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Enhancing Workplace Climate and Learning Outcomes in ABA Services: Prosocial Approaches and PEAK Instruction With Autistic Learners

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ENHANCING WORKPLACE CLIMATE AND LEARNING OUTCOMES IN ABA SERVICES: PROSOCIAL APPROACHES AND PEAK INSTRUCTION WITH AUTISTIC LEARNERS

A Master's Thesis

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In Partial Fulfillment

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Master of Science, Applied Behavior Analysis

By

Stephanie Vickroy

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ENHANCING WORKPLACE CLIMATE AND LEARNING OUTCOMES IN ABA SERVICES: PROSOCIAL APPROACHES AND PEAK INSTRUCTION WITH AUTISTIC LEARNERS

Psychology

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ABSTRACT

The practice of Applied Behavior Analysis (ABA) heavily relies on the relationship between high quality client services and the direct care staff who implement these services. This thesis combines two manuscripts which discuss the field of behavior analysis in terms of clinical approaches. The first chapter evaluated intervention outcomes of 55 autistic learners undergoing language and cognitive training guided by PEAK (*Promoting Emergence of Advanced Knowledge System*; Dixon, 2014) within ABA services. Pre-post analyses of performance on the PCA revealed significant increases in PCA scores following 6-months of intervention and consistent gains in scores occurred across all four PEAK modules. Results from a multiple regression analysis indicated that age at the onset of intervention and the total number of mastered programs were significant predictors of improvements on the PCA. Autism symptom severity and total treatment hours were not significant predictors of intervention outcomes in this sample. To support autistic learners and provide the necessary treatment fidelity, direct care staff must be equipped to implement services. The second chapter discusses the evaluation of a Prosocial intervention to support workplace climate and performance at multiple levels within an ABA clinic. Service providers in the field of applied behavior analysis often experience high rates of burnout, low job satisfaction, and high turnover rates, particularly when professional social support and psychological flexibility are less likely to occur. Prosocial (Atkins et al., 2018) is an approach to supporting organizations by promoting adaptive and flexible responding within groups by integrating elements of acceptance and commitment training (ACT) with Ostrom's core design principles (CDPs) to guide collective action. Results of this study suggested that the use of prosocial frameworks support increases in each CDP as well as improvement in reported stress, burnout, and overall group cohesion.

KEYWORDS: PEAK relational training system, autism, direct care staff, prosocial, core design principles, ABA therapy

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OVERVIEW

This work integrates two separate but collaborative papers that highlight the duality of Applied Behavior Analysis (ABA) in the clinical setting: the clients and the staff. ABA as an industry is growing around the world (ABAI, 2020) which is especially true in the application of treatment of autistic leaners and those with developmental disabilities. Quality of treatment relies on the operation of validated program systems and ways to accomplish these programs with fidelity (Townsend et al., 2024). Quality of treatment may rely heavily on the contingencies between client outcomes and staff performance (Townsend et al., 2024). Empirical evidence exists to emphasize the importance of providing effective and science-based intervention to individuals with autism (Hume et al., 2021; Slocum et al., 2014).

The *Promoting Emergence of Advanced Knowledge* system (PEAK; Dixon, 2014) is an assessment and curriculum that offers an intervention focused on the development of language and cognition skills in autistic individuals. PEAK modules have previously been evaluated in a way that denotes reliability and validity as well as socially valid changes (Dixon et al., 2017). The first manuscript submitted in this thesis by Belisle et al. (under review) in which I am an author evaluated contextual factors that predicted treatment success in an autistic sample. Predictors of learner success were analyzed using a regression analysis and remained consistent with previous research suggesting that early intervention promotes stronger outcomes than intervention that begins later in life or contains fewer intervention hours (Lang et al., 2016). The results of this manuscript may be useful to clinicians and direct care staff in guiding the creation of effective treatment goals. Treatment goals that utilize predictors of stronger outcomes may lead to a higher and more consistent level of overall treatment quality.

Quality of services may additionally be impacted by the direct care staff who implement the previously mentioned assessments and curriculums. Evidence-based research indicates inconsistent staffing and high turnover rates damages productivity within the agency and therefore, impacts the quality of services being implemented (Sulek et al., 2017). If direct care staff are not equipped with the resources needed for retention, the treatment outcomes predicted in the first manuscript of this thesis may be negatively impacted. The second manuscript within this thesis by Vickroy et al. (under review) in which I am an author searches to maintain a positive workplace climate for direct care staff. Workplace climate consists of many interlocking systems that can be described using Ostrom's Core Design Principles (CDPs; Ostrom, 1990). These CDPs can be combined with Acceptance and Commitment Therapy (ACT) – based processes to create Prosocial interventions within the workplace. Prosocial behaviors allow individuals to attain more valued outcomes in their lives. The implementation of a positive workplace climate in which group valued outcomes are prioritized may lead to decreased workplace related stress and burnout.

The field of ABA heavily relies on the implementation of clinical practices as well as the clinicians themselves. With 81.84% of the field emphasized on autism spectrum disorder (BACB, 2023) it is imperative to research ways in which high quality treatment can be maintained. Within this thesis, we examine how treatment can be maximized with treatment outcomes in autistic learners and using a prosocial workplace climate to maintain the staff that effect these outcomes.

PREDICTING RELATIONAL LEARNING OUTCOMES FOLLOWING PEAK INSTRUCTION WITH AUTISTIC LEARNERS: A REPLICATION AND EXTENSION

The current manuscript was written by the authorship of Jordan Belisle, Mark Dixon, Stephanie Vickroy, Shelby Blecha, Claire Zuch, and Lindsey Holtsman. The contents of this manuscript and authorship may differ from the finalized version based on review and revision. Final analyses were conducted from de-identified data collected through the Institute for Dynamic Behavior Science and Missouri State University made available by the primary investigator of those studies. The studies were conducted consistent with the IRB approval presented in Appendix A. Correspondence regarding this thesis should be directed to Stephanie Vickroy (vickroy88@missiouristate.edu) and correspondence regarding the manuscript should be directed to Dr. Jordan Belisle at the Institute for Dynamic Behavior Science (jordanbelisle@dynamicbehaviorscience.com)

Approximately 1 out of every 36 children in the United States are diagnosed with autism spectrum disorder (ASD; Centers for Disease Control and Prevention [CDC], 2020). Differences in social functioning, communication, and restricted and repetitive behaviors are included as diagnostic criteria in the Diagnostic and Statistical Manual of Mental Disorders (DSM; 5th ed.; DSM-5; American Psychiatric Association, 2013). Applied Behavior Analytic (ABA) services have been developed to support autistic learners by teaching adaptive behavioral repertoires that include language and communication skills (Foxx, 2008; Reichow, 2011), and today ABA services are endorsed by multiple quality assurance bodies as evidence-based (Slocum et al., 2014; Smith, 2017). In the area of language and communication training, several protocols have been developed to aid behavior analysts in their programming and many are rooted Skinner's

Verbal Behavior theory (Ackley et al., 2019; Skinner, 1957), such as the *Verbal Behavior Milestones and Placement Program* (VB-MAPP; Sundberg, 2008), *Assessment of Basic Language and Learning Skills-Revised* (ABLLS-R; Partington, 2006), and the *Promoting the Emergence of Advanced Knowledge Relational Training System* (PEAK; Dixon, 2014a; Dixon, 2014b). The latter protocol, PEAK, additionally incorporates more contemporary language learning models extending from Stimulus Equivalence theory (Dixon, 2015; Sidman & Tailby, 1982) and Relational Frame Theory (Barnes, 1994; Dixon, 2016, Hayes, 1994; Hayes et al., 2001).

According to a survey conducted by Padilla et al. (2020), protocols are commonly used by behavior analysts to guide adaptive skill building within ABA services, and empirical support for the protocols are the most often cited reason for selecting a given protocol for use with autistic learners; however, as noted by Padilla (2020) and Padilla et al. (2023), the protocols most often used by behavior analysts (i.e., VB-MAPP and ABLLS-R) lack the necessary empirical evaluation to support their use. PEAK is a notable exception given the now considerable research evaluating the psychometrics of the PEAK assessments, the efficacy of individual PEAK programs, and the effectiveness of the PEAK curriculum in supporting language and cognitive development (Dixon et al., 2017; Dixon et al., 2018; May & Cyr, 2021).

PEAK is comprised of four modules: Direct Training (PEAK-DT; Dixon, 2014a), Generalization (PEAK-G; Dixon, 2014b), Equivalence (PEAK-E; Dixon, 2015), and Transformation (PEAK-T; Dixon, 2016). PEAK-DT emphasizes foundational learning skills and utilizes direct reinforcement training strategies (e.g., discrete trial training). Training targets include elementary and extended verbal operants. PEAK-G expands on a direct reinforcement approach by promoting stimulus and response generalization across multiple program exemplars

(Dunkel-Jackson & Dixon, 2018). Training targets still include the elementary and extended operants, as well as academic programming targets, and PEAK-G introduces a train and test strategy. PEAK-E is built around equivalence-based instruction where subsets of relations are directly trained within programs (e.g., A=B and B=C) and other relations are tested to establish derived relational responding as a generalized operant (Dixon et al., 2021). Finally, PEAK-T targets varying complexities of relational framing across the frame families of coordination, distinction, comparison, opposition, hierarchy, and deictic or perspective taking relations (e.g., Belisle et al., 2016; Paliliunas et al., 2022).

In addition to single-subject evaluations of PEAK programs across all four modules, more recent studies have adopted both single-subject and group design methods to evaluate the efficacy of multiple PEAK programs in improving broad repertoire performance (Dixon, Yi, & Chastain, 2022). McKeel et al. (2015) completed a study using a randomized experimental control group design to assess the effectiveness of the PEAK-DT module. Those in the experimental group showed significant positive gain from pretreatment to posttreatment. Evidence that scores on the PEAK-DT assessment indicate changes in language and cognition as a broad construct are supported by convergent validity studies correlating the PEAK-DT assessment with the Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP; Dixon, et al., 2018) and Assessment of Basic Language and Learning Skills, Revised (ABLLS-R) as similar and common assessments (Malkin et al., 2017; Belisle et al., 2021), as well as the Peabody Picture Vocabulary Test (PPVT; Dixon et al., 2014) as more general language assessments. Thus, we may assume that the training led to improvements in language skills as a broader repertoire.

Dixon et al. (2021) demonstrated the importance of implementing all four PEAK modules concurrently, rather than exclusively running PEAK-DT and PEAK-G modules. In a baseline phase across 3 participants, PEAK training using only the PEAK-DT and PEAK-G modules was efficacious in promoting program mastery, however no improvements in derived relational responding as a generalized operant repertoire were observed using the PEAK-E pre-assessment. For 2 of the participants, programming was shifted to include only programs from the PEAK-E module. Both participants continued to demonstrate program mastery and showed an increase in performance on the PEAK-E pre-assessment following the introduction of this training. Similarly, Dixon et al. (2019) conducted a waitlist randomized control trial comparing comprehensive ABA to traditional ABA using the PEAK curriculum. Results showed those who received comprehensive ABA consisting of both traditional Skinnerian methods of language training and post-Skinnerian methods of relational frame training had a larger impact on changes of intelligence compared to those receiving traditional ABA using only verbal operant training. Although behavior analysts may not be inherently interested in intelligence test performance in its own right, intelligence test performance is correlated with multiple positive life outcomes (e.g., Giofre et al., 2016; Keith et al., 1987) and can be used for educational and vocational placement and opportunities (Harris & Handleman, 2000). In a more recent replication, 73 autistic students received either a traditional language training curricula or a curriculum that integrated relational training through PEAK (Dixon et al., 2023). Results indicated that those who received relational training had greater improvements in intelligence scores than those who received traditional programming without relational training.

The PEAK Comprehensive Assessment (PCA; Dixon, 2018) was developed to synthesize the four PEAK modules in a single standardized assessment consisting of 344 items across five

subtests (Direct Training, Generalization, Equivalence, Transformation – Receptive, Transformation – Expressive). While the PCA aligns with curricular development within PEAK, the tested items within the PCA are not directly trained within PEAK programming, allowing the PCA to provide an estimation of improvements across verbal and relational operant learning abilities (Dixon, 2018). Within the Direct Training subtest, learners are evaluated on readiness skills, motor imitation, object identification, and verbal comprehension. The Generalization subtest evaluates learner's generalization of known skills to novel stimuli. The Equivalence subtest assesses the learner on more complex skills. This includes the emergence of complex verbal behavior through derived relations. The Transformation subtest is divided into Receptive and Expressive assessments to evaluate abstract concepts of coordination, comparison, distinction, opposition, deictic, and hierarchical. The PCA also contains an inventory measuring autism symptomology and challenging behavior in the form of the PAS-BOS (Dixon, 2019) that can be used to supplement the PCA and other assessment to inform intervention strategies.

Sutton et al. (2021) evaluated the PCA's convergent validity compared to other established measures such as the *Vineland Adaptive Behavior Scale – Third Edition* (VABS-3; Sparrow et al., 2016). Participants who had a higher PCA total score were more likely to score higher on the VABS-3 and results of the study showed a strong relationship between scores on the PCA score and intelligence test performance using the Wechsler Preschool and Primary Sale of Intelligence (WPPSI-IV) and the Wechsler Intelligence Scale for Children (WISC-V). Compared to more general measures like intelligence test scores, the PCA may provide a more direct measure of participants' learning repertoires across each of the four modalities in PEAK. Blecha et al. (under review) also demonstrated a strong, positive correlation between scores on the PCA and functional daily living skills assessed within the LIFE functional module,

suggesting a relationship between the learning modalities measured in the PCA and the presence of multiple daily living domains assessed in LIFE. PCA outcomes have also been reported in the literature to evaluate the efficacy of PEAK instruction. For example, in a recent evaluation of PEAK programming implemented in a special education setting by trained teachers and paraprofessionals, the PCA was used as a pre-posttest evaluation over the course of 3 months (Belisle et al., 2022). Results indicated all participants showed an increase on the PCA from pretest to posttest. Socially meaningful improvements in the participants' use of language were reported by both parents and staff following the 3-month intervention.

Although these results are promising, reported results by Belisle et al. (2022) are limited due to smaller sample sizes that precluded more advanced statistical analyses that could allow for greater analysis of factors that predict successful outcomes within PEAK programming. While the present literature suggests that PEAK instruction may be effective within ABA services, understanding predictors of effective outcomes can assist in determining who PEAK intervention may be most effective in supporting, and help to optimize curricular programming decisions. Regression analyses are becoming more common in Applied Behavior Analysis and can describe the conditions in which successful outcomes are most likely to occur (Austin & Fiske, 2023; Wolfe & Seaman, 2023). Linstead et al. (2017) demonstrated the use of a multiple regression analysis to investigate how treatment intensity and duration impact learning in autistic children across eight domains (e.g., academic, adaptive, cognitive, executive function, language, motor, play, and social). Results of this study indicated that treatment intensity and duration were both significant predictors of mastered learning outcomes with academic and language domains showing the strongest response. In the context of PEAK, several within participant and contextual variables may be relevant in predicting training outcomes. Within participant factors

such as age, pre-test performance, and autism symptom severity may be especially relevant and could influence decisions about ABA service provision. Contextual factors like treatment hours, supervision, and program mastery could also influence outcomes providing information about how best to arrange services when utilizing PEAK.

The purpose of the present study was twofold. First, the study replicated and extended the methods described by Belisle et al. (2022) in an ABA service provider with programming delivered by behavior analysts and technicians (Behavior Analyst Certification Board, 2023) and a more extended training duration. Second, the study conducted a preliminary regression analysis of intervention outcomes to determine contextual factors that predicted treatment success in the sample. Predictors included in the analysis were: Age, treatment hours, supervision, mastered programs, and autism severity. These measures have strong external validity given the prevalence and accessibility of these measures within ABA services guided by PEAK.

METHODS

Participants and Setting. Existing clinical records were gathered from a total of 55 participants receiving ABA clinical services at an agency located primarily in the Midwestern United States (44 male, 11 female). The mean age of participants in the study was 7.78 years and ranged from 2 years to 21 years. All participants were autistic and 34 had an additional diagnosis or multiple additional diagnoses. All participant data were de-identified prior to the data analysis and participants consented for the use of existing clinical data in research. Participants were included in the study based on the following inclusion criteria: Diagnosis of autism by a licensed clinician (e.g., psychologist, pediatrician, etc.), had received ABA-based services during a 6-month intervention period, and had completed at least 2 PCAs during this time to allow for pre-

test and post-test comparison. Thus, data analysis was conducted on a retained sample of 55 participants. The sample included 44 males and 11 females (age range 2-21 years; M = 7.78, SD = 4.58). Table 1 shows descriptive data for participants in the study and scores on the PCA prior to the intervention.

