence in Self-Protection and Team-control skills across three time points by TAU and BST

Insert Figure 3 about here

To assess what impact the high no-show rate for the follow-up could have had, we compared the completers and the non-completers on the six post-training outcomes (self-protection and team-control: competence, mastery, and confidence). Non-completers had slightly lower scores than completers except

for the two confidence measures where their self-assessments were higher (not shown). However, the only significant difference between the two groups was for self-protection confidence means (6.9 vs 6.3, completers vs non- completers, t=2.40, 195 df, p=0.17).

In terms of past-month experience, few study completers reported events requiring self-protection (19 at baseline, 9 at follow-up) or team-control skills (14 at baseline, 14 at follow-up). Consequently, we only examined the presence or absence of experience without breaking it down by training method. We found non-significant results for both competence and mastery (not shown) but a potential impact on confidence for self-protection skills at follow-up and for team-control skills at baseline and post-training (Figure 4).

Figure 4: Mean Self-rated Confidence and 95-percent confidence intervals in Self-protection and Team-control skills across three time points by Past-month occasion to use skills

Insert Figure 4 about here

Summary and Discussion

Our strongest finding was that BST was significantly better than TAU in improving the observed performance of self-protection and team-control skills. While follow-up scores decreased for both methods, BST scores remained higher than TAU scores. The impact of training on staff confidence differs from these patterns in that confidence scores improved noticeably at post-training and remained relatively high at follow-up. Further, our post-hoc analyses suggested that recent experience using safety skills might have a greater impact on confidence than on observed skill performance. We also found that training, regardless of method, was independently associated with improved observer-scored skills and self-reported confidence.

The better performance of BST has a certain face validity since it is more structured and intensive than TAU. However, there are at least two questions regarding whether it produced the expected results. The BST framework requires continued rehearsal and feedback until a specified performance criterion is reached (30). However, our mandatory safety training had practical, unmodifiable constraints. The institution required the safety-training sessions be completed in 3.5 hours which meant that BST trainers were limited in their ability to use some of the more stringent performance criteria described in the literature. For example, it was not practical to set the performance criterion at higher than 80 percent. In addition, all BST completers were able to demonstrate 80-percent correct performance for each skill at least once, but not all were able to demonstrate five consecutive, correct executions within the allotted time. If the requirement of five in a row at 80% or higher had been implemented, then the post-training scores (and potentially the 1-month follow-up scores) for the BST completers could have been higher.

A second question is what level of skill retention should be expected at follow-up. The BST scores at one-month follow-up constituted 66% and 74% of the competence scores at post-training (self-protection and team-control, respectively) and 41% and 43% of the mastery percentages at post-training (self-protection and team-control, respectively). Although BST and elements of performance feedback models have been found to be effective in staff training with successful retention over time (47–51), finding appropriate comparators for our study was challenging because there are no studies where BST has been used for training such a large and diverse group of staff. However, the broader literature does suggest that our results are consistent with or somewhat lower than those from other studies. Offiah et al. (52) found that 45 percent of medical students retained the full set of clinical skills 18 months after completing simulation training, and Bruno and colleagues (53) found published retention rates ranging between 75 and 85 percent across time periods between four to 24 months and across diverse disciplinary fields. Regardless of the comparators, the loss in skill performance after one-month post-training is a concern.

Our interpretation is that reliance on a single session, even with highly structured and competency-based methods, is not adequate particularly in the context of managing distressing events. Efforts should be made to allow for flexibility with respect to setting higher thresholds for success despite organizational restraints for staff training. Furthermore, settings that require these skills to be performed more reliably for both patient and staff safety (e.g., emergency departments, acute care settings, security services) should consider on-the-job feedback or booster sessions based on objective assessments of skill rather than on pre-set amounts of time (e.g. annual refresher). This would be more consistent with the BST literature, as on-the-job training should occur based on an evidence-based approach.

The pattern that we found of a differential impact of training on confidence versus demonstrable skills is consistent with other research (24, 25, 54). For both of our study groups, confidence ratings at 1-month follow-up remained relatively high (83% and 86% retention for self-protection and team-control, respectively) and did not parallel the retention rates for either competence or mastery. It is noteworthy that our findings repeat previously-reported patterns despite our attempts to close some of the gaps identified: specifically, studying a higher-risk setting, including non-nursing healthcare professionals, and using a more rigorous study design (25). It is also interesting that our exploratory analyses suggest that experience may impact confidence but not skill acquisition.

