

Effects of a Mindfulness Training Program on Behaviour Intervention Procedural Fidelity

By

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Abstract

Autism Spectrum Disorder (ASD) is a lifelong developmental disability that is characterized by challenges with social communication and social interaction as well as repetitive behaviours, interests, or activities (American Psychiatric Association, 2013). An effective and well documented instructional approach for children with ASD is Discrete Trials Teaching (DTT). Since procedural fidelity is related to client outcomes (e.g., Noell, Gresham, & Gansle, 2002; Rhymer, Evans-Hampton, McCurdy, & Watson, 2002; Wilder, Atwell, & Wine, 2006), it is important to evaluate the accuracy with which staff conduct DTT sessions. Mindfulness training has been applied to improve attention, reflection, and skillful responding (Bishop et al., 2004) and has been proposed as a method to improve patient safety through adherence to prescribed procedures (Epstein, 1999; Pezzolesi, Ghaleb, Kostrzewski, & Dhillon, 2013). This study measured the effect of a brief mindfulness training program on procedural fidelity of staff conducting DTT with children with ASD. Three autism tutors from St. Amant Autism Programs participated. In a multiple-baseline design across participants, the principal investigator and a trained research assistant directly observed the accuracy with which tutors delivered prescribed DTT steps. DTT procedural fidelity increased during training for all participants. Specifically, during the baseline phase, procedural fidelity for Participants 1, 2, and 3 averaged 81%, 69%, and 70%, respectively. During the training phase, procedural fidelity increased to 86%, 83%, and 82%, respectively. Procedural fidelity was maintained at a high level for 2 of the 3 participants who were available at Follow-up.

Keywords: Autism Spectrum Disorder, Discrete Trial Teaching, procedural fidelity, Mindfulness, Autism Tutors.

Effects of a Mindfulness Training Program on Behaviour Intervention Procedural Fidelity

Autism Spectrum Disorder (ASD) is a developmental disorder characterized by deficits in social communication and interaction as well as restricted, repetitive patterns of behaviour (American Psychiatric Association, 2013). A well-established and effective treatment for children with ASD is Early Intensive Behavioural Intervention (EIBI) (Matson & Konst, 2013; National Autism Center, 2009). The main teaching method of EIBI is Discrete-Trial Training (DTT; also called Discrete-Trials Teaching). This procedure involves structuring the environment to create learning opportunities (Lang, Hancock, & Singh, 2016) with the goal of teaching new behaviours and establishing new discriminations as well as other important developmental skills such as imitation, receptive and expressive language, conversation, sentences, grammar, and syntax (Smith, 2001). DTT can significantly improve language, adaptive skills, and social skills, and can reduce autism symptoms, problem behaviours, and the need for academic support (Lang et al., 2016).

DTT is most effective when the prescribed steps are followed accurately, that is, when it has high procedural fidelity (e.g., Noell, Gresham, & Gansle, 2002; Rhymer, Evans-Hampton, McCurdy, & Watson, 2002; Wilder, Atwell, & Wine, 2006). Various strategies have been used to improve procedural fidelity of DTT sessions, including video-modeling, performance feedback, feedback plus demonstration, and self-monitoring, among others (Belfiore, Fritts, & Herman, 2008; Catania, Almeida, Liu-Constant, & Reed, 2009; Digennaro-Reed, Coddling, Catania, & Maguire, 2010; Fazzio, Martin, Arnal, & Yu, 2009). However, to date, there is no research on the effects of a mindfulness intervention on DTT procedural fidelity.

Mindfulness is a process that involves being attentive and aware, in the present moment, and nonjudgmental. Mindfulness promotes attention, reflection, and skilful responding and is

associated with a decrease in distress and maladaptive behaviour (Bishop et al., 2004). Given these benefits, mindfulness in healthcare settings has been proposed as a strategy for improving patient care through adherence to prescribed procedures (Epstein, 1999; Pezzolesi et al., 2013). Therefore, the purpose of this study was to evaluate the effectiveness of mindfulness training on procedural fidelity of DTT sessions conducted by autism tutors from St. Amant Autism Programs.