Participants whose records were included in this sample received ABA services from 1 of 7 ABA clinics specializing in the implementation of the PEAK curriculum and related technologies. ABA services for all participants included functional assessment and intervention for maladaptive behavior, adaptive behavioral programming guided by PEAK and related technologies (e.g., LIFE, Dixon, 2020; AIM; Dixon & Paliliunas, 2018), and parent training. To be included in the study, at least 50 percent of treatment time had to be dedicated to PEAK curricular programming. The PCA was conducted by Board Certified Behavior Analysts (BCBAs) who had at-least completed the PEAK Level 1 certified training or by Registered Behavior Technicians (RBTs) who had at-least completed the PEAK Level 1 certified training and were supervised directly by the BCBA. RBTs who were at least PEAK Level 1 certified also implemented PEAK curricular training during the intervention phase under the supervision of a BCBA. In addition, all RBTs underwent behavioral skills training to implement PEAK programming and on-going in-situ training was conducted by the BCBA throughout the intervention. Program modifications were also made by the BCBA based on direct observation of PEAK implementation to individualize programs for each participant. All PEAK training was conducted in a clinic setting, one-on-one with the RBT implementer and the participant.

Data Collection and Definition of Variables. Data was collected through retrospective record review by gathering de-identified client data. The dependent variable in the present study were changes in PCA scores across the intervention period, where the intervention period was

the time (in days) between the initial PCA administration (Time 1) and a second administration of the PCA for re-authorization of services (Time 2). The mean duration was 204 days, or 6.7 months (204 days divided by 30.5 days). Predictor variables included those that were available within existing client records and were hypothesized to influence intervention outcomes, including age at the on-set of the intervention, intervention hours, supervision, mastered PEAK programs, autism symptom severity, and PCA scores at Time 1.

Dependent Variable

PEAK Comprehensive Assessment (PCA). The PCA (Dixon, 2019) is a standardized instrument used to assess expressive and receptive language skills across each of the four PEAK modules. Three stimulus flipbooks are used during the assessment to ensure standardization in implementation of the assessment and a script guides the assessor through the assessment. The total PCA contains 344 items across five subtests: Direct Training (64 items), Generalization (64 items), Equivalence (24 items), Transformation-Receptive (96 items), and Transformation-Expressive (96 items). Items in the Direct Training and Generalization subtests are exemplar items from the Direct Training and Generalization curricular modules and can be used to estimate performance to develop curricular programming. Factors within these subtests were developed based on the principal component analyses conducted by Rowsey et al. (2015) and Rowsey et al. (2017). These exemplar items are not used within curricular training, and therefore, improvements in this area represent generalization of training outcomes. Both assessments have a discontinuation criterion. If a participant scores 0 in a factor within the subtest, then subsequent factors are not evaluated. Scores are summed for total scores within each subtest and factor scores can also be developed.

The Equivalence subtest tests arbitrary relations that increase in complexity, including tests for reflexivity (train A=A, test A=A), symmetry (train A=B, test B=A), transitivity (e.g., train A=B and B=C, test A=C), and equivalence (e.g., train A=B and A=C, test B=C and C=B). The resulting 4 levels each contain 6 items. The assessment is discontinued within a given level if the participant scores 0 across 2 consecutive items within a level and all levels are tested. Scores are summed to develop a total score for the subtest and level scores can also be developed. Because arbitrary relations are tested in the assessment, the Equivalence subtest is designed to measure the emergence of derived relational responding as a generalized operant following training. The Transformation-Receptive (Transformation – Rec) subtest assesses relational responding across 6 relational frame families, including coordination, distinction, comparison, opposition, hierarchies, and deictics. All items require listener-based responding given an array of options (e.g., pointing to a correct stimulus), and complexity increases within each frame family from non-arbitrary relational tasks to complex arbitrary relational tasks. The Transformation-Expressive (Transformation – Exp) subtest also assesses relational responding across the same 6 relational frame families; however, only auditory stimuli are presented, and vocal or augmented responses are accepted. For both Transformation subtests, testing of a frame family is discontinued if the participant scores 0 in both pre-test items for the frame family or scores 0 across 3 consecutive assessment items within the frame family. Like the Equivalence subtest, the Transformation subtest does not include items from the Equivalence or Transformation curriculum, so the purpose is to evaluate derived relational responding as a generalized operant across each frame family and allowing for direct comparison between receptive and expressive relational repertoires.

PCA Change Score. PCA Change Scores were calculated by subtracting the participant score at Time 1 from the participant score at Time 2. Because the PCA is a direct assessment and not a cumulation count of mastered skills, PCA change scores could be either positive (i.e., the score at Time 2 was greater than the score at Time 1) or negative (i.e., the score at Time 2 was less than the score at Time 1). Change scores were calculated across each of the 5 PCA subtests and changes in PCA Total Scores.

Predictor Variables

Intervention and Supervision Hours. Treatment information was all available within existing client records. The number of intervention hours were based on total intervention hours received that can deviate but not exceed the total number of hours recommended by the BCBA. Recommended hours are developed based on PCA scores at Time 1, autism symptom severity, maladaptive behavior, and clinical judgment of the BCBA. Therefore, PCA scores at Time 1, autism symptom severity, and intervention hours may strongly covary within an active clinical sample. The total number of intervention hours were used as the predictor because of the variable duration between Time 1 and Time 2 assessments. All supervision hours were also documented within existing client records and the percentage of supervised time for each client ranged from 2.8% of total intervention time to 54.4%. The amount of supervision was determined based on clinical judgment, case complexity, experience of the behavior technician, requirements for program adaptation, among other variables.

PEAK Program Mastery. PEAK programming targets a variety of different skillsets. Programs were selected based on the participant's initial acquired PCA score. A PCA decoding sheet was provided as a tool to assist with curricular programming for each participant. Each subtest of the PCA was identified in the decoding sheet along with PEAK curricular targets

which aligned with questions on the PCA. Additionally, the decoding sheet was used as a resource to identify skills that had been within the participant's repertoire. All items in the PEAK were implemented in blocks of 10 trials. Each individual train trial is scored as either a 10, 8, 4, 2, or 0 and utilized least to most prompting. A score of 10 indicated complete independence whereas a score of 0 indicated no response. Test items within the blocks were exclusively scored as either a 10 or a 0 and no reinforcement was present. The Direct Training PEAK module included blocks of 10 train trials and the Generalization module included blocks of 10 trials consisting of both train and test. The Equivalence and Transformation modules included separate train and test blocks of 10 trials. Test blocks were implemented immediately after train. Percent independence is determined based on number of 10s scored in a block. Skills were considered mastered if a participant achieved 90% independence or greater for three consecutive sessions. An independence score of 90% or greater must be maintained across all blocks (i.e., train and test blocks) for a participant to achieve mastery criteria. Once a participant proved mastery on a given PEAK program, the program was replaced with one of an increased difficulty and was selected based on the previous PCA. Participants in this study maintained a total average of mastered PEAK programs between pretest and posttest of 10.73 programs.

Autism Symptom Severity (PAS-BOS). The PEAK Autism Symptoms and Behavioral Observation Summary (PAS-BOS; Dixon, 2019) is an indirect assessment intended to rate the learner on the frequency and severity of the behavioral topographies associated with autism. All recorded responses were based on observations that exclusively occurred during the PCA. The PAS-BOS consists of three segments: social interactions, communication, and restrictive/repetitive behaviors. Each section contained 10 items and was scored in terms of frequency and intensity on a 3-point scale. The frequency score is recorded as either 0 for never

occurred, 1 as sometimes occurred, and 2 as frequently occurred. In addition to frequency, each item was scored in terms of intensity as either 0 as no intensity, 1 as minimal intensity, or 2 as high intensity. Scores for both the frequency and intensity sections are totaled to obtain a range from 0-60 for each respective domain. Results from the PAS-BOS were used to determine individualized session structure for each client. Descriptive results from the PAS-BOS across participants are described in Table 1.

Data Analysis

Several analyses were conducted in the present study. Paired sample t-tests were used to compare pretest and posttest PCA scores for each PEAK subtest and change in total score on the PCA to determine if the service program effectively led to increased performance on the PCA. Pearson correlation coefficients were then conducted to determine the relationship between all dependent and predictor variables. This analysis served two functions. First, it allowed us to compare correlation results in a clinical sample to similar analyses conducted in prior psychometric studies on the PCA in laboratory settings (Sutton et al., 2021). Second, the correlation matrix allowed for an initial analysis of predictor variables that were related to changes in PCA scores as the dependent variable of interest. Moderate predictors were included in the multiple linear regression analysis, including predictors that were statistically significant ($p < 0.05$) and those that were not statistically significant but had a Pearson correlation value exceeding an absolute value of 0.10. We retained these items due to the sample size in the present study and the possibility of a Type 2 statistical error (i.e., false negative, failing to identify a predictor variable that contributed to the regression mode). Items were included in a stepwise fashion such that predictors were only retained in the model if they significantly contributed to the model prediction. This produced a best-fit linear equation describing the

relationship between predictors and outcomes and the amount of variance accounted for in the model.

RESULTS

Results of the present study are summarized below. Figure 1 compares PCA scores across each of the 5 subtests at Time 1 and Time 2. Mean PCA Total Scores increased by 31.04 items from Time 1 to Time 2 (Sd = 32.24), representing a 9.02% increase in performance on the PCA across the intervention period. For the Direct Training subtest, mean scores increased by 6.05 items (Sd = 6.69), representing a 9.45% increase in performance on this subtest. For the Generalization subtest, mean scores increased by 6.45 items (Sd = 7.80), representing a 10.08% increase. For the Equivalence subtest, mean scores increased by 2.09 items (Sd = 4.39), representing an 8.71% increase. For the Transformation – Rec subtest, mean scores increased by 7.47 items, representing a 7.78% increase. Finally, for the Transformation – Exp subtest, mean scores increased by 7.82 items, representing an 8.14% increase. Therefore, the greatest percentage change was observed for the Generalization subtest and the least percentage change was observed for the Transformation – Rec subtest. To determine if changes were statistically significant, paired sample t-tests comparing Time 1 and Time 2 were conducted for the PCA Total Score and each subtest, supporting statistically significant differences across each test (PCA Total Score, $t(54) = -7.14$, $p < 0.001$; PCA Direct Training, $t(54) = -6.69$, $p < 0.001$; PCA Generalization, $t(54) = -6.13$, $p < 0.001$; PCA Equivalence, $t(54) = -3.53$, $p < 0.001$; PCA

Transformation – Rec, t (54) = -5.25, $p < 0.001$; Transformation – Exp, t (54) = -4.32, $p < 0.001$).

A correlation matrix was then developed to evaluate the covariance of predictor items using a Pearson correlational analysis. Table 2 shows how each predictor item correlated with PCA scores at Time 1, Time 2, and change scores as the dependent variables of interest. Results showed several statistically significant correlations between the predictor variables and PCA Total Scores at Time 1 and at Time 2. Age at the on-set of the intervention was moderately predictive of increased scores on the PCA at Time 1 and this was statistically significant; however, a weaker relationship was observed at Time 2 and the relationship was not statistically significant. Intervention hours and not duration were predictive of scores at Time 1 and Time 2. All PAS-BOS subtests were strongly negatively predictive of performance on the PCA at Time 1 and Time 2, and these relationships were statistically significant. There was no relationship between the number of mastered PEAK programs and participant scores on the PCA at Time 1 and Time 2. Scores on each of the PCA subtests were strongly predictive of PCA Total Scores at both Time 1 and Time 2. Conversely, only 2 predictor variables appeared to be moderately predictive of PCA Total Change Scores despite being predictive of scores at either assessment time. Age at the onset of the intervention was negatively related to PCA change scores, suggesting that younger learners were more likely to demonstrate greater improvements on the PCA. The total number of mastered PEAK programs was positively predictive of PCA change scores, suggesting that mastering more programs during PEAK instruction was predictive of greater improvements in the PCA.

Because age and the total number of mastered programs were both predictive of the primary dependent variable, PCA Change Scores, Table 3 shows how each predictor variable

correlated with these two main predictors. Age was not significantly related to any of the other predictor variables in the present study. Intervention duration and hours were both positively predictive of program mastery and the relationship between intervention hours and program mastery was moderate. A significant and weak negative relationship was also observed for maladaptive social behavior frequency and the total number of mastered programs.

Based on the results of the correlation matrix, age and number of mastered programs were both retained in the multiple regression analysis. Supervision hours and scores on the PAS-BOS restricted and repetitive behavior frequency, PAS-BOS restricted and repetitive behavior intensity, and PAS-BOS social frequency were also retained because the correlation coefficient exceeded an absolute value of 0.10. The regression summary is shown in Table 4. Results suggested that both age and mastered programs significantly added to the stepwise multiple regression model, while the remaining predictor variables did not significantly adjust the model. Figure 2 shows the relationship between participant PCA change scores predicted by the model and participant PCA scores that were obtained in the present study, and a linear regression suggests a strong, positive correlation between scores ($r = 0.51$, $p < 0.05$). The present set of predictor variables also produced an R^2 value of 0.26, suggesting that approximately 26% of PEAK intervention outcomes may be predicted given knowledge of a participants' age and the total number of mastered programs, with minimal contributions from other predictor variables.

DISCUSSION

Results of this study should be interpreted as an extension and replication of Belisle et al. (2022) and other prior population-level studies (McKeel et al., 2015; May & St. Cyr, 2021; Dixon et al., 2019). While Belisle et al.'s (2022) study was conducted with 6 participants over 3-

months in a special education setting, the present study was conducted in an ABA therapy setting with a larger participant sample and greater mean duration (i.e., over 6 months). The results replicate Belisle et al.'s (2022) findings that implementing intervention guided by the PEAK curriculum within clinical services can lead to improvements in PCA performance. The PCA is a standardized and direct test that contains stimulus arrangements that are not directly trained in PEAK, so performance on the PCA represents generalization of verbal operant targets (PEAK Direct Training and PEAK Generalization) and improvements in derived relational responding as a generalized operant (PEAK Equivalence and PEAK Transformation). This finding alone goes beyond prior research that simply evaluated the rate of program mastery, such as results reported for PEAK Direct Training by McKeel et al. (2015) and results are consistent with randomized control trial studies showing improvements in performance on other tests, such as intelligence test scores, following PEAK instruction (May & St. Cyr, 2021; Dixon et al., 2019).

Correlations between predictors and PCA performance at Time 1 were also similar to results in other correlational studies using the PCA (Sutton et al., 2021) and in the behavior analytic literature more broadly. PCA subtests correlated with other PCA subtests that supports the internal validity of the PCA as measuring a related constructs or sets of constructs that comprise "language and cognitive abilities" of autistic children. This result is consistent with the principal component analysis conducted by Belisle et al. (under review) showing a high level of interdependency of assessment items in the PCA across modules and factors. Autism symptom severity was also correlated with PCA scores at Time 1 and at Time 2 as measured in the PAS-BOS. This result is consistent with other correlational studies showing that performance in cognitive and intelligence testing can be predicted by autism symptom severity (Mayes et al., 2003; Dyck et al., 2007). Importantly, performance on assessments such as the PCA appears to

be more impacted by autism symptom severity than by developmental predictors such as chronological age, supporting a deviation in performance between autistic clients receiving ABA services and neurotypical peers. Importantly, a correlation between autism symptom severity and PCA scores at any point in time does not mean that autism symptoms *cause* lower PCA scores, nor that reducing autism symptoms will *lead to* improvements in PCA scores, meaning an analysis of the relationship between symptoms and PCA change scores is more critical to current discourse on ABA treatments for autistic symptoms like stereotypy (e.g., Leaf et al., 2022). In the present study, we did not observe a significant relationship between autism symptoms and PCA change scores, suggesting that engaging in autistic behavior did not appear to limit improvements in PCA performance in response to intervention.

