Exploring the Clinical Utility of a Stimulus Avoidance Assessment to Enhance a Relaxation Training Model

Alyssa N. Wilson · Erin M. Kasson · Olivia Gratz · John M. Guercio

Abstract The current case study explored the clinical utility of a stimulus avoidance assessment during relaxation training with an adult with an autism spectrum disorder. A multiple stimulus without replacement procedure was implemented with aversive events to identify an aversive situation hierarchy. Aversive events were then systematically presented during the analogue phase of relaxation training across low, medium, and highly aversive events. Results support a clinical utility of using stimulus assessments to inform relaxation training, while suggesting further modifications to relaxation training protocols for generalization of skills.

Keywords Relaxation training · Stimulus assessment · Autism · Behavior analysis

Integrative stress reduction techniques emphasize nonjudgmental focus on an individual's awareness of internal states and the relationship between internal experiences relative to environmental changes. Examples include mindfulness meditation (Kabat-Zinn et al. 1992), relaxation skills training

Implications for Practice
• Replication of previous research involving relaxation training to decrease aggression in populations with Autism
• Development and systematic implementation of an objective aversive hierarchy through the use of MSWO assessment procedures
• Training protocol to promote client self-regulation of precursory target states and responses
• Highlights the clinical utility of using stimulus avoidance assessments to inform practice

A. N. Wilson (✉) · E. M. Kasson · O. Gratz
School of Social Work, Saint Louis University, 3550 Lindell Blvd, St. Louis, MO, USA
e-mail: awilso95@slu.edu

J. M. Guercio
AWS/Benchmark Human Services, St. Louis, MO, USA

(Manzoni et al. 2008), and a combination of mindfulness-based self-control interventions (Singh et al. 2003). These approaches can reduce physical aggression in individuals diagnosed with autism spectrum disorder (Singh et al. 2011) and intellectual disabilities (Singh et al. 2003).

There is currently a substantial body of research demonstrating behavior change following informally developed graduated exposure interventions (Hayes 2004) and mindfulness-based relaxation training (see Baer 2003 for review). However, little is known about the clinical utility of using in vivo (or analogue) exposure during relaxation training for promoting the generalization of skills. Similarly, no research has been conducted to date that has used a systematic assessment to identify antecedents that evoke problem behavior. While preference (DeLeon and Iwata 1996), reinforcer (Northup et al. 1996) and punisher assessments (Fisher et al. 1994) are common behavior analytic assessments useful for informing treatment; no research has been conducted using stimulus avoidance assessments to inform antecedent-based treatment interventions. Therefore, the purpose of the current case study was to determine (a) if a stimulus avoidance assessment would be effective in identifying a hierarchy of events that evoke problem behavior, (b) the extent to which the identified stimuli would assist with skill building during relaxation training, and (c) the extent that trained skills would persist during naturalistic (or unpredicted) events.

Chris was a 29-year-old Caucasian male with autism receiving in home 24 h direct care services from a behavioral service agency in the Midwest. Chris was ambulatory and sporadically participated in daily living activities with staff assistance. He was prescribed trileptal and propranolol for his behavioral compulsions and outbursts throughout the duration of the study. Behavior analytic sessions were conducted by the first and second authors one to two times a week for 5 months. Problem behaviors were identified by the agency as follows: verbal aggression (any instance of cursing, threats to harm himself or others, and sexual comments)

and physical aggression (any attempt to or success at throwing items toward others, hitting, slapping, punching, pushing, pinching, spitting, or biting others). Indirect and direct functional behavior assessments were conducted and suggested that both verbal and physical aggression were maintained by access to escape.

A multiple stimulus without replacement (MSWO; DeLeon and Iwata 1996) procedure was used to develop a hierarchy of aversive events. Twelve aversive events were derived from direct observation and staff reports and were believed to evoke problem behaviors. Chris's selections were averaged and categorized into high, medium, and low aversive events with four events comprising each category (see Fig. 1).