Autism Spectrum Disorder (ASD)

ASD occurs in 1 in 68 children aged 8 and is 4.5 times more common in boys than in girls (Centers for Disease Control and Prevention, 2015). The diagnosis of ASD includes impairments in two distinct areas: deficits in social communication and interaction and restricted, repetitive behaviour patterns, interests, or activities. Persons with deficits in social communication and interaction present with: (a) deficits in social-emotional reciprocity, such as failure to maintain a normal conversation, (b) deficits in nonverbal behaviours used to communicate in social interactions, such as poor to absent verbal and nonverbal communication and (c) deficits in developing, maintaining, and understanding relationships, such as difficulties in forming peer relationships. Individuals with restricted, repetitive behaviour patterns, interests, or activities present with: (a) repetitive corporal movements, such as hand flapping, (b) insistence on uniformity, strict adherence to routines, or ritualized patterns of either verbal or nonverbal behaviour, (c) highly restricted and fixated interests that are abnormally intense, such as obsession with unusual objects, and (d) hyper- or hyporeactivity to sensory input or unusual interests in sensory aspects of the environment, such as a negative reaction to certain sounds or textures (American Psychiatric Association, 2013).

Early Intensive Behavioural Intervention (EIBI)

EIBI is a behavioural intervention for children with ASD and is based on the principles and procedures of Applied Behaviour Analysis (ABA; Reichow, 2012). EIBI aims to establish or increase important developmental skills and decrease the occurrence of challenging behaviours (Eikeseth, Smith, Jahr, & Eldevik, 2007). It is typically an intensive treatment program (e.g., up to 40 hr per week) that is delivered over a period of two or more years (Lovaas, 1987) and involves a therapist working one-on-one with a child using a Discrete-Trials Teaching format (described on pages 10-11 of this paper; Howlin, Magiati, & Charman, 2009).

In 1987, Lovaas reported the findings of one of the first outcome studies of EIBI that examined the effects of an intensive behavioural treatment on children with ASD below the age of 4 years (Lovaas, 1987). Lovaas hypothesized that placing a child with ASD in an intensive learning environment would enable them to meet the levels of their typically developing first grade peers. Children with ASD who participated in the study were assigned to one of three groups: an intensive-treatment experimental group (> 40 hr per week), a minimal treatment control group (\leq 10 hr per week), or a control group that received no treatment. Comparisons of pre- and post-treatment measures revealed that 47% of participants in the intensive treatment group successfully completed regular first grade in a public school and obtained average IQ scores. In contrast, only 2% of participants in the control groups demonstrated comparable gains. Furthermore, post-treatment measures revealed a significant difference in favor of participants in the intensive treatment group in comparison to participants in the control groups. Improvements found in participants from the intensive treatment group were maintained (Lovaas, 1987).

Since then, many studies demonstrating the effectiveness of EIBI in children with ASD have been conducted (e.g., Cohen, Amerine-Dickens, & Smith, 2006; Eikeseth, Smith, Jahr, &

Eldevik, 2002, 2007; Eldevik, Eikeseth, Jahr, & Smith, 2007; Howard, Sparkman, Cohen, Green, & Stanislaw, 2006; Magiati, Charman, & Howlin, 2007; McEachin, Smith, & Ivar Lovaas, 1993; Perry et al., 2008; Remington et al., 2007; Sallows & Graupner, 2005; Smith, Groen, & Wynn, 2000). More recently, Howlin et al. (2009) conducted a systematic review of EIBI for children with ASD. A total of 11 studies were included in the review. In almost all studies, baseline IQ measures did not significantly differ between participants from EIBI and comparison groups. However, at follow-up, significant differences in IQ between the two groups were found in nine of the 11 studies. Mean IQ scores in the EIBI groups increased in the 11 studies included in this review. Likewise, improvements in language scores were found as measured by the Vineland Adaptive Behaviour Scales (VABS). Notably, there was variability in effects in each individual participant compared to group findings. In almost all studies, individual improvements were not significant for all participants and some did not make any progress (Howlin et al., 2009).

Discrete-Trials Teaching (DTT)

DTT is a teaching component of EIBI that involves structuring the environment to create learning opportunities. It requires three essential components: the presentation of an antecedent, a response from the trainee, and the delivery of a consequence (Lang et al., 2016). A single discrete trial consists of a discriminative stimulus, where the trainer gives an instruction or poses a question to the learner (e.g., “touch your nose”, “What is your name?”). A prompt is then used to guide the learner to respond correctly to the cue (e.g., the trainer may model the correct response by touching his/her nose, or use physical guidance by taking the child’s hand and guiding it to his/her nose). Once the frequency of correct responding increases, prompting is gradually faded until the learner responds independently. Immediately following a correct response, the trainer provides positive reinforcement (e.g., praise, high five, food, access to a

preferred item, etc.). When the learner responds incorrectly, the trainer says “No”, looks in another direction, and removes all teaching materials. DTT sessions can last anywhere from a few minutes to many hours per day, depending on the child’s treatment plan (Smith, 2001). According to the National Autism Center’s National Standards Project (2009), DTT is identified as an *Established Treatment* for individuals with ASD (National Autism Center, 2009).