In a regression analysis of predictors of changes in PCA from Time 1 to Time 2, age and program mastery were significant predictors in our model that accounted for 26 percent of the variance in intervention outcome. Age as a primary predictor is consistent with prior research on early intervention that has demonstrated that intervention that is early and intensive can lead to stronger outcomes than intervention that begins later in life or contains fewer intervention hours (i.e., less intensive, Lang et al., 2016). Therefore, while PEAK as an intervention technology may be effective in general, these results suggest that PEAK with younger participants can lead to greater improvements in verbal operant and relational learning, even when the intervention takes place for the same duration. This result is notwithstanding that younger participants are likely to receive more intervention and support over time than older participants that were not evaluated in the present study. The results of the present study also suggested that program mastery was also predictive of the intervention outcome. This is consistent with the assumption that verbal operant learning and derived relational responding are generalized operants that

develop through multiple exemplar training (Hayes et al., 2001). Each PEAK program contains exemplar targets where participants are reinforced for emitting verbal operant and relational responses, and it follows that a greater program mastery occurs when participants have demonstrated correct responding to multiple programming exemplars. If the PCA is a valid measure of generalized learning across the four learning modalities in PEAK, then mastering more programs should lead to greater generalization of performance measured in the PCA. This result also suggests that efforts to increase the rate of program mastery may improve the efficiency and efficacy of PEAK instruction. Behavior analytic strategies such as discrete trial training (Hillman et al., 2020), gamification (Belisle et al., 2022), fluency-based instruction, and precision teaching (Martinho et al., 2022) may all be useful to increase program mastery that could lead to greater improvements in performance measured using the PCA.

Predictors that were not related to intervention outcome are just as important to consider when informing treatment decisions. Prior research on treatment intensity as the number of treatment hours in intervention outcomes range from supporting higher treatment intensity to mixed findings within regression analyses (e.g., Linstead et al., 2016; Tiura et al., 2017; Eckes, 2023; Vietze & Lax; 2018). In the present study, while intervention hours were not independently predictive of PCA change scores, intervention hours were positively related to program mastery that was a primary predictor. It is important to note that intervention hours can be effective by a myriad of contextual factors and are a combined function of the recommended hours by the BCBA and the availability and treatment adherence of the family. Factors such as age, symptom severity, challenging behavior, and even PCA performance at Time 1 are all considered when recommending treatment hours that are conflated with this variable using a clinical case review method, compared to controlled trials where treatment hours are randomly

assigned that have also shown inconclusive results (Rogers et al., 2021). A conservative conclusion from this finding is that additional intervention hours *may* be beneficial *if* those additional hours lead to the mastery of additional programs, although more research is required to determine factors that predict increased program mastery within PEAK. Broadly, it may be more important how treatment hours are being utilized than simply the occurrence of treatment hours. We also did not observe a relationship between autism symptoms and changes in the PCA, suggesting that attempting to reduce autism symptoms will not independently lead to improvements in performance measured within the PCA, and time may be better allocated towards supporting mastery of programming targets. Moreover, because age is a primary predictor variable, efforts to reduce benign behaviors such as stereotypy may serve to delay the intervention and negatively impact intervention outcomes.

There are several limitations in the current study and these results should be considered preliminary with the intention to guide future research. First, while the sample size in the present study is considered large within traditional behavior analytic research, larger samples are generally recommended for this type of analysis (e.g., Dupont & Plummer Jr., 1998). Jenkins and Quintana-Ascencio (2020) describe a potential strategy for evaluating regression analyses with smaller sample size and suggest greater than 25 participants are needed when variability is high. A small sample of participants in regression analyses increases the risk of Type 2 errors (i.e., false negatives). Therefore, while these results may support that age and program mastery *are* important predictors of intervention outcomes, negating other potential predictors likely requires more robust analyses with larger participants samples. Second, the present study did not compare intervention outcomes to a control group of participants. Control groups can be difficult to develop in active clinical settings and when using client record review as an analytic method.

Prior control-trial studies using PEAK have shown that control groups typically show minimal to no improvements on PEAK assessments and other related measures, while the results of the present study add to the existing evidence that participants who do receive PEAK show consistently positive outcomes. The critical extension of the literature with respect to the present study is the regression analysis predicting intervention outcome. In future research, this type of analysis could be conducted within larger control trial evaluations for both an intervention group and a control group for a more robust evaluation. Third, while we know the total number of treatment hours for each participant, we do not know the percentage of this time that was allocated to PEAK instruction specifically, versus other instructional methods. This may contribute to the null finding with respect to intervention hours, where additional hours may have been allocated to other behavior analytic approaches, and not necessarily increasing exposure to PEAK. Future clinical case review could analyze all programming that a participant is completing during a session to estimate allocation to any specific technologies during active treatment.

Beyond addressing the limitations in the current study, there are several additional avenues for future research. The present study analyzed clinical case data that are commonly available to inform this initial analysis; however, there are many within-treatment variables that could be evaluated in future research. PEAK was designed to be a flexible technology, and while general recommendations are provided as a starting point (e.g., discrete trial training arrangement, 10-trial blocks, interspersing training and testing blocks), all these elements can be adjusted within the technology. At present, these elements are adjusted based on clinical judgment and the knowledge and comfort of the behavior analyst with this technology. In a clinical setting where these elements are being consistently adjusted, coding of these elements

would allow for an analysis of intervention factors that are independently or synthetically predictive of improved outcomes. This research may logically follow from single-subject experimental analyses to larger group-comparison or regression analyses. Critically, the more this work is conducted in active clinical settings, the greater the potential for generality of research findings. Another avenue for future research is the integration of longitudinal research methods to evaluate the trajectory of intervention outcomes. PEAK research studies at the population level have ranged from 12-weeks (Dixon et al., 2019; Belisle et al., 2021) to 6-months in the present study, and single-case studies have been conducted over the course of 1-year (Dixon et al., 2021). Longer-term evaluations would help to determine if initial treatment gains are replicated over successive evaluations, if improvements are exponential over time (i.e., continued instruction leads to even greater improvements over time), or if improvements decay over time (i.e., continued instructions leads to diminishing or asymptotic gains). If gains remain linear or exponential over time, this would support continuing to provide PEAK or related interventions at the same intensity over time. Conversely, if gains decay over time, then implementing PEAK or related interventions in the beginning phases of a treatment may be appropriate, but once asymptotic improvements are observed, either reducing treatment intensity or allocating treatment time towards other technologies or approaches. The continued development and refinement of comprehensive technologies like PEAK, and the wide scale adoption of these and similar technologies by behavior analysts (Padilla, 2020), makes this research increasingly possible within active clinical settings.

In summary, emerging research supports the validity and reliability of the PCA as an assessment of verbal operant and relational learning abilities in autistic children, and outcome research is increasingly supporting the use of PEAK as a technology to improve performance in

these areas. The assumption that verbal operant and relational learning are generalized operants are imperative to the potential to shape these repertoires through verbal operant and relational training guided by PEAK and related technologies. Improvements measured using instruments like the PCA may not be consistent across all learners, necessitating a better understanding of critical factors that predict strong intervention outcomes. In the present study, age at the onset of intervention and program mastery are two such factors. These are predictors that broadly align with prior behavior analytic research and suggest that the best outcomes will likely be achieved when learners enter services at a younger age and when program design leads to mastery of multiple targets over time. When learners enter services at an older age, or when program mastery is not being readily observed, PEAK intervention may be less efficacious, necessitating program modification or exploring other technologies. As an empirical science, it is important that clinical decisions are based on research, rather than the intuition of any single behavior analyst or shared folklore that can emerge within an applied subfield. No single study will ever answer every available research question – it is the cumulation of research findings over time that will guide behavior analysts toward the most effective use of all available intervention technologies and approaches.

REFERENCES

Ackley, M., Subramanian, J.W., Moore, J.W. et al. A Review of Language Development Protocols for Individuals with Autism. J Behav Educ 28, 362–388 (2019). https://doi.org/10.1007/s10864-019-09327-8

Austin, A., & Fiske, K. (2023). Evaluating the relationship between compassion, perceived supervisor support, and burnout among ABA staff. Behavior Analysis in Practice. https://doi.org/10.1007/s40617-023-00813-0

Barnes, D. (1994). Stimulus equivalence and relational frame theory. The Psychological Record, 44, 91.

Belisle, J., Burke, R., & Dennis, L. (2022). An initial evaluation of a gamified program to teach conditional discriminations within curricular programming. Behavior Analysis: Research and Practice, 22(4), 341. https://doi.org/10.1037/bar0000253

Belisle, J., Clark, L., Welch, K., McDonald, N., Dennis, L., & Sickman, E. (2021). Evaluation of broad skill repertoire changes over 3 months of peak implementation in a special education classroom. Behavior Analysis in Practice, 15(1), 324–329. https://doi.org/10.1007/s40617-021-00657-6

Belisle, J., Dixon, M. R., Stanley, C. R., Munoz, B., & Daar, J. H. (2016). Teaching foundational perspective-taking skills to children with autism using the peak-T curriculum: Single-reversal "I-you" deictic frames. Journal of Applied Behavior Analysis, 49(4), 965–969. https://doi.org/10.1002/jaba.324

Belisle, J., Dixon, M. R., Zuch, C., Blecha, S., Campbell, M., Busam, J., & Holtsman, L. (under review). Multidimensional emergence of relational learning and verbal behavior in autistic children: Principal component analysis of the PEAK Comprehensive Assessment

Belisle, J., Dixon, M. R., Munoz, B. E., & Fricke-Steuber, K. (2021). The convergent validity of the PEAK-E-PA and two common assessments of language development: The ABLLS-R and the TOLD 1:4. Journal of Behavioral Education, 31(4), 699–717. https://doi.org/10.1007/s10864-020-09426-x

Blecha, S., Belisle, J., Dixon, M. R., Holtsman, L., & Barron, B. F. (under review). The convergent validity of the LIFE Functional Module assessment: Adaptive behavior, derived verbal relations, and autism symptom severity.

Centers for Disease Control and Prevention. (2023, April 4). Data & statistics on autism spectrum disorder. Centers for Disease Control and Prevention. https://www.cdc.gov/ncbddd/autism/data.html

Diagnostic and statistical manual of mental disorders: DSM-5. (2013). American Psychiatric Association.

Dixon, M. R. (2014a). The PEAK relational training system: Direct training module. Shawnee Scientific Press.

Dixon, M. R. (2014b). The PEAK relational training system: Generalization module. Shawnee Scientific Press

Dixon, M. R. (2015). The PEAK relational training system: Equivalence module. Shawnee Scientific Press

Dixon, M. R. (2016). The PEAK relational training system: Transformation module. Shawnee Scientific Press

Dixon, M. R. (2018). PEAK Comprehensive Assessment. Emergent Learning Press.

Dixon, M. (2020). LIFE Skill Emergence System: Evidence-Based Assessment and Intervention Functional Module. Emergent Learning Press.

Dixon, M. R., Belisle, J., Hayes, S. C., Stanley, C. R., Blevins, A., Gutknecht, K. F., Partlo, A., Ryan, L., & Lucas, C. (2021). Evidence from children with autism that derived relational responding is a generalized operant. Behavior Analysis in Practice, 14(2), 295–323. https://doi.org/10.1007/s40617-020-00425-y

Dixon, M. R., Belisle, J., McKeel, A., Whiting, S., Speelman, R., Daar, J. H., & Rowsey, K. (2017). An internal and critical review of the Peak Relational Training System for children with autism and related intellectual disabilities: 2014–2017. The Behavior Analyst, 40(2), 493–521. https://doi.org/10.1007/s40614-017-0119-4

Dixon, M. R., Belisle, J., Stanley, C. R., & Rowsey, K. (2018). Student outcomes after 1 year of front line staff implementation of the peak curriculum. Behavioral Interventions, 33(2), 185–195. https://doi.org/10.1002/bin.1516

Dixon, M. R., Belisle, J., Stanley, C. R., Rowsey, K. E., Daar, J. H., & Szekely, S. (2015). Toward a behavior analysis of complex language for children with autism: evaluating the relationship between PEAK and the VB-MAPP. Journal of Developmental and Physical Disabilities, 27, 223–233. https://doi.org/10.1007/s10882-014- 9410-4.

Dixon, M. R., Carman, J., Tyler, P. A., Whiting, S. W., Enoch, M. R., & Daar, J. H. (2014). PEAK relational training system for children with autism and developmental disabilities: Correlations with Peabody Picture Vocabulary Test and assessment reliability. Journal of Developmental and Physical Disabilities, 26, 603-614. https://doi.org/10.1007/s10882-014-9384-2

Dixon, M. R., Paliliunas, D., Barron, B. F., Schmick, A. M., & Stanley, C. R. (2019). Randomized controlled trial evaluation of ABA content on IQ gains in children with autism. Journal of Behavioral Education. https://doi.org/10.1007/s10864-019-09344-7

Dixon, M. R., Paliliunas, D., & Critchfield, T. S. (2018). AIM: A behavior analytic curriculum for social-emotional development in children. Shawnee Scientific Press.

Dixon, M. R., Yi, Z., & Chastain, A. N. (2022). PEAK relational training system. Handbook of Applied Behavior Analysis Interventions for Autism, 341–360. https://doi.org/10.1007/978-3-030-96478-8_18

Dixon, M. R., Yi, Z., Sutton, A., & Pikula, A. (2023). Randomized-controlled trial examining differing content of ABA therapy delivered to autistic children. Journal of Contextual Behavioral Science, 28, 169–179. https://doi.org/10.1016/j.jcbs.2023.03.016

Dunkel-Jackson, S. M., & Dixon, M. R. (2018). Promoting generalized advanced language skills of children in intensive behavioral intervention with promoting the emergence of advanced knowledge generalization module (PEAK-G). Behavior Analysis in Practice, 11(4), 289–306. https://doi.org/10.1007/s40617-017-0204-x

Dupont, W. D., & Plummer Jr, W. D. (1998). Power and sample size calculations for studies involving linear regression. Controlled Clinical Rrials, 19(6), 589-601. https://doi.org/10.1016/S0197-2456(98)00037-3

Dyck, M. J., Piek, J. P., Hay, D. A., & Hallmayer, J. F. (2007). The relationship between symptoms and abilities in autism. Journal of Developmental and Physical Disabilities, 19, 251-261. https://doi.org/10.1007/s10882-007-9055-7

Eckes, T., Buhlmann, U., Holling, H. D., & Möllmann, A. (2023). Comprehensive ABA-based interventions in the treatment of children with autism spectrum disorder–a meta-analysis. BMC psychiatry, 23(1), 133. https://doi.org/10.1186/s12888-022-04412-1

Foxx, R. M. (2008). Applied Behavior Analysis Treatment of autism: The state of the art. Child and Adolescent Psychiatric Clinics of North America, 17(4), 821–834. https://doi.org/10.1016/j.chc.2008.06.007

Giofrè, D., Borella, E., & Mammarella, I. C. (2017). The relationship between intelligence, working memory, academic self-esteem, and academic achievement. Journal of Cognitive Psychology, 29(6), 731–747. https://doi.org/10.1080/20445911.2017.1310110

Harris, S. L., & Handleman, J. S. (2000). Age and IQ at intake as predictors of placement for young children with autism: A four-to six-year follow-up. Journal of Autism and Developmental Disorders, 30, 137-142. https://doi.org/10.1023/a:1005459606120

Hayes, S. C. (1994). Relational frame theory: A functional approach to verbal events. In S. C. Hayes, L. J. Hayes, M. Sato, & K. Ono (Eds.), Behavior analysis of language and cognition (pp. 9–30). Reno, NV: Context Press.

Hayes, S. C., Barnes-Holmes, D., & Roche, B. (2001). Relational frame theory: A post-Skinnerian account of human language and cognition. New York: Plenum

Hillman, C. B., Lerman, D. C., & Kosel, M. L. (2020). Discrete-trial training performance of behavior interventionists with autism spectrum disorder: A systematic replication and extension. Journal of Applied Behavior Analysis, 54(1), 374–388. https://doi.org/10.1002/jaba.755

Jenkins, D. G., & Quintana-Ascencio, P. F. (2020). A solution to minimum sample size for regressions. PloS one, 15(2), e0229345.

Keith, T. Z., Fehrmann, P. G., Harrison, P. L., & Pottebaum, S. M. (1987). The relation between Adaptive Behavior and intelligence: Testing alternative explanations. Journal of School Psychology, 25(1), 31–43. https://doi.org/10.1016/0022-4405(87)90058-6

Lang, R., Hancock, T. B., & Singh, N. N. (2016). Overview of early intensive behavioral intervention for children with autism. Early intervention for young children with autism spectrum disorder, 1-14.