The relaxation training model was adapted from Singh et al. (2003). During the relative baseline condition, Chris was read the following task analysis of six steps to complete the relaxation exercise as he thought of an occasioning event: (a) "Stand naturally with the soles of your feet flat on the floor. If you are sitting, sit comfortably with the soles of your feet flat on the floor," (b) "Breathe naturally, and do nothing," (c) "Think about what happened to make you angry," (d) "Now shift all of your attention to the soles of your feet," (e) "Slowly, move your toes and feel your shoes covering your feet, the texture of your socks, the arches of your feet, your heels against the back of your shoes," and (f) "Keep breathing naturally and focus on the soles of your feet until you feel calm." During analogue training, Chris was directly trained on how to complete the first two steps using modeling and feedback as he thought of an occasioning event. Low, medium, and high conditions were systematically varied. Analogue conditions consisted of pre-instruction related to an upcoming occasioning event, implementing this event, and Chris completing the steps of the relaxation exercises. In order to promote generalization to in situ events, pre-instructed events implemented in unpredictable ways (e.g., different stimuli than predicted, Chris was unable to see the event occurring,

implementing before Chris was ready or after it was anticipated) were interspersed throughout the session.

During analogue exposure, Chris selected an event from an array of three, and the researcher presented the selected event to allow Chris an opportunity to rehearse the relaxation skills. No prompts were provided during these sessions, and Chris's behaviors were scored similarly to the training phase. Events categorized as "low" were implemented first, and after Chris demonstrated 80 % accuracy, "medium" events were presented. After Chris demonstrated consistent accuracy at or above 80 % correct across "medium" and "low" events, "high" events were presented. Generalization probes occurred after Chris demonstrated mastery criterion. During generalization probes, similar events from mastered categories were presented without Chris's awareness (e.g., the researcher engaged in the aversive event without first allowing Chris to choose the event or informing him that the event was about to happen).

Figure 2 represents the percentage of steps completed during each relaxation exercise. Aversive events are differentiated across low, medium, high, and unpredicted generalization probes. During the relative baseline condition, responding varied during but 100 % correct responding in session 3 indicated that Chris could perform this skill with only verbal instruction. During training, Chris performed all steps with 100 % accuracy. During analogue sessions, Chris performed the relaxation skills with higher accuracy in the presence of low and medium aversive events. Highly aversive events occasioned lower and more varied percentages of skill accuracy. The skill accuracy for high aversive events ranged from 0 to 100 %, with an average accuracy of 53.3 %. While Chris eventually engaged in the required skills with the highly aversive events with 67 % accuracy, the same results did not emerge for the unpredicted events. The skill accuracy for unpredicted events ranged from 0 to 100 %, with an average accuracy percentage of 47 %.