Procedural Fidelity

Procedural fidelity, also called treatment fidelity, refers to the extent to which a treatment protocol is carried out as planned (Cooper, Heron, & Heward, 2007). Treatment fidelity is an important determinant of client outcomes (e.g., Noell, Gresham, & Gansle, 2002; Rhymer, Evans-Hampton, McCurdy, & Watson, 2002; Wilder, Atwell, & Wine, 2006). For example, Reed, Reed, Baez, and Maguire (2011) evaluated the effects of the level of treatment integrity of DTT sessions on participants’ performance on a receptive identification task of arbitrary shapes. During baseline, the experimenter prompted the participants to find a certain shape. Following the participant’s response, no consequence was delivered. The next phase involved varying the degree of treatment fidelity by implementing different consequences. As in the baseline phase, the experimenter delivered a prompt to find a shape. Reinforcement was applied for unprompted correct responses and an error correction procedure was used for incorrect responding. Next, DTT sessions were conducted with either 100% integrity, 50% integrity, or 0% integrity. During the 100% integrity condition, no commission errors were committed (i.e., no incorrect responses were reinforced before applying the error-correction procedure). During the 50% integrity condition, every second incorrect response was reinforced. Finally, during the 0% integrity condition, all incorrect responses were reinforced before an error-correction procedure was conducted.

All participants showed low levels of correct responding during baseline. However, when levels of treatment integrity were varied, participants' performance also varied. Shortly following the manipulation of treatment integrity levels, all participants demonstrated higher performance accuracy when 100% integrity was implemented. When 50% and 0% integrity were implemented, two of the three participants demonstrated low performance accuracy. In addition, these two participants' accuracy was similar between the two integrity conditions (Reed et al., 2011). Thus, high levels of treatment integrity are vital in ensuring skill acquisition.

Discrete-Trials Teaching Evaluation Form (DTTEF). Given that DTT is a central feature of EIBI, there is a need to reliably assess DTT treatment quality delivered by instructors (Babel, Martin, Fazio, Arnal, & Thomson, 2008). In order to accomplish this, Fazio, Arnal, and Martin created the Discrete-Trials Teaching Evaluation Form (DTTEF) in 2007 (Fazio, Arnal, & Martin, 2007). The DTTEF was designed in two phases. During the first phase, Fazio et al. (2007) observed several DTT sessions conducted by staff of the Autism Programs at St. Amant, a government-funded program in Manitoba for EIBI services. The authors then designed a 19-component checklist to assess the accuracy with which DTT sessions are conducted. During the second phase, Fazio et al. (2007) reviewed published studies that attempted to teach individuals to implement DTT, and examined the task analyses that were used. Based on the reviewed studies, two components were added to the DTTEF to create a 21-component evaluation form (Babel et al., 2008).

Babel et al. (2008) evaluated the reliability and validity of the DTTEF. First, three DTT experts completed a questionnaire to assess the face validity of the DTTEF (i.e., the importance of each component of the DTTEF). Next, two trained observers scored a DTT session and interobserver reliability (IOR) was assessed before and after the administration of DTT training.

Lastly, the DTTEF was evaluated by comparing the DTTEF scores obtained by the trainees to experts' ratings of these trainees' DTT performances. Results were that each component of the DTTEF was rated as important, that the two trained observers obtained IOR scores of 90% or higher for the majority of sessions, that there was a significant difference between the pre- and post- DTT training scores, and that there was high agreement between these comparisons.

Therefore, this study has demonstrated that the DTTEF has strong face validity, high reliability, and high concurrent validity (Babel et al., 2008) making it an appropriate tool to measure DTT procedural fidelity for the purpose of this study.