The important question is how to interpret these discrepancies. It may be that confidence and competence are orthogonal constructs with different causal/relational associations with training or experience. Barsuk, et al. (55), for example, found that the year of the medical resident and their procedural experience did not predict skill mastery. Similarly, Choudhry and colleagues (56) in a systematic literature review concluded that the more experienced physicians might be at risk for providing lower-quality care. With respect to confidence and performance, Magnacca and colleagues (54) found that participants being taught to facilitate Acceptance and Commitment Training (ACT) exercises had a high baseline confidence which was inconsistent with their directly observed performance. Interestingly, these confidence ratings decreased after follow-up sessions which the authors speculated could be due to the fact participants encountered the complexities of facilitating ACT. It may also be that the

measurement method is an important factor. Self-assessment, for example, has been consistently found to be an imperfect measure of actual performance or knowledge (57, 58). Whether or not attitudes and confidence contribute positively in ways that are independent of actual skills or negatively in that they provide an inappropriate sense of competence merits exploration.

The major strength of our study is its design. Currently, we have identified only one other study evaluating the impact of BST training for clinical staff using an RCT design (36). Another strength is our inclusion of a large percentage of non-nursing, direct-care staff. Finally, we used both self-reported and observer-assessed outcome measures. These strengths allow us to add to the evidence base already established in the literature.

However, interpretation of our results should consider several limitations. Conducting a research study on full-time clinical staff during a pandemic meant that a high percentage of those consenting to be in the study did not complete their 1-month follow-up assessment. The reported reasons for missing the third assessment (unit restrictions or short staffing because of the pandemic) are consistent with the demographic differences between completers and non-completers in that they were more likely to be nurses or working on inpatient units. Our comparison of the post-training scores of the completers and non-completers suggested that the no-shows had slightly lower post-training observed skill performance (but slightly better confidence ratings). If we had managed to assess the non-completers at follow-up, our reported findings may have been diluted although it is unlikely that this would have completely negated the large effect sizes.

Another limitation, as identified by Price, et al. (24), is that we used artificial training scenarios, though this may be unavoidable given the low frequency of aggressive events and the ethics of deliberately exposing staff to these events. Also, we only measured the skills directly related to handling client/patient events. We were not able to access information on event frequency or severity, staff distress and complaints, or institutional-level measures such as lost workdays due to sick leave, staff turnover, or expenditures (25, 59). A further gap, which is important but difficult to assess, is whether there is any impact of staff safety training on the clients or patients who are involved.

Given these strengths and limitations, we see our study as adding one piece of evidence that needs to be a) confirmed or disconfirmed by other researchers in both the same and different settings and b) understood as part of a complex mix of ingredients. Future research on these fronts will hopefully contribute to maintaining and improving workplace safety.

Declarations

- This study was approved by the Research Ethics Board of the Centre for Addiction and Mental Health (#101/2020). Informed consent was obtained from all subjects participating in the study. All interventions were performed in accordance with the Declaration of Helsinki.
- Consent for publication: not applicable

- Availability of data and materials: The dataset generated and analysed during the current study is not publicly available due to the fact that it is part of a larger internal administrative data collection but is available from the corresponding author on reasonable request.
- Competing interests: none
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- Authors' contributions: All authors were involved in the study design, monitoring and implementing the study, and review of manuscript drafts. EL was responsible for the original study design and drafting of the full manuscript. MM, EB, and FH led the implementation of the training sessions. EB, FH, HB, KT, and LB were involved in the reliability assessments (IOA). KD and HB were primarily responsible for data analysis. HB and RB monitored the data collection and the ongoing study procedures. RS and MBB assisted in the literature review.
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References