Leaf, J. B., Cihon, J. H., Javed, A., Klick, S., Ferguson, J. L., Milne, C., Creem, A., Arthur, S., Saunders, M., S., Olive, M. L., Ross, R. K., Leaf, R., & McEachin, J. (2022). A call for discussion on stereotypic behavior. European Journal of Behavior Analysis, 23(2), 156–180. https://doi.org/10.1080/15021149.2022.2112810

Linstead, E., Dixon, D. R., Hong, E., Burns, C. O., French, R., Novack, M. N., & Granpeesheh, D. (2017). An evaluation of the effects of intensity and duration on outcomes across treatment domains for children with autism spectrum disorder. Translational Psychiatry, 7(9). https://doi.org/10.1038/tp.2017.207

Malkin, A., Dixon, M. R., Speelman, R. C., & Luke, N. (2017). Evaluating the relationships between the PEAK relational training system–direct training module, assessment of basic language and learning skills–revised, and the Vineland adaptive behavior scales–II. Journal of Developmental and Physical Disabilities, 29, 341-351. https://doi.org/10.1007/s10882-016-9527-8

Martinho, M. T., Booth, N., Attard, N., & Dillenburger, K. (2022). A systematic review of the impact of precision teaching and fluency-building on teaching children diagnosed with autism. International Journal of Educational Research, 116, 102076. https://doi.org/10.1016/j.ijer.2022.102076

May, B. K., & St. Cyr, J. (2021). The impact of the PEAK curriculum on standardized measures of Intelligence: A systems level randomized control trial. Advances in Neurodevelopmental Disorders, 5(3), 245–255. https://doi.org/10.1007/s41252-021-00199-6

Mayes, S. D., & Calhoun, S. L. (2003). Analysis of WISC-III, Stanford-Binet: IV, and academic achievement test scores in children with autism. Journal of autism and developmental disorders, 33, 329-341. https://doi.org/10.1023/A:1024462719081

McKeel, A. N., Dixon, M. R., Daar, J. H., Rowsey, K. E., & Szekely, S. (2015). Evaluating the efficacy of the PEAK relational training system using a randomized controlled trial of children with autism. Journal of Behavioral Education, 24, 230-241. https://doi.org/10.1007/s10864-015-9219-y

Padilla, K. L. (2020). Global assessment use and practices in Applied Behavior Analysis: Surveying the field. Research in Autism Spectrum Disorders, 79, 101676. https://doi.org/10.1016/j.rasd.2020.101676

Padilla, K. L., Weston, R., Morgan, G. B., Lively, P., & O'Guinn, N. (2023). Validity and reliability evidence for assessments based in applied behavior analysis: A systematic review. Behavior Modification, 47(1), 247-288. https://doi.org/10.1177/01454455221098151

Paliliunas, D., Belisle, J., Barron, B. F., & Dixon, M. R. (2022). Transformation of hierarchical multiply controlled verbal relations in children with autism in a game of I spy. Behavior Analysis in Practice, 15(4), 1383–1389. https://doi.org/10.1007/s40617-019-00391-0

Partington, J. (2006). Assessment of Basic Language and Learning Skills-Revised (The ABLLS-R). Pleasant Hill, CA: Behavior Analysts.

Reichow, B. (2011). Overview of meta-analyses on early intensive behavioral intervention for young children with autism spectrum disorders. Journal of Autism and Developmental Disorders, 42(4), 512–520. https://doi.org/10.1007/s10803-011-1218-9

Rogers, S. J., Yoder, P., Estes, A., Warren, Z., McEachin, J., Munson, J., ... & Whelan, F. (2021). A multisite randomized controlled trial comparing the effects of intervention intensity and intervention style on outcomes for young children with autism. Journal of the American Academy of Child & Adolescent Psychiatry, 60(6), 710-722. https://doi.org/10.1016/j.jaac.2020.06.013

Rowsey, K. E., Belisle, J., & Dixon, M. R. (2015). Principal component analysis of the PEAK relational training system. Journal of Developmental and Physical Disabilities, 27, 15-23. https://doi.org/10.1007/s10882-014-9398-9

Rowsey, K. E., Belisle, J., Stanley, C. R., Daar, J. H., & Dixon, M. R. (2017). Principal component analysis of the PEAK generalization module. Journal of Developmental and Physical Disabilities, 29, 489-501. https://doi.org/10.1007/s10882-017-9539-z

Sidman, M., & Tailby, W. (1982). Conditional discrimination vs. matching to sample: An expansion of the testing paradigm. Journal of the Experimental Analysis of Behavior, 37, 5–22. doi:10.1901/jeab.1982.37-5

Skinner, B. F. (1957). Verbal behavior. Englewood Cliffs: Prentice Hall.

Slocum, T. A., Detrich, R., Wilczynski, S. M., Spencer, T. D., Lewis, T., & Wolfe, K. (2014). The evidence-based practice of Applied Behavior Analysis. The Behavior Analyst, 37(1), 41–56. https://doi.org/10.1007/s40614-014-0005-2

Smith, T. (2017). What is evidence-based behavior analysis? The Behavior Analyst, 36(1), 7–33. https://doi.org/10.1007/bf03392290

Sparrow, S. S. (2016). Vineland Adaptive Behavior Scales. Pearson.

Sundberg, M. L. (2008). VB-MAPP: Verbal behavior milestones assessment and placement program: A language and Social Skills Assessment Program for children with autism or other developmental disabilities. AVB Press.

Sutton, A., Pikula, A., Yi, Z., & Dixon, M. R. (2021). Evaluating the convergent validity of the Peak Comprehensive Assessment (PCA): Intelligence, behavior challenges, and autism symptom severity. Journal of Developmental and Physical Disabilities, 34(4), 549–570. https://doi.org/10.1007/s10882-021-09814-9

Tiura, M., Kim, J., Detmers, D., & Baldi, H. (2017). Predictors of longitudinal ABA treatment outcomes for children with autism: A growth curve analysis. Research in Developmental Disabilities, 70, 185-197. https://doi.org/10.1016/j.ridd.2017.09.008

Vietze, P., & Lax, L. E. (2018). Early intervention aba for toddlers with ASD: Effect of age and amount. Current Psychology, 39(4), 1234–1244. https://doi.org/10.1007/s12144-018-9812-z

Wolfe, K., & Seaman, M. A. (2023). The influence of data characteristics on interrater agreement among visual analysts. Journal of Applied Behavior Analysis, 56(2), 365–376. https://doi.org/10.1002/jaba.980

Table 1. Descriptive data for participants in the study and PCA scores across modules at Time 1. Percent values for PCA Total Scores and PCA Subtests were calculated by dividing the raw score by the total number of items in the subtest (i.e., Direct Training, 64 items; Generalization, 64 items; Equivalence, 24 items; Transformation – Rec, 96 items; Transformation – Exp, 96 items).

Variable	Mean	Minimum	Maximum	Standard Deviation
Age (Years)	7.78	2	21	4.58
Intervention Duration (Days)	204.07	119	264	28.84
Intervention Hours (Total)	196.57	26	719	150.66
Supervised Hours (Percent)	21.87%	2.80%	54.40%	9.16%
Mastered PEAK Programs (Total)	10.73	0	35	9.06
PAS-BOS Social Frequency	7.93	0	18	5.38
PAS-BOS Social Intensity	7.07	0	16	4.92
PAS-BOS Communication Frequency	7.24	0	18	5.21
PAS-BOS Communication Intensity	6.71	0	17	4.92
PAS-BOS Rest/Rep Frequency	4.65	0	14	4.21
PAS-BOS Rest/Rep Intensity	4.24	0	15	3.85
PCA Total Score (Raw / %)	99.47 (29%)	0 (0%)	271 (79%)	81.46 (24%)
PCA Direct Training (Raw / %)	36.20 (57%)	0 (0%)	63 (98%)	19.97 (31%)
PCA Generalization (Raw / %)	23.89 (37%)	0 (0%)	61 (95%)	18.81 (29%)
PCA Equivalence (Raw / %)	5.16 (22%)	0 (0%)	24 (100%)	6.31 (26%)
PCA Transformation – Rec (Raw / %)	18.64 (19%)	0 (0%)	69 (72%)	21.10 (22%)
PCA Transformation – Exp (Raw / %)	16.18 (17%)	0 (0%)	79 (82%)	21.56 (22%)

Table 2. Pearson correlation coefficients for each predictor variable and PCA Time 1 Total Score, PCA Time 2 Total Score, and PCA Total Change Score as outcome variables of interest.

Predictor	PCA Time 1	PCA Time 2	PCA Change Score
Age	**+0.35**	+0.21	**-0.31**
Intervention Duration	-0.05	-0.08	-0.08
Intervention Hours	**-0.39**	**-0.41**	-0.12
Supervised Hours	+0.15	+0.19	+0.14
Mastered PEAK Programs	-0.00	-0.11	**+0.31**
PAS-BOS Social Frequency	**-0.61**	**-0.63**	-0.13
PAS-BOS Social Intensity	**-0.56**	**-0.55**	-0.08
PAS-BOS Communication Frequency	**-0.73**	**-0.71**	-0.05
PAS-BOS Communication Intensity	**-0.70**	**-0.68**	-0.04
PAS-BOS Rest/Rep Frequency	**-0.62**	**-0.67**	-0.22
PAS-BOS Rest/Rep Intensity	**-0.60**	**-0.63**	-0.18
PCA Total Score - Time 1	-	**+0.93**	-0.03
PCA Direct Training - Time 1	**+0.91**	**+0.89**	+0.11
PCA Generalization - Time 1	**+0.98**	**+0.81**	+0.01
PCA Equivalence - Time 1	**+0.84**	**+0.91**	-0.13
PCA Transformation – Rec - Time 1	**+0.95**	**+0.98**	+0.02
PCA Transformation – Exp - Time 1	**+0.93**	**+0.91**	-0.18

Note. Significant values are bolded.

Table 3. Pearson correlation coefficients for each predictor variable and age and mastered programs.

Predictor	Age	Mastered Programs
Age	-	-0.07
Intervention Duration	-0.09	+**0.28**
Intervention Hours	-0.01	+**0.35**
Supervised Hours	-0.17	-0.20
Mastered PEAK Programs	-0.07	-
PAS-BOS Social Frequency	-0.17	**-0.27**
PAS-BOS Social Intensity	-0.20	-0.24
PAS-BOS Communication Frequency	-0.16	-0.11
PAS-BOS Communication Intensity	-0.15	-0.10
PAS-BOS Rest/Rep Frequency	-0.14	-0.13
PAS-BOS Rest/Rep Intensity	-0.16	-0.10

Note. Significant values are bolded.

Table 4. Regression summary of all predictor variables included in the model for PCA Total Change Score as the outcome variable.

Predictor	B	Std. Error	Beta	t (48)	p-value
Intercept			+31.09	+1.68	0.10
Age	-0.29	0.13	-2.05	-2.24	0.03
Mastered Programs	+0.31	0.13	+1.09	+2.28	0.03
Supervision Hours	+0.12	0.13	+41.75	+0.90	0.37
PAS-BOS RR Freq.	+0.17	0.45	+1.38	+0.37	0.72
PAS-BOS RR Inten.	-0.44	0.46	-3.37	-0.97	0.34
PAS-BOS Soc Freq.	+0.10	0.20	+0.62	+0.53	0.60

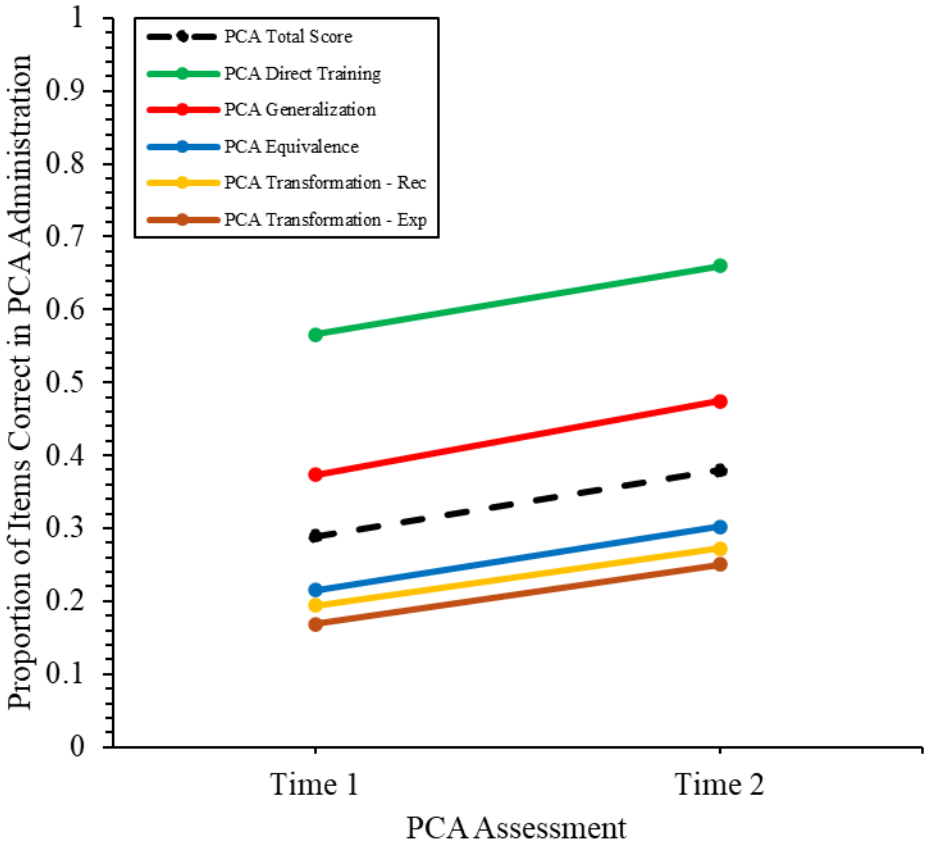

Figure 1. Mean proportional items correct in Time 1 and Time 2 administration of the PCA.

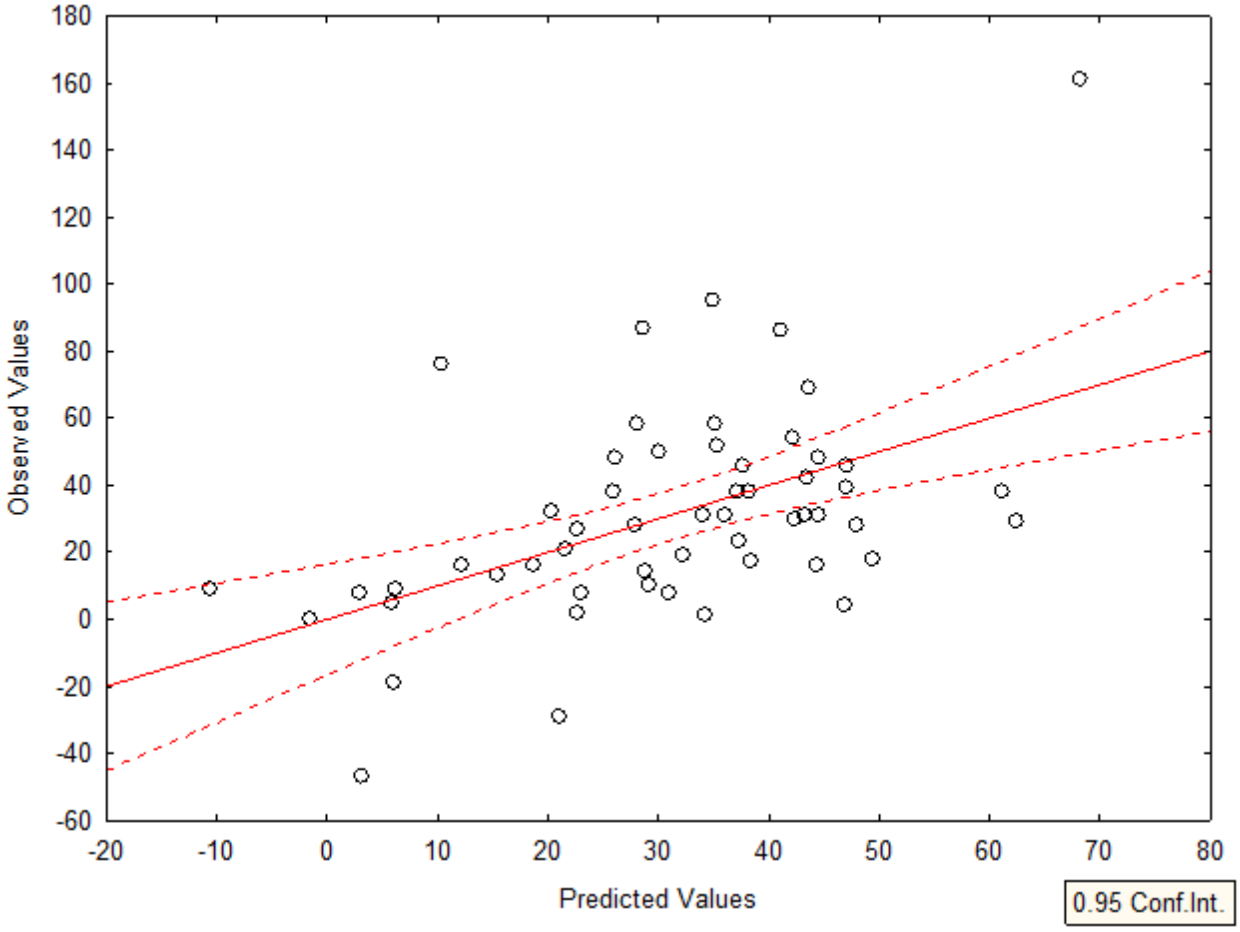

Figure 2. Relationship between PCA change scores predicted based on regression analysis and participant PCA scores obtained in the present study.