Methods to improve DTT procedural fidelity. DTT procedural fidelity can be improved using video modeling (Catania et al., 2009), video modeling plus performance feedback (Digennaro-Reed et al., 2010), verbal feedback plus demonstrations (Fazzio et al., 2009), and video self-monitoring (Belfiore et al., 2008). All of the above studies used a multiple baseline design and showed that each method to improve DTT procedural fidelity was effective in increasing performance accuracy compared to baseline.

Studies of methods to improve DTT procedural fidelity have rarely taken into account the possible impact of distractions present in a classroom setting. For example, all but one study (Digennaro-Reed et al., 2010) among those cited above took place in a separate dedicated room or at the child's home. Thus, a certain level of control of extraneous variables was present. However, in the real world, autism tutors conduct DTT in classroom settings where they are surrounded by many children and other tutors. This means that tutors must work amidst many distractions that could affect their concentration on the task at hand.

Moreover, high levels of stress and burnout are common in staff working with individuals with intellectual and developmental disabilities (Skirrow & Hatton, 2007). The training strategies

mentioned above are not designed to reduce the effect of distractions on the tutor or to improve well-being, but training in mindfulness has the potential to do so (Gilmartin, 2017). Given the limitations of prior training approaches, it is worth exploring the effects of a mindfulness intervention on autism tutors' DTT performance accuracy.

Mindfulness

Mindfulness is a practice rooted in the Buddhist tradition, where present-moment awareness and attention are cultivated, in large part through meditation (Brown & Ryan, 2003). Mindfulness can be defined as “Paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally” (Kabat-Zinn, 2005, p. 4). Mindfulness training typically involves highly structured practices such as body scans, and breath meditation. Attention is deliberately and nonjudgmentally directed towards present-moment experiences such as physiological sensations, cognitions, and emotional states (Taylor et al., 2016).

Mindfulness interventions are effective in increasing well-being (Keng, Smoski, & Robins, 2011; Shapiro, Oman, Thoresen, Plante, & Flinders, 2008). They have been applied to improve attention, reflection, and skillful responding, all of which may lead to decreased distress and maladaptive behaviour (Bishop et al., 2004). A research literature review on mindfulness interventions for clinical populations (Baer, 2003) found that further benefits have also been demonstrated for chronic pain sufferers (e.g., Kabat-Zinn, 1985; Kabat-Zinn, Lipworth, Burncy, & Sellers, 1986; Kabat-Zinn, 1982), anxiety, eating, and depressive disorders (e.g., Kabat-Zinn, 1992; Kristeller & Hallett, 1999; Teasdale, 2000), and other medical disorders such as psoriasis and mood disturbance and stress symptoms in cancer patients (e.g., Kabat-Zinn, 1998; Speca, Carlson, Goodey, & Angen, 2000).

Mindfulness and procedural fidelity. As previously mentioned, mindfulness involves paying attention to the present moment, and procedural fidelity requires taking correct action at the right times (sometimes under challenging or distracting circumstances). It is therefore plausible that mindfulness training may promote procedural fidelity. Indeed, developing attentiveness and vigilance has been identified as an important part of reducing medical errors (Parnes et al., 2007), and mindfulness training in healthcare settings has been proposed and recommended for future research as a method to improve patient safety through adherence to prescribed procedures (Epstein, 1999; Pezzolesi et al., 2013).

Mindfulness exercises can decrease the occurrence of medication administration errors (MAEs). Durham et al. (2016) evaluated the effectiveness of a medication safety pilot program on Registered Nurses' (RNs) sensitivity to error risk, error interception, compliance with recommended behaviours, and MAEs. A training program was developed that ran on an acute care unit and in the ICU and involved a presentation on safety, a simulation of medication administration, and a brief mindfulness meditation exercise to promote awareness prior to and during medication administration and interruptions. A medication administration checklist was developed for the RNs that included a mindfulness strategy. For example, the first step involved stopping and focusing on one breath before starting the medication administration process. The next step was a prompt to open the electronic medical record (EMR). The third step involved verifying the five rights of the patient and then removing the medications for one patient while being aware and not doing anything else. This mindfulness meditation exercise was repeated upon entering the patient's room.