1. International Labour Organization. Joint Programme Launches New Initiative Against Workplace Violence in the Health Sector [Internet]. 2002 [cited 2022 Aug 5]. Available from: https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_007817/lang–en/index.htm
2. Di Martino V. Workplace violence in the health sector. Country case studies Brazil, Bulgaria, Lebanon, Portugal, South Africa, Thailand and an Additional Australian Study. Geneva, Switzerland; 2002.
3. Needham I, Kingma M, O'Brien-Pallas L, McKenna K, Tucker R, Oud N, editors. Workplace Violence in the Health Sector. In: Proceedings of the First International Conference on Workplace Violence in the Health Sector - Together, Creating a Safe Work Environment. Amsterdam, The Netherlands; 2008. p. 383.
4. Health Quality Ontario. Quality Improvement Plan Guidance: Workplace Violence Prevention. 2019.
5. Bodenheimer T, Sinsky C. From triple to Quadruple Aim: Care of the patient requires care of the provider. Ann Fam Med. 2014;12(6):573–6.
6. Somani R, Muntaner C, Hillan E, Velonis AJ, Smith P. A Systematic Review: Effectiveness of Interventions to De-escalate Workplace Violence against Nurses in Healthcare Settings. Saf Health Work [Internet]. 2021;12(3):289–95. Available from: https://doi.org/10.1016/j.shaw.2021.04.004
7. Li Y, Li RQ, Qiu D, Xiao SY. Prevalence of workplace physical violence against health care professionals by patients and visitors: a systematic review and meta-analysis. Int J Environ Res

Public Health. 2020;17(1):299.

8. Liu J, Gan Y, Jian H, Li L, Dwyer R, Lu K, et al. Prevalence of workplace violence against healthcare workers: a systematic review and meta-analysis. Occup Environ Med. 2019;76(12):927–35.
9. O'Rourke M, Wrigley C, Hammond S. Violence within mental health services: how to enhance risk management. Risk Manag Healthc Policy. 2018;11:159–67.
10. Al-Azzam M, Al-Sagarat AY, Tawalbeh L, Poedel RJ. Mental health nurses' perspective of workplace violence in Jordanian mental health hospitals. Perspect Psychiatr Care. 2018;54(4):477–87.
11. Lim M, Jeffree M, Saupin S, Giloi N, Lukman K. Workplace violence in healthcare settings: The risk factors, implications and collaborative preventive measures. Ann Med Surg. 2022;78:103727.
12. Lanctôt N, Guay S. The aftermath of workplace violence among healthcare workers: A systematic literature review of the consequences. Aggress Violent Behav. 2014;19(5):492–501.
13. Friis K, Pihl-Thingvad J, Larsen FB, Christiansen J, Lasgaard M. Long-term adverse health outcomes of physical workplace violence: a 7-year population-based follow-up study. Eur J Work Organ Psychol. 2019;28(1):101–9.
14. Berlanda S, Pedrazza M, Fraizzoli M, de Cordova F. Addressing Risks of Violence against Healthcare Staff in Emergency Departments: The Effects of Job Satisfaction and Attachment Style. Biomed Res Int. 2019;May 28(5430870):1–12.
15. Baig LA, Ali SK, Shaikh S, Polkowski MM. Multiple dimensions of violence against healthcare providers in Karachi: Results from a multicenter study from Karachi. J Pakistani Med Assoc. 2018;68(8):1157–65.
16. International Labour Organization. Safe and healthy working environments free from violence and harassment [Internet]. International Labour Organization. Geneva, Switzerland: International Labour Organization; 2020. Available from: https://www.ilo.org/global/topics/safety-and-health-at-work/resources-library/publications/WCMS_751832/lang--en/index.htm
17. Wirth T, Peters C, Nienhaus A, Schablon A. Interventions for Workplace Violence Prevention in Emergency Departments: A Systematic Review. Int J Environ Res Public Heal. 2021;18(16):8459.
18. U.S. Congress. Workplace Violence Prevention for Health Care and Social Service Workers Act [Internet]. U.S.A.; 2020. Available from: https://www.congress.gov/bill/116th-congress/house-bill/1309
19. Lu A, Ren S, Xu Y, Lai J, Hu J, Lu J, et al. China legislates against violence to medical workers. TneLancet Psychiatry. 2020;7(3):E9.
20. Government of Ontario Ministry of Labour T and SD. Preventing workplace violence in the health care sector | ontario.ca [Internet]. 2020 [cited 2020 Jul 28]. Available from: https://www.ontario.ca/page/preventing-workplace-violence-health-care-sector
21. Safe and Well Committee. Safe & Well Newsletter. 2018; Available from: http://insite.camh.net/files/SafeWell_Newsletter_October2018_107833.pdf