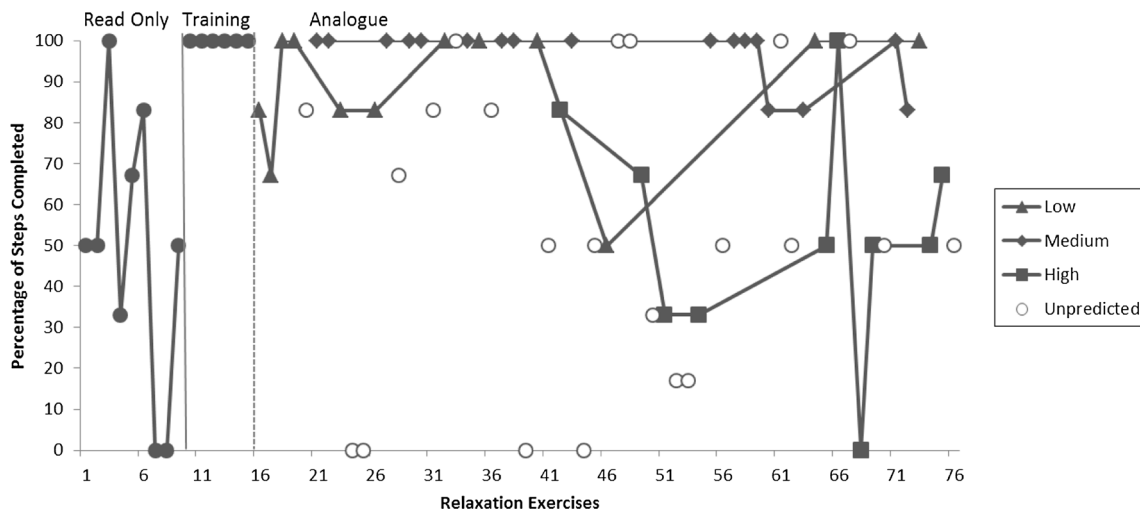Fig. 1 MSWO stimulus avoidance assessment outcomes
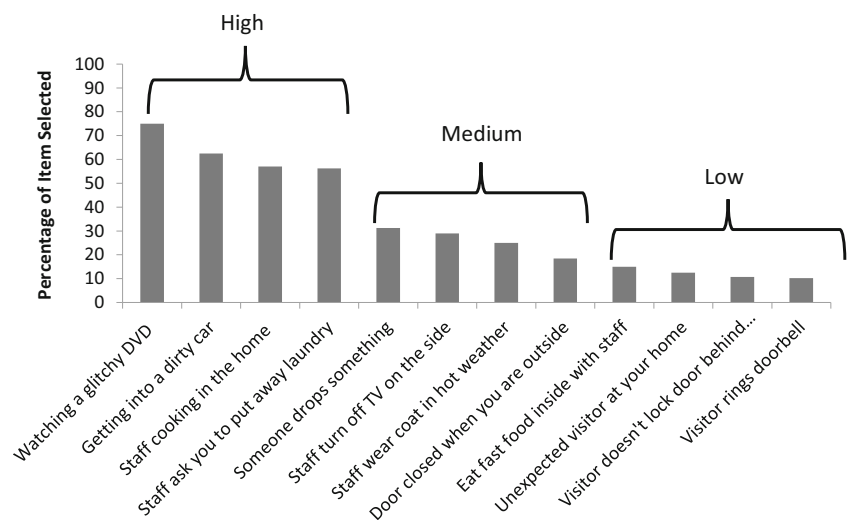
Fig. 2 Percentage of relaxation steps completed across conditions

Despite the varied outcomes during analogue sessions, Chris's problem behaviors as reported by direct care staff decreased overtime (see Fig. 3). The findings of the present case study replicate previous research on relaxation training (e.g., Singh et al. 2003), as evident by the overall decrease of problem behavior following relaxation training. Additionally, the current study highlights the potential clinical utility of

stimulus avoidance assessments to inform relaxation training. While relaxation skills maintained across low, medium, and high aversive events, minimal correct responding occurred during generalization probes.

One notable limitation of the study is the absence of treatment fidelity checks and limited interobserver agreement observations. While both direct care staff and researchers were