Awareness, behaviours, and error outcomes improved following the training program. Specifically, 99% of RNs reported an increase in awareness of error risk, 61% reported

incorporation of the meditation exercise in their practice, and changes in behaviours were noted. Moreover, strategies to intercept errors increased in both the acute care unit and the ICU by 92% and 303% respectively, suggesting that nurses were more aware of potential error outcomes. Opening the EMR when removing medications and verifying two patient identifiers before administering medications improved by 100% or more in both the acute care unit and the ICU. The mindfulness intervention improved procedural fidelity by increasing adherence to proper medication administration procedures. Specifically, administration behaviours improved and MAEs decreased following the pilot program (Durham et al., 2016).

Unfortunately, research on the effects of mindfulness on health care provider behaviour remains quite limited. A systematic literature review (Gilmartin et al., 2017) identified 14 studies on the effects of brief mindfulness interventions on health care providers' well-being and behaviour. Only two studies examined the effect of mindfulness training on provider behaviours, and only one (Durham et al., 2016) included behaviours related to procedural fidelity. There is a great need for further research to understand where procedural fidelity can be improved, and what kinds of mindfulness training may be most helpful.

A mindfulness training program for employees. Flaxman, Bond, and Livheim (2013) developed a three-session evidence-based mindfulness training program designed for employees that is easily adaptable to different objectives. Specifically, it uses Acceptance and Commitment Therapy (ACT) to bolster self-awareness, guide workers towards purpose and direction, offer various strategies to increase work and daily living performance, and assist employees in defining personal values and pursuing them with appropriate behaviours.

Flaxman et al. (2013) based their training on ACT because of its underlying model of psychological flexibility, which can be defined as “the ability to contact the present moment

more fully as a conscious human being, and to change or persist in behaviour when doing so serves valued ends” (Hayes, Luoma, Bond, Masuda, & Lillis, 2006, p. 7). This model of psychological flexibility has six sub-processes: present-moment awareness, acceptance, cognitive defusion, self-as-context, values, and committed action (Flaxman et al., 2013). Many of these (especially present-moment awareness, acceptance, cognitive defusion, and self-as-context) relate closely to mindfulness. ACT interventions not only have the potential to help workers who are psychologically distressed but can also help workers who are functioning well but who want to improve their functioning. This can be done by increasing present-moment awareness and values- and goal-guided behaviour (Flaxman et al., 2013).

The training sessions in ACT aim to develop both mindfulness and values-based action skills. This gives individuals the tools necessary to identify their values and behave in a way that enables them to pursue their values and goals despite negative and unwanted thoughts and feelings. Mindfulness skills in this training program include: (a) present-moment awareness, (b) noticing and separating oneself from internal barriers, and (c) enhancing resilience. Values-based action skills include: (a) identifying and defining one’s values, and (b) pursuing these values and using them mindfully to guide goals and behaviour (Flaxman, Bond, and Livheim, 2013). ACT incorporates values- and goal-oriented skills with the purpose of increasing behaviours congruent with one’s values. These are in accordance with goals in specific life domains (Flaxman, Bond, and Livheim, 2013). According to Flaxman et al. (2013), values in combination with mindfulness are more effective than more traditional programs targeting goal-setting. That is, mindfulness and values allow participants to find meaning and direction in their lives as well as identifying and overcoming obstacles that impede performance improvement. More specifically, mindfulness increases values-based actions, which increases the probability that these behaviours

will be reinforced for pursuing these values.

During Session 1, present-moment awareness is targeted. This process involves contacting inner and environmental events in a non-judgemental way (Hayes et al., 2006). Depending on the situation, sometimes we must attend to a variety of stimuli in the present moment and at other times, it is beneficial to focus on a particular stimulus. Therefore, present-moment awareness promotes the use of an appropriate amount of focus required in a specific situation (Flaxman et al., 2013). Sessions 2 and 3 involve mindfulness exercises that are more related to values and goals. Each session includes a combination of presentations from the trainer, discussions, and skill practice as well as home practice assignments that participants are encouraged to engage in between training sessions (Flaxman et al., 2013).

Evidence supporting Flaxman et al.'s (2013) training program. A small number of studies has evaluated the effectiveness of brief ACT based interventions similar to Flaxman et al.'s (2013) training program. For example, Bond and Bunce (2000) examined the effects of ACT on general mental health and work-related variables, such as job motivation, job satisfaction, and propensity to innovate. Employees were randomly assigned to either an ACT group, an Innovation Promotion Program (IPP) group, or a waitlist control group. The interventions were delivered in three half-day sessions in which Session 2 was delivered one week following Session 1, and Session 3 was delivered 3 months later. Both interventions resulted in improvements in mental health and work-related measures, such as propensity to innovate (Bond & Bunce, 2000).