22. Heckemann B, Zeller A, Hahn S, Dassen T, Schols JMGA, Halfens RJG. The effect of aggression management training programmes for nursing staff and students working in an acute hospital setting. A narrative review of current literature. Nurse Educ Today. 2015;35(1):212–9.
23. Patel MX, Sethi, Faisil N Sethi Barnes TR, Dix R, Dratcu L, Fox B, Garriga M, et al. Joint BAP NAPICU evidence-based consensus guidelines for the clinical management of acute disturbance: de-escalation and rapid tranquillisation. J Psychiatr Intensive Care. 2018;14(2):89–132.
24. Price O, Baker J, Bee P, Lovell K. Learning and performance outcomes of mental health staff training in de-escalation techniques for the management of violence and aggression. Br J Psychiatry. 2015;206:447–55.
25. Geoffrion S, Hills DJ, Ross HM, Pich J, Hill AT, Dalsbø TK, et al. Education and training for preventing and minimizing workplace aggression directed toward healthcare workers. Cochrane Database Syst Rev [Internet]. 2020 Sep 8 [cited 2021 Dec 3];9(Art. No.: CD011860). Available from: /pmc/articles/PMC8094156/
26. Paterson B, Turnbull J, Aitken I. An evaluation of a training course in the short-term management of violence. Nurse Educ Today. 1992;12(5):368–75.
27. Rice ME, Helzel MF, Varney GW, Quinsey VL. Crisis prevention and intervention training for psychiatric hospital staff. Am J Community Psychol. 1985;13(3):289–304.
28. Wondrak R, Dolan B. Dealing with verbal abuse: evaluation of the efficacy of a workshop for student nurses. Nurse Educ Today. 1992;12(2):108–15.
29. Miltenberger RG, Flessner C, Gatheridge B, Johnson B, Satterlund M, Egemo K. Evaluation of behavioral skills training to prevent gun play in children. J Appl Bahavior Anal. 2004;37:513–6.
30. Parsons MB, Rollyson JH, Reid DH. Evidence-based staff training: A guide for practitioners. Behav Anal Pract. 2012;5(2):2–11.
31. Baer DM, Wolf MM, Risley TR. Some still-current dimensions of applied behavior analysis. Journal of Applied Behavior Analysis. J Appl Behav Anal. 1987;20(4):313–27.
32. Dillenburger K. Staff Training. Handbook of Treatments for Autism Spectrum Disorder. In: Matson JL, editor. Handbook of Treatments for Autism Spectrum Disorder. Springer; 2017. p. 95–107.
33. Kirkpatrick M, Akers J, Rivera G. Use of Behavioral Skills Training with Teachers: A Systematic Review. J Behav Educ. 2019;28(3):344–61.
34. Sun X. Behavior skills training for family caregivers of people with intellectual or developmental disabilities: a systematic review of literature. Int J Dev Disabil. 2020;Jul 21:1–27.
35. Davis S, Thomson K, Magnacca C. Evaluation of a caregiver training program to teach help-seeking behavior to children with autism spectrum disorder. Int J Dev Disailities. 2020;66(5):348–57.
36. Gormley L, Healy O, O'Sullivan B, O'Regan D, Grey I, Bracken M. The impact of behavioural skills training on the knowledge, skills and well-being of front line staff in the intellectual disability sector: a clustered randomised control trial. J Intellect Disabil Res. 2019;63(11):1291–304.