Fig. 3 Weekly frequency of verbal aggression (*top panel*) and physical aggression (*bottom panel*) as reported by direct care staff
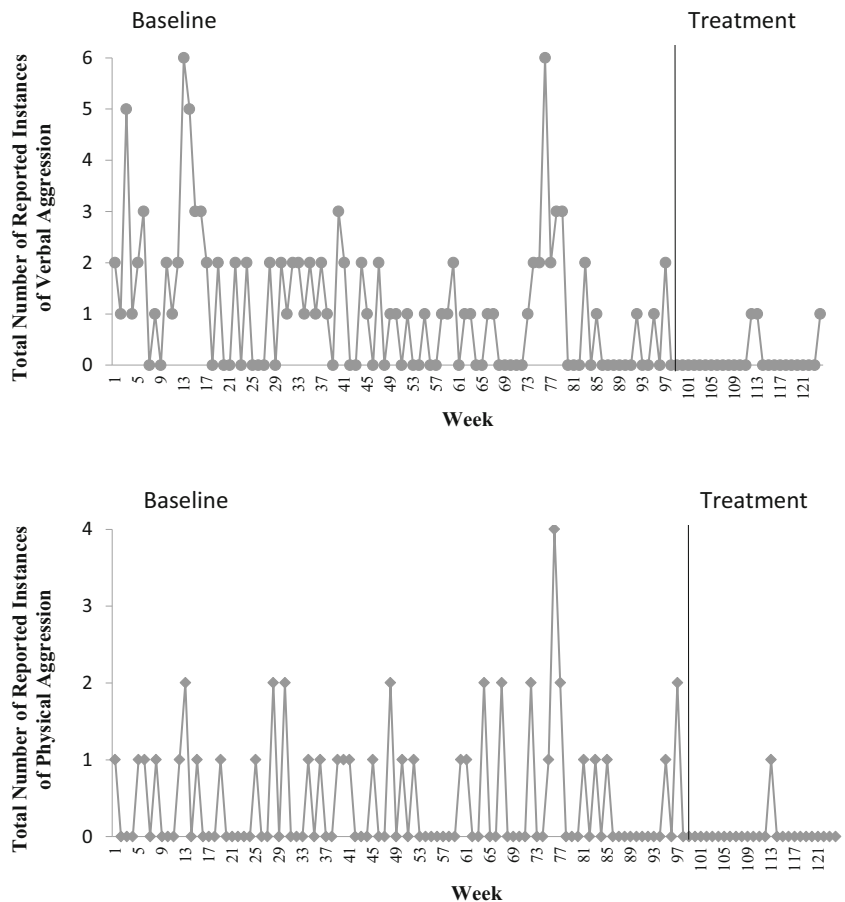
trained to implement treatment and collect data, the extent to which the treatment fidelity was consistent throughout the study is unknown. Another limitation was the selection-based method used for the stimulus assessment, as Chris was not required to experience each event. Further, it is unclear if the unpredicted probes during analogue sessions suggest a weakness of training or the need for additional pre-instruction sessions.

Subsequent research should control for these limitations by including treatment fidelity checks and increased inter-observer agreement observations, to ensure the validity of treatment delivery. Similarly, future research should explore the utility of unpredicted probes during each phase of pre-instruction. Future research should also implement forced choice requirements when evaluating stimulus assessments on antecedents that occasion problem behavior. Further, plans for generalization should include incorporating other idiosyncratic occasioning situations within client's aversive hierarchy as previous items are mastered. Perhaps, the greatest benefit of using relaxation interventions over behavioral medication or consequence procedures is in the development of self-monitoring skills and the auxiliary regulation skills (Baer 2003). However, the results of the current study suggest that more information is needed to bridge the gap between training and natural environmental settings.

Method

Chris was an adult male residing alone in a community home who was referred for additional behavioral services. Sessions took place within the home, and the location varied depending on the client preference and the occasioning stimuli chosen (e.g., kitchen, living room, back porch). Sessions were approximately 1 h in length and took place one to two times weekly for 5 months. Clinicians used pencil and paper data sheets to record outcomes during both MSWO exemplars and the number of relaxation exercise steps performed independently out of the total number of steps during each trial.

A MSWO procedure was used to assess client's relative aversion to discrete activities and situations. Each item was textually represented on a card (3 in. × 3 in.), and a field of 12 cards was presented to the client. Clinicians asked him to choose the "most challenging situation." Once chosen, the card was removed from the field, and the client was asked to choose the next "most challenging situation." This procedure was repeated 1 week following the initial assessment to increase retest reliability in the developed aversive hierarchy. The resulting hierarchy consisted of three levels (e.g., low, medium, high) each containing four aversive items.

An additive ABC embedded multielement probe design was used to evaluate independent use of relaxation skills. A relative baseline condition consisted of the clinician reading the six steps of the relaxation exercise (Singh et al. 2003), without providing prompts or feedback. During training, the clinician provided ongoing modeling and feedback as the client covertly visualized an occasioning event and completed the relaxation exercise.