UTILIZING PROSOCIAL TO SUPPORT POSITIVE WORKPLACE CLIMATE AND PERFORMANCE IN APPLIED BEHAVIOR ANALYSIS (ABA) SERVICES

The current manuscript was written by the authorship of Stephanie Vickroy, Jordan Belisle, Mikayla Campbell, Blayne Stemple, Lindsey Schneider, and Mark Dixon. The contents of this manuscript and authorship may differ from the finalized version based on review and revision. Final analyses were conducted from de-identified data collected through the Institute for Dynamic Behavior Science and Missouri State University made available by the primary investigator of those studies. The studies were conducted consistent with the IRB approval presented in Appendix B. Correspondence regarding this thesis should be directed to Stephanie Vickroy (vickroy88@missiouristate.edu) and correspondence regarding the manuscript should be directed to Dr. Jordan Belisle at the Institute for Dynamic Behavior Science (jordanbelisle@dynamicbehaviorscience.com)

Applied Behavior Analysis (ABA) and its behavior analytic principles have strong empirical evidence for creating effective intervention strategies for autistic individuals (Anderson & Carr, 2021). The abundance of research in support of ABA for autistic learners has led to its endorsement by the US Surgeon General (U.S. Department of Health and Human Services, 1999). ABA as an intervention is evidence based and evidence informed to promote an individual's growth, development, and independence deeming this practice as medically necessary (Long, 2013). What determines the success of ABA services is highly variable and individualized across settings and clients. A therapeutic setting is designed to support learners in a controlled environment where clients may have access to other peers, one-on-one treatment, and higher treatment fidelity; however, the methodology involved during the implementation of

ABA services is demanding and generally stressful for the therapist (Padilla et al., 2020; Hurt et al., 2013).

Caregivers of autistic individuals often report frequent emotionally draining experiences which can recurrently lead to stress, burnout, and decreased quality of life (Singh et al., 2020). These experiences are especially prevalent in ABA direct care staff (Gibson et al., 2009). High rates of burnout and low job satisfaction within ABA service providers may contribute to absenteeism, turnover, and diminished job performance (Plantiveau et al., 2018). Maslach et al. (1996) characterized burnout across three dimensions including emotional exhaustion, depersonalization, and reduced personal accomplishment. Personal conflicts within the organizational context and insufficient support from colleagues contribute to depersonalization (Leiter & Harvie, 1996; Pines & Maslach, 1978). Behavioral health providers experience moderate to high levels of job burnout where personal accomplishment of employees has a strong positive relationship with supervisor monitoring (Thomas et al., 2014; Aarons et al., 2009). Large client caseloads, complexity of cases, and demanding job duties outside of direct client services are associated with emotional exhaustion within direct care staff (O'Conner et al., 2018; Tsai et al., 2020). The autistic experience often includes challenges with aggressive behaviors that occur in higher rates and intensity compared to a normative sample (Quetsch et al., 2022). Employees who support autistic individuals that engage in aggressive behaviors experience increased rates of burnout which may indicate client interaction as an additional source of workplace stress (Quetsch et al., 2022). Concerns regarding staff retention are relevant as turnover rates hinder productivity within an organization and can lead to financial strain within the agency (Ganz, 2007). High quality ABA services rely on practitioner competencies and attention to training programs; however, turnover may prevent the quality assurance needed

to maintain effective practice (Silbaugh & Fattal, 2021). Competent and effective clinical behavior analysts are a crucial asset to human service organizations; however, it is challenging to maintain direct care staff due to the vocational technicality and the burden of workplace related stress. This may directly influence the efficacy of achieving client goals.

Individuals who work in high stress environments may be susceptible to psychological inflexible behaviors such as experiential avoidance or rigidity managed by unhelpful verbal rules (Biglan et al., 2013). Psychological flexibility refers to the ability to accept the present and engage in adaptive, flexible behaviors to increase contact with one's values in spite of aversive experiences (Hayes et al., 2012). This concept directly opposes experiential avoidance which involves the conscious intention to avoid contacting aversive private events, which further increases the possibility of undesired psychological events such as depression, anxiety, and poor work performance (Biglan, 2009; Hayes et al., 2006). Noone and Hastings (2011) evaluated the relationship between psychological flexibility and burnout in direct support staff for individuals with intellectual disabilities. The results indicated that those who reported more psychological acceptance had less emotional exhaustion at work. Additionally, staff who demonstrated high commitment to their workplace values reported fewer depersonalizing attitudes and more feelings of accomplishment within the workplace. This highlights psychological flexibility as a protective factor for reducing and preventing burnout symptomology. Acceptance and commitment therapy (ACT) is designed to cultivate psychological flexibility through six core processes that embody willingness to engage in behaviors harmonious with values and accepting challenging thoughts and feelings as they occur (Hayes et al., 2012; Singh et al., 2020). Studies suggest that ACT based interventions may be effective in organizational settings to enhance psychological flexibility in direct service providers who are heavily impacted by high rates of

stress and burnout (Bond et al., 2006). The utilization of ACT based procedures in the workplace has led to improvements in job satisfaction, psychological flexibility, and active engagement with clients (Pingo et al., 2020). However, establishing flexible workplace conditions is complex due to a cultural milieu comprised of values, beliefs, and opinions that persons share with members of the organization (Houmanfar et al., 2024).

When individuals within an organizational context begin to act in their own self-interest, the depletion of resources occurs known as the "Tragedy of the Commons" (Hardin, 1968). Elinor Ostrom argued that avoiding tragedy of the commons is possible when designed approaches are created in which those most affected by issues within an organization commit themselves to cooperation (Atkins et al., 2019). Ostrom's eight core design principles (CDPs) yield the primary purpose to explain the contingencies in which trust and reciprocity can be maintained to sustain collective action towards valued outcomes (Ostrom, 1990; Cox et al., 2010). Prosocial (Atkins et al., 2019) as an intervention approach, has the ability to improve workplace climate. Prosocial promotes a framework that utilizes ACT consistent principles (i.e., the ACT matrix; Polk et al., 2016) with the CDPs to (1) determine a group's collective values, (2) create committed actions that aid in the achievement of these values, and (3) provide avenues for psychological flexibility. These concepts occur across each of the eight CDPs and are evaluated at the group level using the ACT matrix as a map to navigate the group through the intersecting dimensions (Atkins et al., 2019). The function of these principles is to define the group or organization and ensure effectiveness by balancing individual and collective interests through (1) shared identity and purpose, (2) equitable distribution of costs and benefits, (3) fair and inclusive decision making, (4) monitoring agreed upon behaviors, (5) graduated responding

to helpful and unhelpful behaviors, 6) fair and fast conflict resolutions, 7) authority to self-govern, and 8) collaborative relations with other groups (Atkins et al., 2019).

Although research is limited, Prosocial technologies have been adapted to create supportive systems for teachers and direct care staff within a special education system (Libman et al., in prep; Paliliunas et al., in press). Libman et al. (2024) evaluated the implementation of a relational training-based modality and its effects on staff's psychological experiencing at an alternative day-treatment school program. A training workshop, using Prosocial (Atkins et al., 2018) was utilized to isolate staff's flexibility processes to adapt programming. The results of this study demonstrated improvements in program implementation as well as greater positive affective experiences around the technology at the individual and organizational level. Paliliunas et al. (in press) evaluated changes in group prosocial engagement using the Prosocial Survey (Atkins et al., 2019). The Prosocial intervention occurred across four sessions in a 10-week period where participants were subject to the collective ACT matrix. Each session included guided discussion that integrated Ostrom's CDPs with staff member's group values and selected correlated committed actions. The results of this study produced statistically significant decreases in both psychological inflexibility and overall stress. This infers that utilizing Prosocial strategies in the workplace may lead to staff's increased ability to access psychologically flexible behaviors which may provide further choices when approaching stressful events. The prosocial survey; however, is flawed due to a ceiling effect and an absence of prescriptive abilities. Therefore, it cannot create individualized interventions containing both qualitative and quantitative data.

The Prosocial approach requires further diagnostic strategies to guide assessment around the prosocial processes. The Prosocial Guided Interview (PGI-Beta; Belisle & Paliliunas, in

prep) was developed to provide a flexible analysis of the CDPs operating within an organization. This is an interview process that provides qualitative information to determine the overarching prosocial target. Each of the 8 CDPs are evaluated using a PIC analysis. The PIC analysis provides information regarding 1) Performance, 2) Information, and 3) Community. Lower endorsement of these items in any area will pinpoint specific targets for intervention. Additionally, the interviewer has the option of probing questions to better understand motivational factors that encourage engagement in CDPs or present barriers. Specific targets are selected for the group based on responses on the Prosocial Matrix which are then used to generate solutions within the PIC for low scoring CDPs. These targets can only be as effective as the overall workplace climate. Workplace climate contains the cooperation of human psychological events which can be conceptualized using the ROE-M within the hyper-dimensional multi-level (HDML) framework where stimulating events are deemed as either appetitive or aversive (Harte & Barnes-Holmes, 2022). One way to measure the overall climate is to measure the evoking functions of stimuli in the environment. The Affect and Willingness Scale (AWS; Belisle & Paliliunas, in prep) maintains the intention of capturing affective and emotional experiencing of stimulus events as well as the willingness to engage in said events. Research has utilized the AWS in a basic experiment on the transformation of affective evoking functions within arbitrary stimuli (Middleton & Belisle, in prep). However, within an organizational setting, individuals interact with stimuli variably, meaning some stimuli may require more time spent engaged. The AWS can also include a Time Allocation Estimator that is incorporated using a ranking system. Stimulus events are ranked in order from most to least time spent engaged. When an individual begins to spend an increased amount of time engaging in negatively valenced events associated with unwillingness to engage, psychological flexibility is

impacted. The concept of thriving requires being momentarily willing to engage in negatively valenced events, or actions to alter contextual experiencing.

The present study evaluated Prosocial as an intervention on overall workplace climate using Ostrom's CDPs combined with the Prosocial Matrix to increase psychological flexibility in direct care staff working with autistic individuals. Pre-posttest evaluations were used to identify changes in perceived stress, burnout, and psychological experiencing within the workplace.

METHODS

Participants and Setting. The study occurred within a Midwestern ABA clinic in which the purpose was to provide treatment to autistic individuals. All learners within the clinic were aged 2-16 years old and had previously received an autism diagnosis where a sample maintained comorbid diagnoses. Clinical sessions were structured to include one-on-one intervention with staff members and the supervision of Board Certified Behavior Analysts (BCBAs). Participants included 10 staff members which represented the totality of persons employed within the agency. Of the participants, 20% had obtained a master's degree along with the graduate-level certification of BCBA (BACB, 2024). The remaining 80% of participants had completed a bachelor's degree as well as the necessary Registered Behavior Technician (RBT) certification requirements (BACB, 2024). At the time of the study, the age of participants ranged from 21-30 years old with a mean age of 23. Of the participants included, all 9 identified as female. On average, participants reported working 23.45 hours per week at the agency which ranged from 5 to 50 hours per week. Time employed with the target agency was recorded using 6-month increments with 30% of participants being employed 0-6 months, 20% employed 6-12 months, 10% employed 12-18 months, 20% employed 18-24 months, and 20% employed greater than 24 months.

Dependent Variables

Participants completed four self-report measures as an indicator of prosocial climate, stress, burnout, and affect and willingness in a pre-posttest analysis.

Process Measure

Prosocial Guided Interview – Beta. The Prosocial Guided Interview – Beta (PGI-Beta; Belisle & Paliliunas, in prep) was completed individually with each participant. Participants evaluated their workplace climate across each CDP in terms of performance, information, and community on a 10-item Likert scale (see Table 5). Participants were additionally provided with the opportunity to add qualitative data in the form of an optional contingency analysis to indicate any further strengths or deficits regarding the CDPs. The optional contingency analysis consisted of pre-determined questions that were provided within the PGI- Beta and guided by the interviewer. Questions were selected based on the participant's quantitative scores on the Likert scale. If CDP scores were clustered toward either extremity (i.e., high or low scores) the corresponding question would be selected. Results were evaluated and used to guide future intervention strategies.

Primary Outcome Measures

Perceived Stress Scale. The Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) provided a measure which evaluated the degree of individual's reported stress. The PSS occurred on a 10-item Likert scale where higher scores indicated more prevalence of stress. Participants responded to 10 questions on a 5-point scale where response options ranged from 0 (never) to 4 (very often). These items were totaled then averaged to create a mean psychological stress score that reflected the group's perceived stress.

Maslach Burnout Inventory. The Maslach Burnout Inventory (MBI; Maslach, 1996) was used to measure participant burnout. The MBI consisted of a 22-item survey that identified burnout across the three subscales of emotional exhaustion, depersonalization, and low sense of personal accomplishment. Responses occurred on a six-point Likert scale where 0 as identified as N*ever* and 6 was identified as *Every Day*.

Affect and Willingness Scale. The Affect and Willingness Scale (AWS; Belisle & Paliliunas., in prep) was used to evaluate the participant's affect and willingness across 14 stimuli that were hand selected by the researcher. Both affect and willingness were rated by the participant on a scale from -100 to 100 where lower scores indicated more negatively valenced items or lower willingness to engage.

Procedure

A pre-posttest design was used for this study to evaluate the changes in dependent variables from time 1 to time 2 across a 20-week intervention period. The intervention framework included four, 60-minute group sessions facilitated by the researcher. Prior to session 1, the Prosocial Vision Planning Worksheet as seen in Figure 3 (Belisle & Paliliunas, in prep) was used to guide discussion with the clinic director and BCBAs employed within the organization. These results were then shared with the agency's owner to facilitate and promote long-range planning. Session 1 was included as a pre-test data measurement to establish shared values and collective actions needed to guide the intervention process. Post-data measures were recorded in the week following session four. All sessions were based on the PGI-Beta results targeting the main processes using the Prosocial Matrix to guide decision making.

Pre – Sessions. The Prosocial Vision Planning Worksheet was completed with the purpose of developing a long-range strategic agenda to guide group decision making. This was

used as a qualitative data measure to develop a preferred future for the target organization. The BCBAs of the organization were interviewed by the researcher and the results were shared with the agency's CEO post semi-structured interview. The worksheet was comprised of five sections: 1) identifying critical uncertainties, 2) preferred and probable future, 3) trend analysis, 4) capabilities, and 5) additional information. This process focused on identifying the shared purpose of the group and potential contextual evolutions that may occur within the organization. The results of the trend analysis (see Table 6) were used as a structural unit for creating the following sessions.

Session 1: Introducing Prosocial. Session 1 introduced participants to the core concepts of ACT, Ostrom's CDPs, and how they combine to support a prosocial environment. Within the session, the researcher presented participants with the results of the pre-test data. The purpose of this was to allow participants to be involved in identifying strengths and weaknesses within the workplace. The Prosocial Matrix was introduced as an extension of the ACT matrix (Polk & Schoendorff, 2014) and completed collectively with the participants to highlight psychological flexibility within the group. Together, participants mapped experiences of overall workplace climate along two dimensions: inner or outer actions and towards and away from specified values.

Session 2: Fair and Fast Conflict Resolution and Community. Overall sense of community in the workplace was targeted during session 2. The Prosocial Matrix allowed participants to map their experiences with community as a group. The researcher oriented the participants to the right side of the matrix which included moving towards shared values and interests. The focus of session 2 was placed on participants creating committed actions to be used as intervention. An anonymous survey was provided where participants were encouraged to vote

on selected committed actions as means for intervention. The highest voted suggestion was selected by the researcher and presented to the group. Participants selected attending community events outside of the work environment as a way to encourage community and comradery at the within group level.

A similar process was used again for targeting fair and fast conflict resolution. Participants collectively completed the Prosocial Matrix with a focus on experiences of conflict resolution within the workplace. Committed actions were identified by members of the group and in this case, committed actions were used in combination with *Prosocial* by Atkins (2019) to build a conflict resolution process unique to the agency.