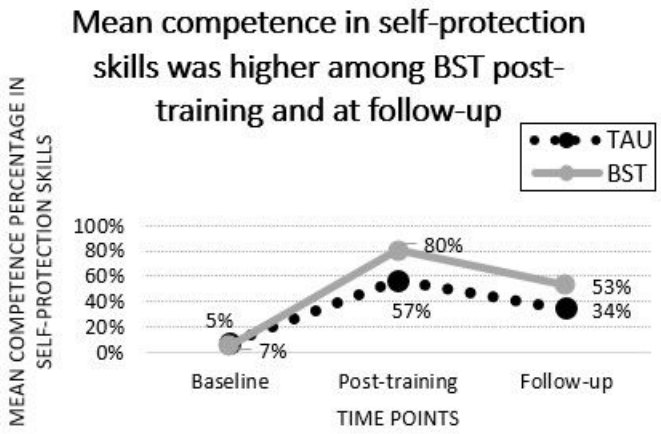
37. Lin E, Malhas M, Bratsalis E, Thomson K, Boateng R, Hargreaves F, et al. Behavioural skills training for teaching safety skills to mental health clinicians: A protocol for a pragmatic randomized control trial. JMIR Res Protoc. 2022;11(12):e39672.
38. GraphPad. Randomly assign subjects to treatment groups [Internet]. [cited 2023 Jun 6]. Available from: https://www.graphpad.com/quickcalcs/randomize1.cfm
39. Van Voorhis CRW, Morgan BL. Understanding Power and Rules of Thumb for Determining Sample Sizes. Tutor Quant Methods Psychol. 2007;3(2):43–50.
40. Erath TG, DiGennaro Reed FD, Sundermeyer HW, Brand D, Novak MD, Harbison MJ, et al. Enhancing the training integrity of human service staff using pyramidal behavioral skills training. J Appl Behav Anal. 2020 Jan 1;53(1):449–64.
41. Pitts L, Hoerger ML. Mastery criteria and the maintenance of skills in children with developmental disabilities. Behav Interv [Internet]. 2021 Apr 25 [cited 2022 Oct 17];36(2):522–31. Available from: https://onlinelibrary.wiley.com/doi/10.1002/bin.1778
42. Richling SM, Williams WL, Carr JE. The effects of different mastery criteria on the skill maintenance of children with developmental disabilities. J Appl Behav Anal [Internet]. 2019 Jun 1 [cited 2022 Oct 14];52(3):701–17. Available from: https://pubmed.ncbi.nlm.nih.gov/31155708/
43. R Core Team. R: A language and environment for statistical computing. Vienna, Austria: R Foundation for Statistical Computing; 2021.
44. Bosker R, Snijders TA. Multilevel analysis: An introduction to basic and advanced multilevel modeling. In: Multilevel Analysis. London, UK: Sage Publishers; 2012. p. 1–368.
45. Pinheiro J, Bates D. Mixed-effects models in S and S-PLUS. Springer Science+Business Media; 2006.
46. Cohen J. Statistical power analysis for the behavioral sciences. 2nd ed. Hillsdale, NJ: Lawrence Erlbaum Associates; 1988.
47. Alavosius MP, Sulzer-Azaroff B. The effects of performance feedback on the safety of client lifting and transfer. J Appl Behav Anal. 1986;19:261–7.
48. Hogan A, Knez N, Kahng S. Evaluating the use of behavioral skills training to improve school staffs' implementation of behavior intervention plans. J Behav Educ. 2015;24(2):242–54.
49. Nabeyama B, Sturmey P. Using behavioral skills training to promote safe and correct staff guarding and ambulation distance of students with multiple physical disabilities. J Appl Behav Anal. 2010;43(2):341–5.
50. Parsons MB, Rollyson JH, Reid DH. Teaching Practitioners to Conduct Behavioral Skills Training: A Pyramidal Approach for Training Multiple Human Service Staff. Behav Anal Pract. 2013;6(2):4–16.
51. Sarakoff RA, Sturmey P. The effects of behavioral skills training on staff implementation of discrete-trial teaching. J Appl Behav Anal. 2004;37(4):535–8.
52. Offiah G, Ekpotu LP, Murphy S, Kane D, Gordon A, O'Sullivan M, et al. Evaluation of medical student retention of clinical skills following simulation training. BMC Med Educ. 2019;19:263.