During the analogue sessions, a field of four aversive stimuli from the MSWO procedures was presented to the client, from which he was instructed to select one event. The clinician would then initiate the chosen predicted aversive situation and take data on client's independent use of the relaxation exercise steps. No feedback was given during this phase; however, the client was asked to tact what he had done and his level of anxiety after each exercise. Aversive situations from the hierarchy were later implemented in unpredicted ways (e.g., before prepared or after anticipated, with different stimuli) in an attempt to increase the generalization of the relaxation skills to naturalistic situations. After completion of relaxation exercises, the clinician engaged in a discussion of preferred topics with Chris until the end of each session.

The primary dependent measure was percent of relaxation exercise steps completed. Percent correct was calculated by dividing the number of steps displayed independently by the total number of steps (i.e., six). A second observer collected data for over 20 % of analogue sessions. Interobserver agreement (IOA) was calculated dividing the total number of steps in agreement by the total number of steps, multiplied by 100 %. Agreement on this measure was 100 %.

A secondary dependent measure was the total number of occurrences of verbal and physical aggression as reported weekly by direct care staff. Chris displayed infrequent yet intense aggressive behavior directed toward his staff members, therapists, and family. Staff completed competency training on data collection and job duties (e.g., intervening with problem behaviors, daily living activities, etc.) and were not informed about the goals or procedures of the relaxation training. Each staff completed data collection forms during each shift. Interobserver reliability was computed by comparing the number of agreements on the forms and dividing them by the number of agreements and disagreements that were possible and multiplying this number by 100. These reliability assessments were conducted on 35 % of the weeks that were involved in the baseline and intervention phases of the study and averaged 98 % (range=97–100 %).

References

Baer. (2003). Mindfulness training as a clinical intervention: a conceptual and empirical review. *Clinical Psychology: Science and Practice, 10*, 125–143.

DeLeon, I. G., & Iwata, B. A. (1996). Evaluation of a multiple-stimulus presentation format for assessing reinforcer preferences. *Journal of Applied Behavior Analysis, 29*, 519–533.

Fisher, W., Piazza, C. C., Bowman, L. G., Hagopian, L. P., & Langdon, N. A. (1994). Empirically derived consequences: a data-based method for prescribing treatments for destructive behavior. *Research in Developmental Disabilities, 15*(2), 133–149.

Hayes, S. C. (2004). Acceptance and commitment therapy, relational frame theory, and the third wave of behavioral and cognitive therapies. *Behavior Therapy, 35*, 639–665.

Kabat-Zinn, J., Massion, A. O., Kristeller, J., Peterson, L. G., Fletcher, K. E., Pbert, L., et al. (1992). Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders. *American Journal of Psychiatry, 149*, 936–943.

Manzoni, G. M., Pagnini, F., Castelnuovo, G., & Molinari, E. (2008). Relaxation training for anxiety: a ten-year systematic review with meta-analysis. *BMC Psychiatry, 8*, 41.

Northup, J., George, T., Jones, K., Broussard, C., & Vollmer, T. R. (1996). A comparison of reinforcer assessment methods: the utility of verbal and pictorial choice procedures. *Journal of Applied Behavior Analysis, 29*, 201–212.

Singh, N. N., Wahler, G. R., Adkins, A. D., & Myers, R. E. (2003). Soles of the feet: a mindfulness based self-control intervention for aggression by an individual with mild mental retardation and mental illness. *Research in Developmental Disabilities, 24*(3), 158–169.

Singh, N. N., Lancioni, G. E., Singh, A. D. A., Winton, A. S. W., Singh, A. N. A., & Singh, J. (2011). Adolescents with Asperger syndrome can use a mindfulness-based strategy to control their aggressive behavior. *Research in Autism Spectrum Disorders, 5*(3), 1103–1109.