In another study, employees with above-average psychological distress were randomly assigned to one of three groups: worksite-based ACT (similar to Flaxman et al., 2013 intervention; Flaxman et al., 2013), Stress Inoculation Training (SIT), or a waitlist control group

in order to evaluate whether ACT could improve mental health by increasing psychological flexibility. The ACT and SIT training were delivered in two 3-hr training sessions that were separated by one week. All participants completed pre- and post-intervention assessments, such as the General Health Questionnaire (GHQ), the AAQ-II (i.e., measures psychological flexibility), and the Dysfunctional Attitude Scale (DAS). Both ACT and SIT resulted in a significant decrease in psychological distress. Specifically, an increase in psychological flexibility significantly mediated the beneficial influence of ACT on general mental health rather than from a change in cognitive content (Flaxman & Bond, 2010a).

In a related study, authors evaluated the effects of an ACT-based intervention program adapted for use in work settings on employees' general mental health. Participants were allocated to either an intervention group or a waitlist control group. Participants completed assessments at three time points: preceding Session 1, 3 months following Sessions 1 and 2, and 3 months following Session 3. Participants completing the ACT-based training improved significantly in general mental health (Flaxman & Bond, 2010b).

The above studies demonstrate the effectiveness of brief ACT-based interventions similar to Flaxman et al.'s (2013) program. However, they do not examine the effects of ACT-based interventions on procedural fidelity. The current study thus serves as an important extension to the existing literature.

Statement of the Problem

Many studies support the use of mindfulness interventions to improve mental health and increase attention. However, little is known about the effects of mindfulness on procedural fidelity. Furthermore, no research to date has evaluated the effectiveness of mindfulness training on procedural fidelity in DTT. Thus, the purpose of the present study is to use a multiple baseline

design across participants to evaluate the effect of a mindfulness training program on procedural fidelity in DTT as conducted by autism tutors.

Method

Participants and Setting

Participants were three autism tutors from St. Amant Autism Programs. They were two females and one male, although no effort was made to obtain a particular sex ratio. Participants ranged from 18 to 30 years of age and completed a minimum of a High School Diploma. The average time worked as an autism tutor was 11.3 months (range: 10-12 months) and all participants reported working with their current client for more than 1 month but less than 1 year. Table 1 summarizes participant demographic characteristics. St. Amant Autism Early Learning Program supports children diagnosed with ASD until they enter Kindergarten. Supported children all have adaptive and academic skills training programs.

In addition to the demographic variables listed above, participants were asked to rate their experiences and opinions related to mindfulness and their work performance on a -3 to +3 scale (see background questionnaire in Appendix A). Overall, the majority of participants highly rated (+2) their satisfaction with their current job performance and the progress they were making with their client. One participant was not very satisfied (-1). Two of the three participants had never participated in any mindfulness training programs or sessions. One participant reported having attended the Mindful Practice for Direct Support Providers (MPDSP) session. Two thirds of participants indicated that they were very interested and enthusiastic in learning more about mindfulness (+3), while one participant reported a moderate (+1) interest and enthusiasm. Two thirds of participants indicated that they really thought that mindfulness could improve their job

performance (+3), while one participant thought that mindfulness could somewhat (+1) improve their job performance. Table 2 summarizes participant mindfulness characteristics.

This research was approved by the Psychology/Sociology Research Ethics Board at the University of Manitoba (#P2017:091) and by a St.Amant Research Review Committee. A Service Coordinator from the St.Amant Autism Programs mailed a recruitment letter and a project description and consent form to each autism tutor. Interested autism tutors were instructed to complete and return the consent form by mail in a pre-addressed envelope. Additionally, the principal researcher presented information about the study at a meeting that all autism tutors were required to attend. Posters were also posted at St.Amant (e.g., elevator, meeting room) and the St.Amant autism classrooms and on St.Amant's Facebook page. An email including information about the study was sent out to autism tutors by Autism Programs on my behalf. Tutors who had less than 3 months of experience as an autism tutor would have been excluded from the study to reduce the possible confound of performance improvements that were unrelated to the mindfulness training in this study; no tutors who responded to a recruitment letter were excluded. Participants received an honorarium of \$178.00 to recognize their contributions to this study.