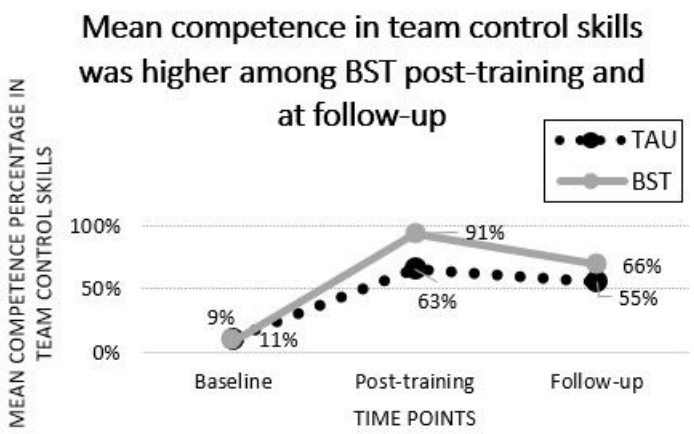
53. Bruno P, Ongaro A, Fraser I. Long-term retention of material taught and examined in chiropractic curricula: its relevance to education and clinical practice. J Can Chiropr Assoc. 2007;51(1):14–8.
54. Magnacca C, Thomson K, Marcinkiewicz A, Davis S, Steel L, Lunsky Y, et al. A Telecommunication Model to Teach Facilitators to Deliver Acceptance and Commitment Training. Behav Anal Pract. 2022;15(3):752–752.
55. Barsuk JH, Cohen ER, Feinglass J, McGaghie WC, Wayne DB. Residents' procedural experience does not ensure competence: A research synthesis. J Grad Med Educ. 2017;9(2):201–8.
56. Choudhry NK, Fletcher RH, Soumerai SB. Systematic review: the relationship between clinical experience and quality of health care. Ann Intern Med. 2005;142(4):260–73.
57. Lu FI, Takahashi SG, Kerr C. Myth or Reality: Self-Assessment Is Central to Effective Curriculum in Anatomical Pathology Graduate Medical Education. Acad Pathol. 2021;8.
58. Yates N, Gough S, Brazil V. Self-assessment: With all its limitations, why are we still measuring and teaching it? Lessons from a scoping review. Med Teach [Internet]. 2022;44(11):1296–302. Available from: https://doi.org/10.1080/0142159X.2022.2093704
59. Leach B, Gloinson ER, Sutherland A, Whitmore M. Reviewing the Evidence Base for De-escalation Training: A Rapid Evidence Assessment [Internet]. RAND Research Reports. RAND Corporation; 2019 Aug [cited 2021 Nov 26]. Available from: https://www.rand.org/pubs/research_reports/RR3148.html