Session 3: Monitoring Agreed Upon Behaviors. This session incorporated a review of the intervention strategies utilized in the prior month for both community and fair and fast conflict resolution. The completed conflict resolution chart was reviewed the group and consisted of the following principles: 1) separate people from the problem, 2) focus on shared interests, 3) escalation according to need, and 4) develop and evaluate options. The review included an anonymous survey where participants were encouraged to leave any positive or negative feedback for the researcher. This was to reticulate the process while alleviating any social pressure that may arise when giving constructive feedback.

Monitoring agreed upon behaviors was the next CDP presented to the participants. After learning the basic concepts, the group completed the collective matrix with an emphasis on moving towards their values using committed actions. The following intervention was individualized for the group based on the values identified in the monitoring agreed upon behaviors matrix as well as the previous community matrix. The selected intervention

incorporated a drop box where notes containing positive feedback could be placed when participants noticed value-based behaviors performed by others.

Session 4: Fair and Inclusive Decision Making. The final meeting took place at the end of the 20-week intervention and involved a review of the Prosocial process. Participants were asked to reflect on their experience using the Prosocial process. This was an informal reflection and the group was encouraged to be mindful of how they have gotten closer to their values at both the individual and group level. A brief discussion involving fair and inclusive decision making occurred where participants identified how the Prosocial process aided in the development of their group decision making. Additionally, members cultivated future scenarios in which further intervention strategies or processes may be relevant. Following the meeting, participants were asked to complete the final posttest survey.

RESULTS

We sought to evaluate the effectiveness of Prosocial as a means of supporting a positive workplace climate by creating individualized systems reflective of Ostrom's Core Design Principles. Initially, the Prosocial Vision Planning Worksheet indicated organizational focal values such as: collaboration with students; open and honest communication; high-end performance; and feeling open, centered, and engaged. These values were reported to be encompassed in the broader focal area of workplace climate and wellbeing. The results of the trend analysis are displayed in Table 6 where both potential positive and potential negative outcomes are shown. As the timescale increases, potential positive outcomes become more stable and formalized, whereas potential negative outcomes increase in severity. Developments within the organization began occurring immediately following the results of the Prosocial Vision

Planning Worksheet. Increased autonomy was provided to the clinic director that incorporated an enhanced influence over budgeting, scheduling, and working directly with the research team. Additional responsibilities were given to team members including the position of Prosocial facilitator. Monthly neurodiversity consultations were coordinated within the organization to promote further educational opportunities for staff members. A Prosocial PEAK (Promoting the Emergence of Advanced Knowledge Relational Training System; Dixon, 2014) workshop was additionally created which integrated elements of gamification and Hanely's HRE (Happy, Relaxed, Engaged) work to encourage psychological flexibility during direct work with clients (Stemple et al., 2024).

Participants identified several collective values and values-aligned behaviors during session 1. Workplace values appear to have organized themselves into two categories. The first being workplace culture (i.e., comradery, respect, and creating a fun environment) and the second being professional development (i.e., professional growth, client growth, and compassionate care). Results included values-based actions to maintain the identified valued workplace culture. Committed actions were relevant and included items such as: prioritizing client interests during treatment, thinking flexibly, and appreciating the collaborative approach. Figure 4 provides a visual representation of the ways in which participants mapped their experiences to foster prosocial behaviors.

Pre-posttest analyses were completed for the PGI-Beta which included the 8 CDPs (see Figure 5) and the corresponding PIC analysis (see Figure 6). Visual analyses of these results suggest there was an increase in all 8 CDPs as well as an increase in all components within the PIC analysis, including those not targeted within this study. Results of the items targeted within this study are described as follows. Overall community within the PIC analysis increased in

mean score by 29.46 (Sd = 20.83). Fair and fast conflict resolution had a mean score of 2.33 at pre-test and a mean score of 7.93 at post-test which represented a 70.62% increase (Sd = 3.95). Monitoring agreed upon behaviors increased in mean score by 4.44 (Sd = 3.14) which contributed to a 60.24% increase. Lastly, fair and inclusive decision making increased in mean by 3.98 (Sd = 2.82) and demonstrated a 55.26% increase from pretest to posttest. To determine if changes were statistically significant, a paired sample t-test was conducted for each of the 8 CDPs as well as for each item contained within the PIC analysis. Each targeted item demonstrated statistically significant differences from pre to post intervention (Community, $t(8) = 6.75$, $p < 0.001$; Fair and Fast Conflict Resolution, $t(8) = 7.95$, $p < 0.001$; Monitoring Agreed Upon Behaviors, $t(8) = 8.01$, $p < 0.001$; Fair and Inclusive Decision Making, $t(8) = 5.62$, $p < 0.001$). T-test results of all PGI-Beta items are displayed in Table 7.

Results of the AWS were additionally evaluated using a pre-posttest analysis. During the pre-intervention assessment, all stimuli for both measures of affect and willingness averaged a positive score on a scale from -100 to 100. A visual representation of affective change scores are shown in Figure 7. All selected stimuli demonstrated an increase in affect from pretest to posttest. Total affect score was determined across each participant and used to evaluate statistical significance with a paired sample t test. Results revealed statistical differences in affect scores from pre intervention to post ($t(8) = 3.97$, $p = 0.004$). A similar process was used to evaluate change in willingness across stimuli from pre-posttest (See Figure 8.). Results of the willingness scale showed less consistency across stimuli where select items decreased in willingness during posttest measures (PEAK, sessions, value 1, and value 2). A paired sample t test did not express statistically significant differences across willingness scores from pretest to posttest ($t(8) = 1.03$, $p = 0.333$).

Stress and burnout measures were evaluated using a pre-posttest measure. Figure 9 highlights the difference in average staff perceived stress from pre to post intervention. The average PSS score decreased from a mean of 23.11 (SD = 2.57) to 18.33 (SD = 4.44). A paired sample t test demonstrated statistically significant differences in mean score ($t(8) = 3.51$, $p = 0.008$). The MBI (see Figure 10) showed positive changes across each domain with both emotional exhaustion and depersonalization decreasing in average score and personal accomplishment increasing in average score. Emotional exhaustion decreased from a mean of 29.56 (SD = 5.75) to 21.81 (SD = 6.09) with statistically significant changes ($t(8) = 4.02$, $p = 0.004$). Depersonalization decreased from a mean score of 9.89 (SD = 6.37) to 5.44 (SD = 4.19) whereas personal accomplishment increased from 26.22 (SD = 4.76) to 29.89 (SD = 7.24). Both depersonalization and personal accomplishment did not demonstrate statistically significant changes from pre-posttest.

DISCUSSION

The present study sought to evaluate the effects of a prosocial intervention on workplace climate, psychological flexibility, stress, burnout, and overall group cohesion. The data provides support of using a prosocial as an intervention to support direct care staff implementing ABA services. The results of this study expand on prior research utilizing prosocial frameworks in organizational settings (Libman et al, in 2024; Paliliunas et al., in press) as well as ACT based interventions for direct care staff who may be at higher risk for stress and burnout (Bond et al., 2006). The current study heavily expands on the work from Paliliunas et al. (in press) by combining Ostrom's CDP's with a collective Prosocial matrix provides organizations with the diagnostic and qualitative tools to design individualized interventions. This study appears to have

conceptually achieved what has been describe to support ABA staff in a way that is individualistic of the organization's needs and overarching values. Frameworks which are individualized to the organization may produce results that are pertinent to that organization. When specific strengths and weaknesses are identified, structured intervention strategies can promote efficient results.

Efficient results are imperative particularly in regard to staff retention. High stress work environments tend to create inflexible and avoidant behaviors in staff (Biglan et al., 2013). If increased flexible responding fails to be established agencies will experience high turnover. Employee retention is necessary to maintain treatment fidelity and keep organizational costs attainable (Silbaugh & Fattal, 2021). Interventions developed by the group in a Prosocial framework are relatively low cost; however, if there is a lack of support systems in place for ABA direct care staff, potential costs of not maintaining a prosocial workplace include burnout, stress, and high attrition rates.

Several limitations did occur in the current study. The target organizational context was a small clinic within a larger agency and contained a limited number of participants which contributed to a small sample size. We did not measure psychological flexibility of the participants; therefore, we cannot determine if psychological flexibility increased at posttest. We do not yet know if retention was improved or if this framework will maintain over time. The adherence to this framework is costly in terms of staff time and resources and requires the willingness to engage in the Prosocial process by staff. Additionally, Prosocial is not a standardized or streamlined technology, it is an approach. Therefore, all intervention may contain different methods and cannot be effectively replicated.

Future research may begin by combining Prosocial with additional intervention strategies such as behavioral skills training to implement effective conflict resolution processes and other workplace related performance. The relationship between overall workplace climate and stress and burnout could be evaluated using other technologies such as delay discounting. This could be used to identify or prioritize organizations or groups in need of prosocial intervention especially within a larger agency. Prosocial as an intervention must continue to be explored particularly as a modality for increasing overall workplace climate. To continue to evaluate an organization's workplace climate, a formal evaluation of assessments such as the PGI-Beta and the AWS is necessary to determine the efficacy of such assessments.

In summary, emerging research supports the use of Prosocial frameworks as an intervention strategy for supporting overall workplace climate. Using ACT-based methodologies in the form of the combined Prosocial matrix can allow for members of an organization to map their psychological experiences while identifying ways to maintain or increase flexible responding in the presence of less affective stimuli. Workplace climate relies on the trust and reticulating systems in place that can be used to sustain collective action towards valued outcomes. Ostrom's Core Design Principles highlight the domains in which an organization can thrive while emphasizing ways in which to avoid selfish behavior amongst the group. It is important to continue research that supports ABA direct care staff as they are the frontlines of the field, and their implementation of intervention technologies drives the development of ABA as an entity.

REFERENCES

Aarons, G. A., Fettes, D. L., Flores, J. L. E., & Sommerfeld, D. H. (2009). Evidence based practice implementation and staff emotional exhaustion in children's services. Behaviour Research and Therapy, 47(11), 954–960. doi:10.1016/j.brat.2009.07.006

Anderson, A., & Carr, M. (2021). Applied Behaviour Analysis for autism: Evidence, issues, and implementation barriers. Current Developmental Disorders Reports, 8(4), 191–200. https://doi.org/10.1007/s40474-021-00237-x

Atkins, P. W. B., Wilson, D. S., & Hayes, S. C. (2019). *Prosocial: Using evolutionary science to build productive, equitable, and collaborative groups*. New Harbinger Publications.

BACB. Behavior Analyst Certification Board. (2024b, June 14). https://www.bacb.com/

Belisle, J. & Paliliunas, D. (in preparations) *Affect and willingness scale (AWS)*.

Belisle, J. & Paliliunas, D. (in preparation) *Prosocial guided interview – Beta (PGI-Beta)*.

Biglan, A. (2009). Increasing psychological flexibility to influence cultural evolution. Behavior and Social Issues, 18(1), 15–24. https://doi.org/10.5210/bsi.v18i1.2280

Biglan, A., Layton, G. L., Jones, L. B., Hankins, M., & Rusby, J. C. (2013). The value of workshops on psychological flexibility for Early Childhood Special Education staff. Topics in Early Childhood Special Education, 32(4), 196–210. https://doi.org/10.1177/0271121411425191

Bond, F. W., Hayes, S. C., & Barnes-Holmes, D. (2006). Psychological flexibility, act, and organizational behavior. Journal of Organizational Behavior Management, *26*(1–2), 25–54. https://doi.org/10.1300/j075v26n01_02

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. Journal of Health and Social Behavior, *24*(4), 385. https://doi.org/10.2307/2136404

Cox, M., Arnold, G., & Tomás, S. V. (2010). A Review of Design Principles for Community-based Natural Resource Management. Ecology and Society, 15(4).

Dixon, M. R. (2014). *The PEAK relational training system: direct training module.* Carbondale: Shawnee Scientific Press.

Ganz, M. L. (2007). The lifetime distribution of the incremental societal costs of autism. Archives of Pediatrics & Adolescent Medicine, 161(4), 343. https://doi.org/10.1001/archpedi.161.4.343

Gibson, J. A., Grey, I. M., & Hastings, R. P. (2009). Supervisor support as a predictor of burnout and therapeutic self-efficacy in therapists working in ABA Schools. Journal of Autism and Developmental Disorders, 39(7), 1024–1030. https://doi.org/10.1007/s10803-009-0709-4

Hardin, G. (1968). The tragedy of the commons. *Science*, *162*(3859), 1243–1248. https://doi.org/10.1126/science.162.3859.1243

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes and outcomes. Behaviour Research and Therapy, 44(1), 1–25. https://doi.org/10.1016/j.brat.2005.06.006

Hayes, S. C., Strosahl, K., & Wilson, K. G. (2012). *Acceptance and commitment therapy the process and practice of Mindful Change Steven C. Hayes ; Kirk D. Strosahl ; Kelly G. Wilson*. Guilford Press.

Houmanfar, R. A., Alavosius, M. P., Ghezzi, E. L., & Olla, R. (2024). Verbal repertoires and contextual factors in cultural change. The Psychological Record. https://doi.org/10.1007/s40732-024-00587-z

Hurt, A. A., Grist, C. L., Malesky, L. A., & McCord, D. M. (2013). Personality traits associated with occupational 'burnout' in aba therapists. Journal of Applied Research in Intellectual Disabilities, 26(4), 299–308. https://doi.org/10.1111/jar.12043

Leiter, M. P. & Harvie, P. L. (1996). Burnout among mental health workers: A review and a research agenda. International Journal of Social Psychiatry, 42(2), 90-101.

Libman, A., Libman, S., Paliliunas, D., & Belisle, J., (2024, May 23-27). Using a prosocial framework to improve staff experiences implementing relational training [Conference presentation]. ABAI 2024 Convention, Philadelphia, PA, United States.

Long, T. F., Helm, M., Hudak, M. L., Racine, A. D., Shenkin, B., Snider, I. G., White, P. H., Harbaugh, N. C., & Droge, M. (2013). Essential contractual language for medical necessity in children. Pediatrics, 132(2), 398–401. https://doi.org/10.1542/peds.2013-1637

Maslach, C., Jackson, S. E., & Leiter, M. P. (1996). *Maslach burnout inventory manual*. Palo Alto, CA (577 College Ave., Palo Alto 94306): Consulting Psychologists Press.

Middleton, A. & Belisle, J. (in preparation). Transfer of emotional functions through high-mass relational networks.

Noone, S. J., & Hastings, R. P. (2011). Values and psychological acceptance as correlates of burnout in support staff working with adults with intellectual disabilities. *Journal of Mental Health Research in Intellectual Disabilities, 4(2)*, 79–89. https://doi.org/10.1080/19315864.2011.582230

O'Connor, K., Muller Neff, D., & Pitman, S. (2018). Burnout in mental health professionals: A systematic review and meta-analysis of prevalence and determinants. European Psychiatry, 53, 74–99. doi:10.1016/j.eurpsy.2018.06.003

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge university press.

Padilla, K., Akers, J. S., & Kirkpatrick, M. (2020). Coordinating Aba Services. Interprofessional Care Coordination for Pediatric Autism Spectrum Disorder, 225–240. https://doi.org/10.1007/978-3-030-46295-6_15

Paliliunas, D., Burke, R., Taylor, S., Belisle, J., Frizell, C., & Sickman, E., (in press). A preliminary analysis of a prosocial intervention to support teachers and staff implementing behavioral interventions in a specialized school setting. Behavior Analysis in Practice.

Pines, A. & Maslach, C. (1978). Characteristics of staff burnout in mental health settings. Hospital & Community Psychiatry, 29(4), 233-237.

Pingo, J. C., Dixon, M. R., & Paliliunas, D. (2019). Intervention enhancing effects of acceptance and commitment training on performance feedback for direct support professional work performance, stress, and job satisfaction. Behavior Analysis in Practice, 13(1), 1–10. https://doi.org/10.1007/s40617-019-00333-w

Plantiveau, C., Dounavi, K., & Virués-Ortega, J. (2018). High levels of burnout among early-career board-certified behavior analysts with low collegial support in the work environment. European Journal of Behavior Analysis, 19(2), 195–207. https://doi.org/10.1080/15021149.2018.1438339

Polk, K. L., & Schoendorf, B. (2014). *The act matrix: A new approach to building psychological flexibility across settings and populations*. New Harbinger Publications, Inc.