Footnotes

[1]Predefined as 80% or better competence as assessed by observers

Figures

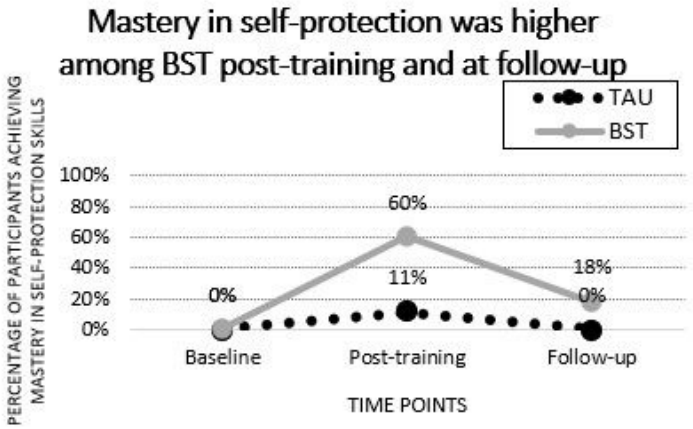


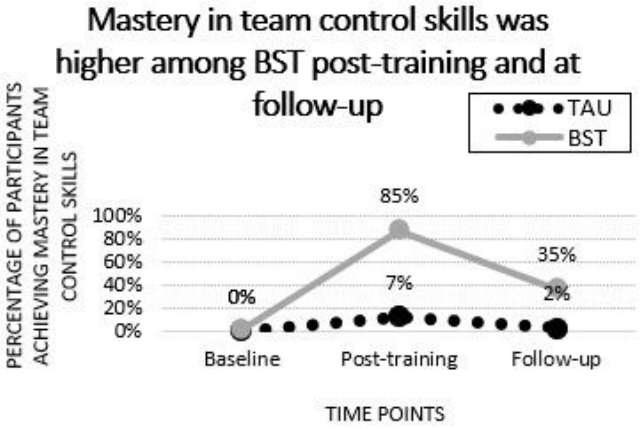


Competence: Linear Mixed Model (study completers, n=99)						
	Self-protection			Team Control		
	Df	Chi-squared	p-value	Df	Chi-squared	p-value
Method	1	34.46	<.001	1	50.42	<.001
Time	1	81.29	<.001	1	56.51	<.001
Method-by-Time	1	0.97	n.s.	1	17.41	<.001
TIME POINT	**BST-TAU**	**Cohen's d [95% CI]**	**Effect size (ES)**	**BST-TAU**	**Cohen's d [95% CI]**	**Effect size (ES)**
Post-training	0.23	1.45 [1.02,1.87]	large	0.28	2.55 [2.08, 3.02]	large
Follow-up	0.19	0..82 [0.40, 1.23]	small	0.12	0.62 [0.21, 1.03]	small

Figure 1

Mean Observer-rated Competence in Self-Protection and Team-control skills across three time points by TAU and BST





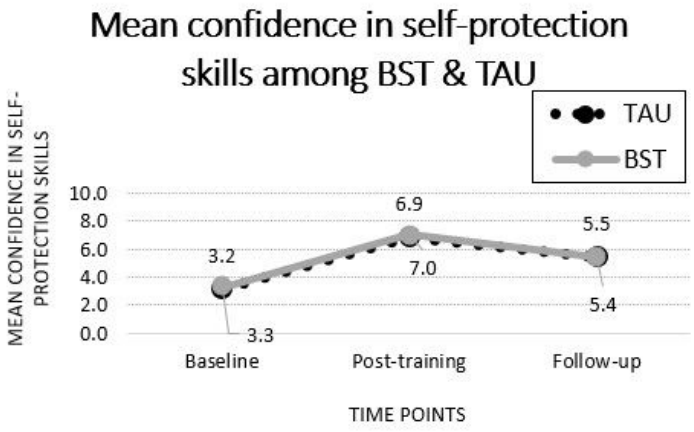
Mastery: Generalized Linear Mixed Model (study completers, n=99)

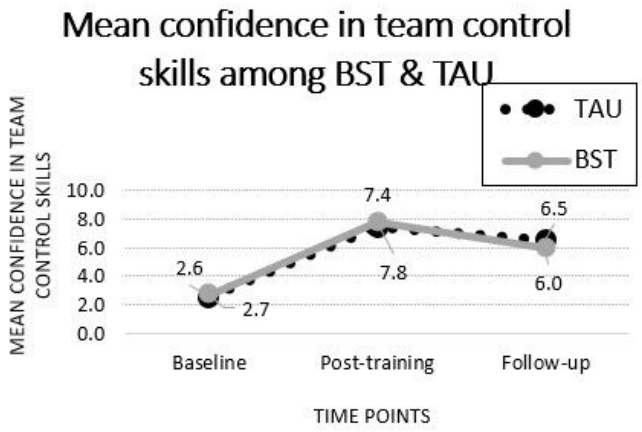
	Self-protection			Team Control		
	Df	**Chi-squared**	**p-value**	**Df**	**Chi-squared**	**p-value**
Method	1	28.82	<.001	1	72.87	<.001
Time	1	27.54	<.001	1	33.03	<.001
Method-by-Time	1	0.50	n.s.	1	1.89	n.s.
TIME POINT	**BST/TAU risk ratio[1]**	**95% CI[2]**		**BST/TAU risk ratio[2]**	**95% CI[2]**	
Post-training	13.43	4.01, >1000		**31.24**	8.45, >1000	
Follow-up	12.30	1.58, >1000		**30.60**	6.75, >1000	

[1] Risk ratios based on model estimates rather than observed proportions
[2] Wide CIs because of cell proportions near zero in TAU condition

Figure 2

Percent of Participants Achieving Mastery[1] in Self-Protection and Team-control skills across three time points by TAU and BST