Quetsch, L. B., Brown, C., Onovbiona, H., Bradley, R., Aloia, L., & Kanne, S. (2023). Understanding aggression in autism across childhood: Comparisons with a non-autistic sample. Autism Research, 16(6), 1185–1198. https://doi.org/10.1002/aur.2930

Silbaugh, B. C., & El Fattal, R. (2021). Exploring quality in the Applied Behavior Analysis Service Delivery Industry. Behavior Analysis in Practice, 15(2), 571–590. https://doi.org/10.1007/s40617-021-00627-y

Singh, N. N., Lancioni, G. E., Medvedev, O. N., Hwang, Y.-S., Myers, R. E., & Townshend, K. (2020). Using mindfulness to improve quality of life in caregivers of individuals with intellectual disabilities and autism spectrum disorder. International Journal of Developmental Disabilities, 66(5), 370–380. https://doi.org/10.1080/20473869.2020.1827211

Singh, R. S., Watford, T. S., Cotterman, R. E., & O'Brien, W. H. (2020). A pilot study of acceptance and commitment therapy for sexual minorities experiencing work stress. Journal of Contextual Behavioral Science, 16, 25–29. https://doi.org/10.1016/j.jcbs.2020.02.001

Stemple, B. D., Mikayla, C., Schneider, L., Belisle, J., Paliliunas, D. & Dixon, M. R., (2024, May 23-27). *Prosocial implementation of the PEAK relational training system in a clinical setting : A replication* [Conference presentation]. ABAI 2024 Convention, Philadelphia, PA, United States.

Thomas, M., Kohli, V., & Choi, J. (2014). Correlates of job burnout among human services workers: Implications for workforce retention. J. Soc. & Soc. Welfare, 41, 69.

Tsai, J., Jones, N., Klee, A., & Deegan, D. (2020). Job burnout among mental health staff at a veterans affairs psychosocial rehabilitation center. Community Mental Health Journal, 56(2), 294–297. doi:10.1007/s10597-019-00487-5

U.S. Department of Health and Human Services. *Mental Health*: *A Report of the Surgeon General.* Rockville, MD: U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Mental Health Services, National Institutes of Health, National Institute of Mental Health, 1999.

Table 5. Summary of each item on the Prosocial Guided Interview – Beta in regard to each Core Design principle and the corresponding PIC questions

CDP	Performance	Information	Community
Shared Identity and Purpose	Does the team successfully achieve the outcome?	Is the outcome monitored and results shared with the team?	Is the outcome important to all members of the team?
Equitable Distribution of Costs and Benefits	Are members performing their duties reliably and with fidelity?	Are members aware of both the contributions and benefits experienced by other members of the team?	Do members have opportunities to negotiate roles and responsibilities that represent their strengths and interests?
Faire and Inclusive Decision Making	Do members at multiple levels report that decisions are fair and lead to desirable outcomes?	Are members aware of how decisions are made for the team, including who informed the decisions and reasons for the decision?	Are members most impacted by decisions included in all parts of the decision-making process?
Monitoring Agreed Upon Behaviors	Are the most important contributions of members monitored at all levels?	Is the data made available to all members to inform important decisions?	Do members involved in the monitoring process (including those being monitored) participate in deciding how best to monitor performance and what is done with the information?
Graduated Responding	Is feedback regularly provided to members that rewards helpful behavior and attempts to correct unhelpful behavior?	Is on-going feedback for individuals and teams documented and only shared with those who "need to know" (e.g., direct supervisors)?	Are reticulating feedback systems used that include self-evaluation, team-evaluation, evaluation of supervisees, and evaluation of supervisors?

Table 5 Continued. Summary of each item on the Prosocial Guided Interview – Beta in regard to each Core Design principle and the corresponding PIC questions.

CDP	Performance	Information	Community
Fair and Fast Conflict Resolution	Are conflicts resolved quickly and in a way that feels supportive of members involved in the conflict?	Do members have a standardized path to conflict resolution that respects the dignity and privacy of other members?	Were the methods for conflict resolution developed by the groups most likely to experience conflicts in pursuit of the shared purpose of the group?
Authority to Self Govern	Are individuals and teams creating materials, procedures, and systems that achieve the shared purpose of the group?	Do members regularly receive appropriate training and information needed to develop their own materials, procedures, and systems?	Are training and information systems developed based on the shared interests and input of members at all levels of the group?
Collaboration with Other Groups	Does collaboration with other groups occur regularly and in ways that support the shared purpose of this group?	Is information obtained from collaboration with other groups documented and shared with members of the group (e.g., meeting minutes, update emails)?	Does collaboration with other groups create opportunities for members of the group to better achieve personal ambitions beyond the current project?

Table 6. Potential positive and negative evolutions of the target clinic using the trend analysis within the Prosocial Vision Planning Worksheet

Timescale	Positive Evolution	Negative Evolution
Current	First monthly check-in with staff, start Prosocial studies, review current handbook	Monthly check-ins either do not occur or go poorly, staff are communicating in ways that suggest burnout, low staff engagement in Prosocial process
4-8 months	Create training protocol, internal budget review, develop monthly staff meeting and training, start reworking handbook	Current staff do not choose to work here, staff are not taking professional development opportunities, no training or consultants in the system
12 months	Formalized training and feedback procedures in place, include a neurodiversity consultant inside training, embedding prosocial, create handbook for clinic	Center might close, possible loss of current staff and resources, burnout staff and students, toxic workplace culture, diminishing client care

Table 7. T-test results of items on the PGI-Beta

PGI-Beta Item	t	p-value
Shared Identity and Purpose	1.07	0.314
Equitable Distribution of Costs and Benefits	4.99	**0.001**
Fair and Inclusive Decision Making	5.62	**< 0.001**
Monitoring Agreed Upon Behaviors	8.01	**< 0.001**
Graduated Responding	4.93	**0.001**
Fair and Fast Conflict Resolution	7.95	**< 0.001**
Authority to Self-Govern	3.74	**0.005**
Collaboration with Other Groups	1.86	0.100
Performance	4.31	**0.002**
Information	5.77	**< 0.001**
Community	6.75	**< 0.001**

Note. Bolded items represent statistical significance.

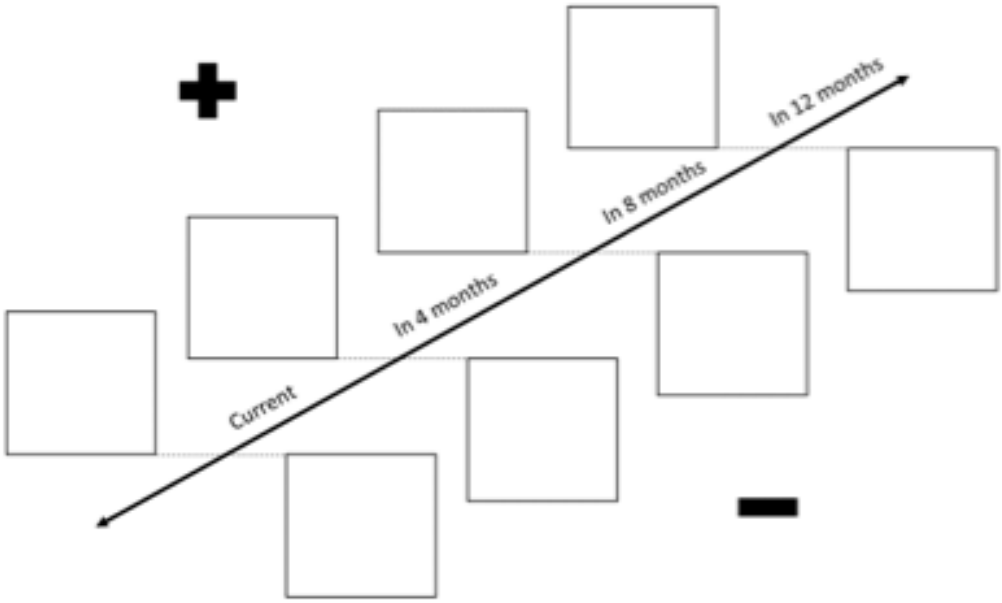

Figure 3. Trend analysis as used the in Prosocial Vision Planning Worksheet

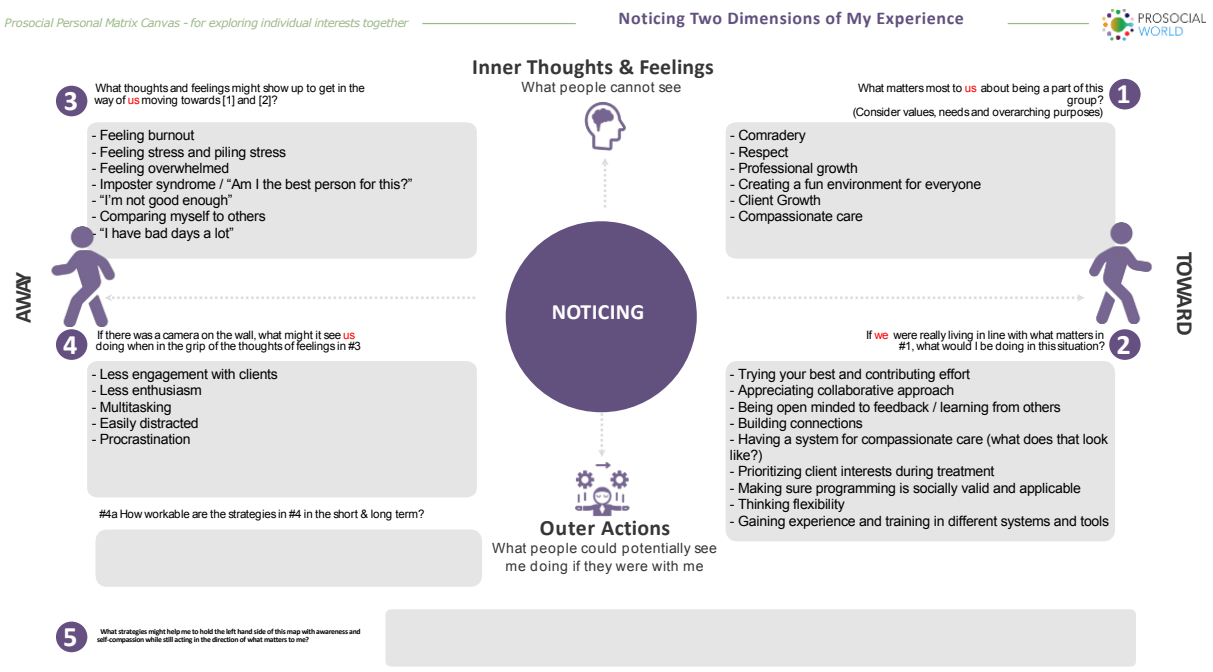

Figure 4. Collective Prosocial Matrix adapted from Prosocial World (2020) for the present study, implemented during session 1.

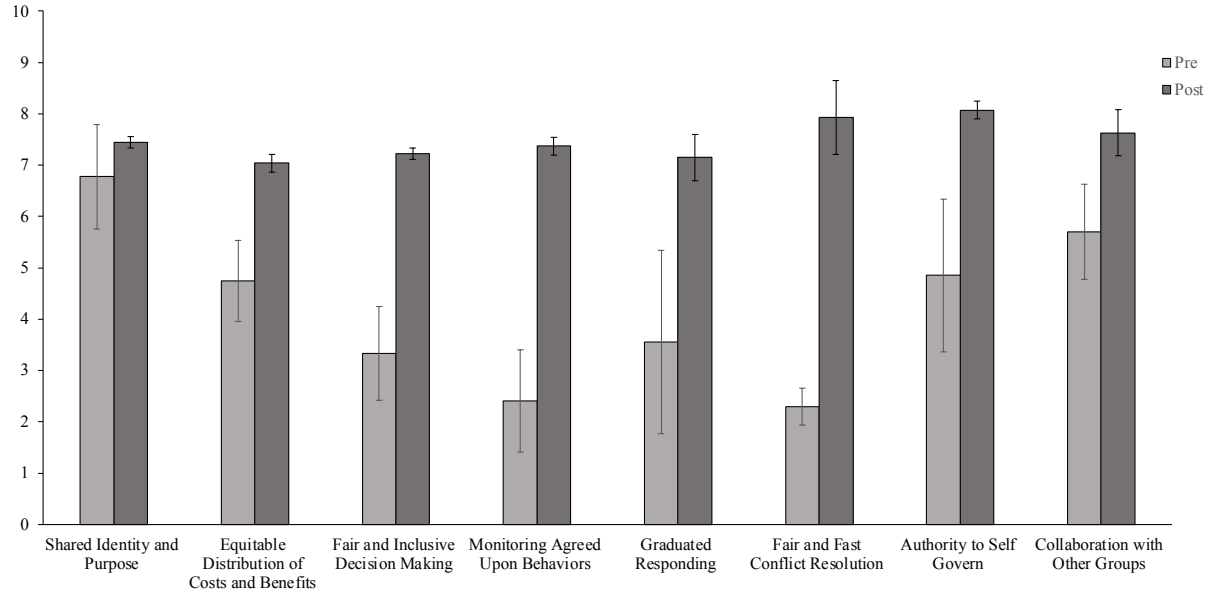

Figure 5. Results of each Core Design Principle from pre-test to posttest

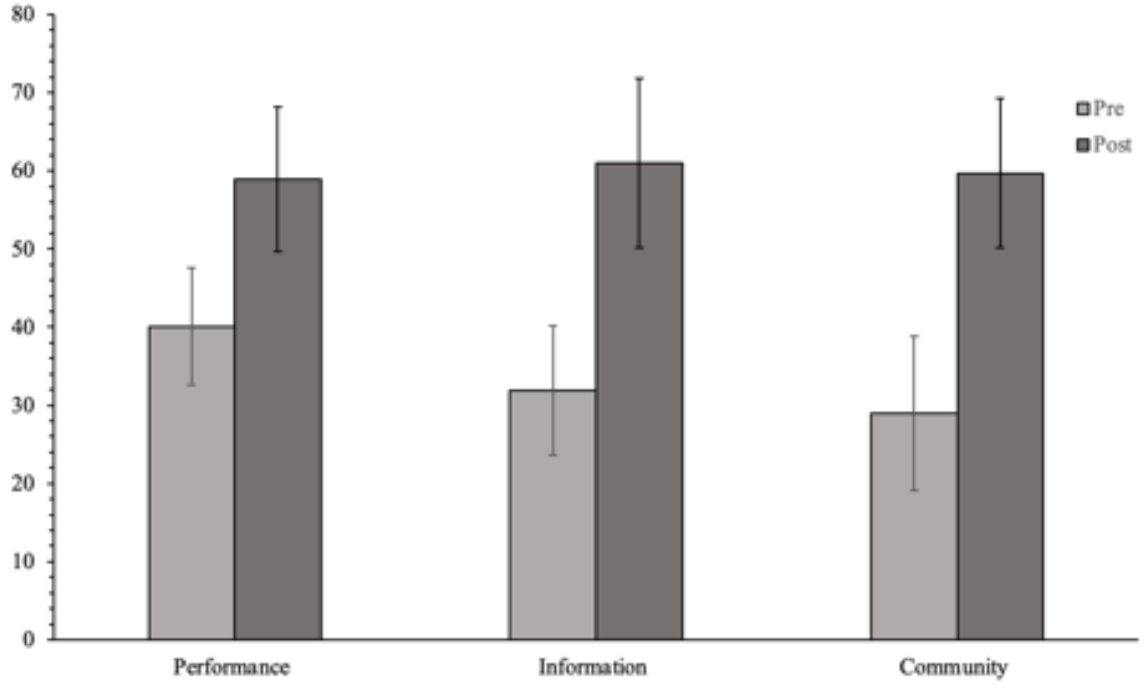

Figure 6. Pre-posttest results of the PIC analysis

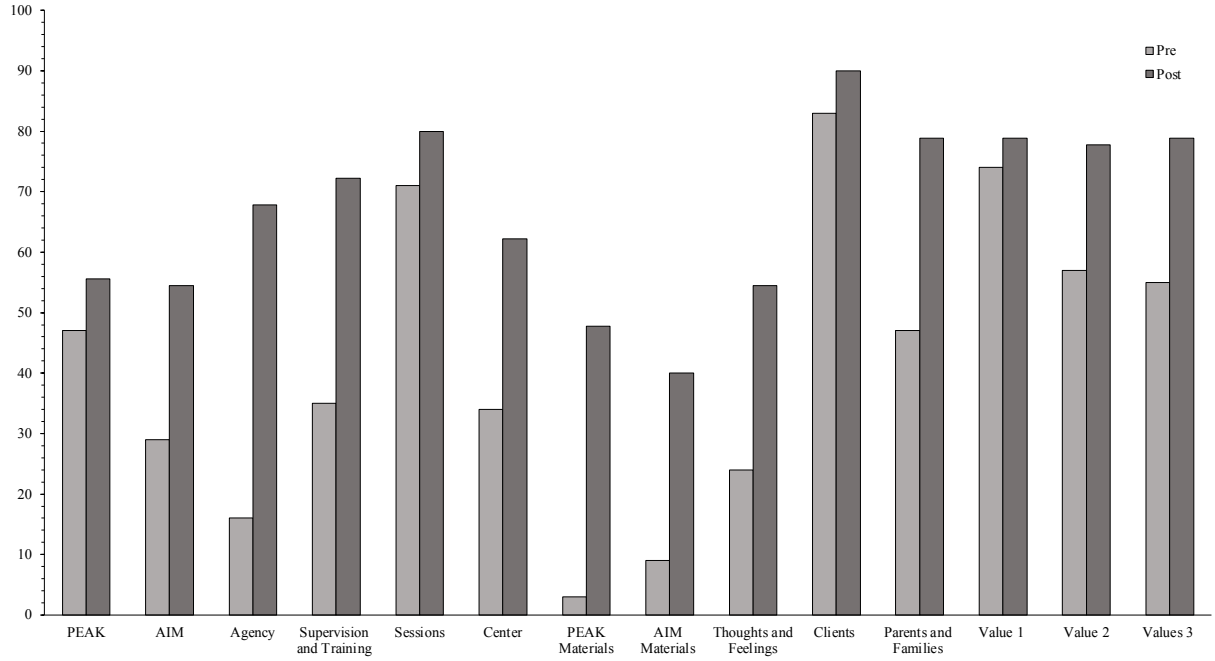

Figure 7. Affect pre-posttest across stimuli on the AWS.

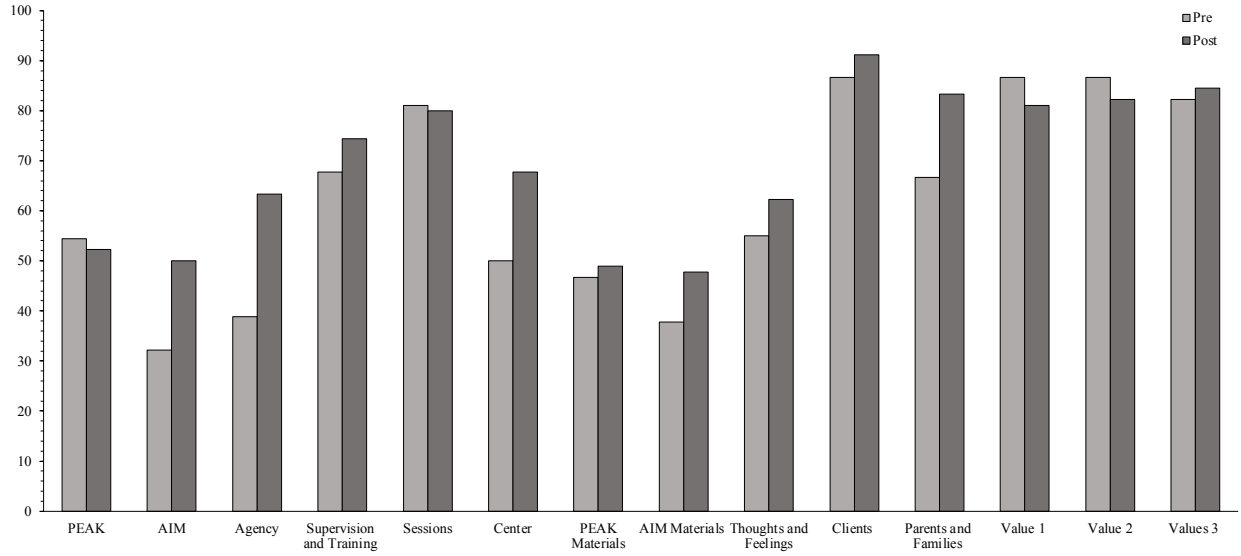

Figure 8. Willingness pre-posttest across stimuli on the AWS

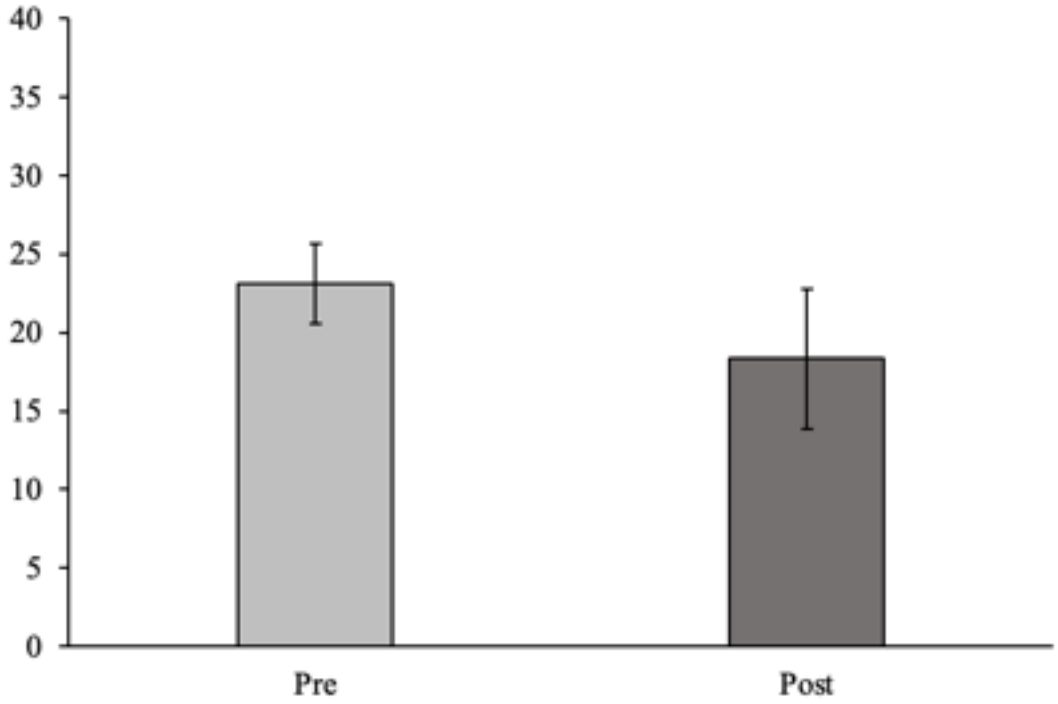

Figure 9. Pre-post outcomes of Perceived Stress Scale (PSS) collected before and after prosocial interventions.

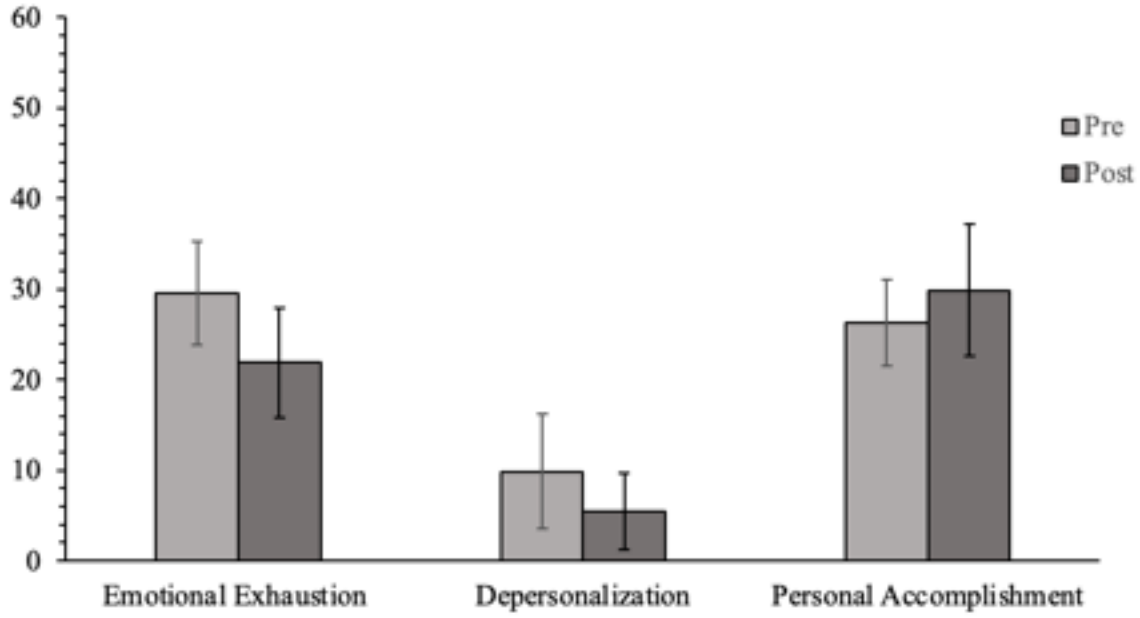

Figure 10. Pre-post outcomes of Maslach Burnout Inventory (MBI) collected before and after Prosocial interventions.

SUMMARY

Clinical ABA services require the support from research-based practices. Across settings in the ABA field, there remains a gap between research and practice (Baer et al., 1987). Smith (2013) reported the need for researchers to support effective practice in terms of creating interventions that produce socially important outcomes with autistic individuals. In order to produce these socially important outcomes, understanding the predictors that influence successful outcomes in autistic learners may be a necessary component. In the context of the first study, the empirical based modality that is the PEAK relational training system was evaluated in terms of items that may be predictive of change score. Predictors of change score may assist clinicians in leading more socially valid sessions; however, it may also be important to take variables that were not considered predictors of high change score into consideration. Within the first manuscript of this thesis, items such as number of treatment hours were not predictive of change score. Number of treatment hours is traditionally and clinically considered to promote more successful outcomes. Study 1 emphasizes how this might not be the case if ABA providers can utilize time spent in session to produce higher rates of mastered programming.

Efficient and effective clinical sessions are predominately controlled by the ABA service providers who implement these sessions. Direct care staff of autistic individuals often report frequent emotionally draining experiences which can recurrently lead to stress and burnout (Singh et al., 2020). High rates of burnout and low job satisfaction within ABA service providers may contribute to absenteeism, turnover, and diminished job performance (Plantiveau et al., 2018). If ABA service providers are continuously experiencing aversive thoughts, feelings, and interactions within the workplace, job performance may have a direct impact. This can be shown

through both affective functions of work-related stimuli and the willingness to engage in these experiences. Study 2 identifies ways in which workplace climate can be oriented towards more job-related positive experiences at both the individual and group level.

Results presented within this thesis are likely related due to the intersectional components maintained in each. In reference to Smith (2013), the PEAK relational training system is a research-based curriculum and assessment that is currently being used in many clinical settings to produce socially valid outcomes in terms of change scores. It appears; however, that the ABA service providers who are implementing these treatments are suffering psychologically. In order to maintain treatment quality at the clinical and organizational level, there needs to be systems in place that support the overall wellbeing of staff members. Future research may begin to explore the direct effects of overall workplace climate on PEAK scoring. We also must keep in mind that research does not end with these two manuscripts. In order to promote higher quality ABA services, we must continue to examine contextual contingences that may directly impact the success of learners.

ADDITIONAL REFERENCES

Association for Behavior Analysis International (ABAI). (2020). https://www.abainternational.org/welcome.aspx.

BACB. Behavior Analyst Certification Board. (2024b, June 14). https://www.bacb.com/

Baer, D. M., Wolf, M. M., & Risley, T. R. (1986). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 1,* 91-97.

Belisle, J., Dixon, M. R., Vickroy, S., Blecha, S., Zuch, C., Holtsman, L., (in prep). Predicting relational learning outcomes following PEAK instruction with autistic learners: a replication and extension.

Dixon, M. R. (2014). *The PEAK relational training system: direct training module.* Carbondale: Shawnee Scientific Press.

Dixon, M. R., Belisle, J., McKeel, A., Whiting, S., Speelman, R., Daar, J. H., & Rowsey, K. (2017). An internal and critical review of the Peak Relational Training System for children with autism and related intellectual disabilities: 2014–2017. *The Behavior Analyst*, *40*(2), 493–521. https://doi.org/10.1007/s40614-017-0119-4

Hume, K., Steinbrenner, J. R., Odom, S. L., Morin, K. L., Nowell, S. W., Tomaszewski, B., Szendrey, S., McIntyre, N. S., Yücesoy-Özkan, S., & Savage, M. N. (2021). Evidence-based practices for children, youth, and young adults with autism: Third generation review.

Journal of Autism and Developmental Disorders, *51*(11), 4013–4032. https://doi.org/10.1007/s10803-020-04844-2

Lang, R., Hancock, T. B., & Singh, N. N. (2016). Overview of early intensive behavioral intervention for children with autism. Early intervention for young children with autism spectrum disorder, 1-14.

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge university press.

Plantiveau, C., Dounavi, K., & Virués-Ortega, J. (2018). High levels of burnout among early-career board-certified behavior analysts with low collegial support in the work environment. *European Journal of Behavior Analysis*, *19*(2), 195–207. https://doi.org/10.1080/15021149.2018.1438339

Singh, N. N., Lancioni, G. E., Medvedev, O. N., Hwang, Y.-S., Myers, R. E., & Townshend, K. (2020). Using mindfulness to improve quality of life in caregivers of individuals with intellectual disabilities and autism spectrum disorder. *International Journal of Developmental Disabilities*, *66*(5), 370–380. https://doi.org/10.1080/20473869.2020.1827211

Slocum, T. A., Detrich, R., Wilczynski, S. M., Spencer, T. D., Lewis, T., & Wolfe, K. (2014). The evidence-based practice of Applied Behavior Analysis. *The Behavior Analyst*, *37*(1), 41–56. https://doi.org/10.1007/s40614-014-0005-2

Smith, T. (2013). What is evidence-based behavior analysis? *The Behavior Analyst, 36*, 7-33.

Sulek, R., Trembath, D., Paynter, J., Keen, D., & Simpson, K. (2017). Inconsistent staffing and its impact on service delivery in ASD early-intervention. *Research in Developmental Disabilities*, *63*, 18–27. https://doi.org/10.1016/j.ridd.2017.02.007

Townsend, D. B., Brothers, K. J., MacDuff, G. S., Freeman, A., Fry, C., Rozenblat, E., DeFeo, D., Budzinska, A., Ruta-Sominka, I., Birkan, B., Hall, L. J., Krantz, P. J., & McClannahan, L. E. (2023). Alliance for Scientific Autism Intervention: System components and outcome data from high-quality service delivery organizations. *Behavior Analysis in Practice*, *17*(2), 565–580. https://doi.org/10.1007/s40617-023-00898-7

Vickroy, S., Belisle, J., Campbell, M., Stemple, B., Schneider, L., & Dixon, M. R. (in prep). Utilizing prosocial to support positive workplace climate and performance in applied behavior analysis (ABA) services.

APPENDICES

Appendix A: Human Subjects IRB Approval Study 1

To:
Jordan Belisle
Psychology

RE: Notice of IRB Approval
Submission Type: Initial
Study #: IRB-FY2019-576
Study Title: Evaluating the Efficacy of the PEAK Relational Training System in Active Clinical Settings - Existing Data
Decision: Approved

Approval Date: March 18, 2019
Expiration Date: --

This submission has been approved by the Missouri State University Institutional Review Board (IRB) for the period indicated.

Federal regulations require that all research be reviewed at least annually. It is the Principal Investigator's responsibility to submit for renewal and obtain approval before the expiration date. You may not continue any research activity beyond the expiration date without IRB approval. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.

You are required to obtain IRB approval for any changes to any aspect of this study before they can be implemented. Should any adverse event or unanticipated problem involving risks to subjects or others occur it must be reported immediately to the IRB.

This study was reviewed in accordance with federal regulations governing human subjects research, including those found at 45 CFR 46 (Common Rule), 45 CFR 164 (HIPAA), 21 CFR 50 & 56 (FDA), and 40 CFR 26 (EPA), where applicable.

Appendix B: Human Subjects IRB Approval Study 2

To:
Jordan Belisle
Psychology
Dana Paliliunas

RE: Notice of IRB Approval
Submission Type: Initial
Study #: IRB-FY2023-276
Study Title: Using a Prosocial Framework to Train Staff to Implement ABA Programming
Decision: Approved

Approval Date: February 25, 2023

This submission has been approved by the Missouri State University Institutional Review Board (IRB). You are required to obtain IRB approval for any changes to any aspect of this study before they can be implemented. Should any adverse event or unanticipated problem involving risks to subjects or others occur it must be reported immediately to the IRB.

This study was reviewed in accordance with federal regulations governing human subjects research, including those found at 45 CFR 46 (Common Rule), 45 CFR 164 (HIPAA), 21 CFR 50 & 56 (FDA), and 40 CFR 26 (EPA), where applicable.