Confidence: Linear Mixed Model (study completers, n=99)						
	Self-protection			Team Control		
	Df	**Chi-squared**	**p-value**	**Df**	**Chi-squared**	**p-value**
Method	1	0.006	n.s.	1	0.03	n.s.
Time	1	57.15	<.001	1	43.25	<.001
Method-by-Time	1	0.53	n.s.	1	5.01	0.025
TIME POINT	**BST-TAU**	**Cohen's d [95% CI]**	**Effect size (ES)**	**BST-TAU**	**Cohen's d [95% CI]**	**Effect size (ES)**
Post-training	0.07	0.04 [-0.21,0.28]	n.s.	0.32	0.19 [-0.12, 0.50]	n.s.
Follow-up	-0.17	0.08 [-0.18, 0.34]	n.s.	-0.50	0.22 [-0.13, 0.57]	n.s.

Figure 3

Mean Self-rated Confidence in Self-Protection and Team-control skills across three time points by TAU and BST

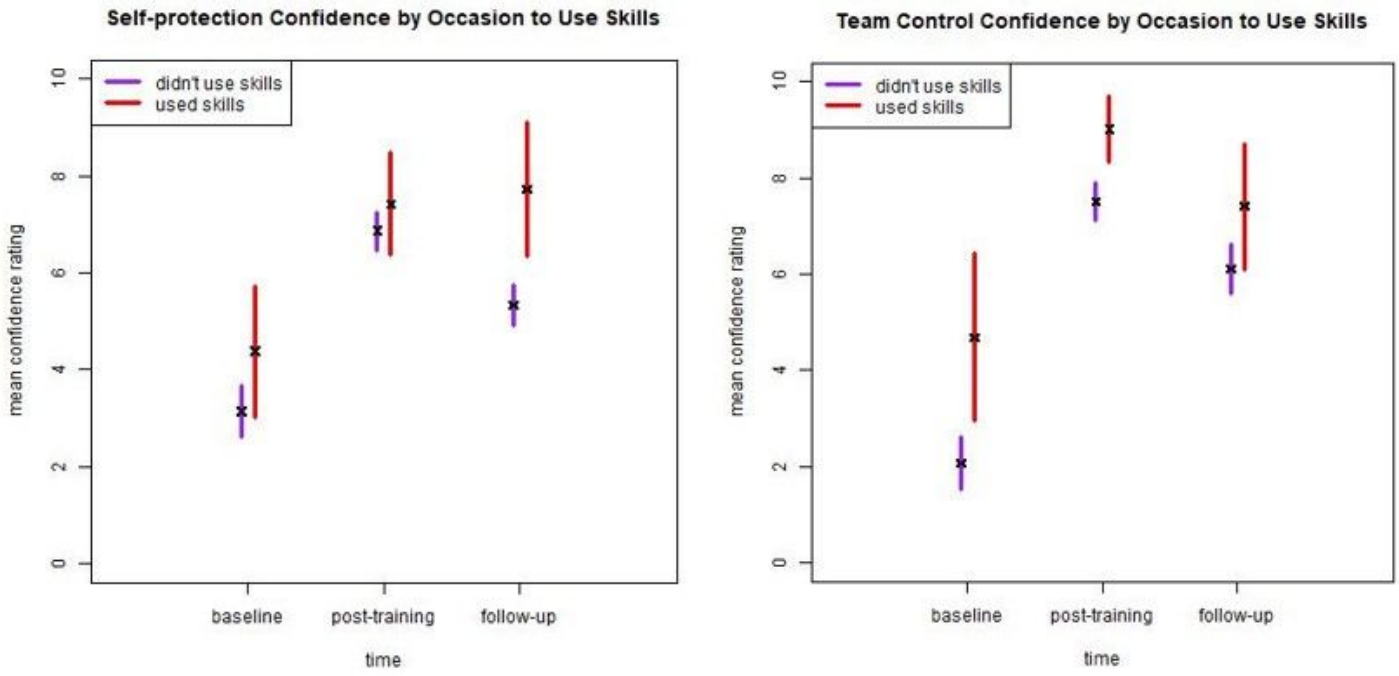


Figure 4

Mean Self-rated Confidence and 95-percent confidence intervals in Self-protection and Team-control skills across three time points by Past-month occasion to use skills

Supplementary Files

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