For Participants 1 and 2, observation sessions (Baseline, Training, and Follow-up) were conducted in one of the autism classrooms. For Participant 3, all observations were conducted in a family child care home. Both the autism classroom and the family child care home were located in Winnipeg, MB. All mindfulness training sessions took place in a meeting room at St.Amant River Road Place.

Experimental Design

A multiple baseline design across three participants was used to evaluate the effects of the mindfulness training sessions on DTT procedural fidelity. All participants experienced baseline and training phases, as well as follow-up observations. Baseline phase duration was deliberately varied across participants, to reduce the plausibility of alternate explanations (i.e., a change in reactivity, or learning not related to training) for training improvement. Participant 1 remained in baseline for 32 days, participant 2 for 24 days, and participant 3 for 17 days.

Participants 1 and 2 received the first training session together (see Procedures below); Participant 3 received the first session one week later. All participants received training session 2 together, one week after Participant 3 received the first training session. All participants received training session 3 together, three weeks after they received the second training session.

Observations were conducted throughout the training phase for an average of 3 days per week and terminated approximately 1 week following the third and last training session. Follow-up observations were then conducted approximately 9 weeks following the end of the training phase and lasted 2 days. Observations and data collection in DTT sessions conducted by autism tutors with their client thus occurred during baseline, training phases, and follow-up phases. Data from each phase were compared using visual inspection to determine whether there was an improvement in DTT treatment fidelity.

Measures

See Table 3 for a breakdown of measures and their purpose for each phase of the study.

Primary measure.

Discrete Trial Teaching Evaluation Form (DTTEF). Autism tutors' correct demonstration of DTT components were observed during teaching sessions using the DTTEF.

The DTTEF (see Appendix B) is a 20-item checklist developed and revised by Fazzio, Arnal, and Martin (2012) that evaluates the treatment fidelity of a DTT session conducted by instructors and parents (Babel et al., 2008). Previous research has demonstrated that the DTTEF has high face validity, high interobserver reliability, and high concurrent validity and is able to demonstrate changes in DTT performance due to training (Babel et al., 2008; Jeanson et al., 2010). Because each child's programming was different, certain items on the DTTEF were not applicable for all tutors. These items (items 7, 15, 21, and 22 for Participants 1 and 2; items 3, 7, 21, and 22 for Participant 3) were excluded when calculating procedural fidelity. Procedural fidelity was calculated by dividing the number of steps completed by the number of steps specified by the DTTEF and expressing the result as a percentage.

Secondary measures.

Philadelphia Mindfulness Scale (PHLMS). The PHLMS (Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008; see Appendix C) is a 20-item questionnaire rated on a 5-point scale (*1 – never to 5 – very often*). It measures two core components of mindfulness: present-moment awareness and acceptance. A present-moment awareness subscale score is obtained by computing a sum from all odd items. Higher scores indicate greater levels of awareness. An acceptance subscale score is obtained by reversing the scores and computing a sum of all even items. Higher scores indicate greater levels of acceptance (Cardaciotto et al., 2008).

Social Validity Questionnaire. The social validity questionnaire was adapted from a version created by the trainer of the current mindfulness training program, Dr. James Ediger. The questionnaire (see Appendix D) measured tutors' satisfaction with the training program and applicability of skills acquired during training. The questionnaire consisted of rating scale questions (*1 = not at all* and *5 = very much*) and open-ended questions.

Procedures

Pre-baseline. First, autism tutors completed a project description and consent form and completed a background survey (see Appendix A). The survey requested information such as name, age, sex, employment, education, and general mindfulness-related questions. Before conducting baseline sessions, the principal researcher and supervisor met with the participant tutors' autism consultants and manager to discuss the relevance of each item on the DTTEF for each tutor. Items that were not relevant to a particular tutor were either crossed off or modified to represent the tutor's expected behaviours.

Baseline. Baseline sessions were conducted in an autism classroom and a home daycare. Autism tutors completed the PHLMS at the first session. Then, throughout baseline and subsequent phases, the principal investigator directly observed (in vivo) autism tutors conducting DTT sessions with their client. Observations occurred for approximately 30 minutes, 3 days a week depending on scheduling.

Training. Following the baseline phase, autism tutors attended the mindfulness training sessions that were delivered by a trainer (see Introduction for details and Appendix E for program overview). Training content was presented in three half-day group sessions each lasting approximately 3 hr over a period of 5 weeks. Because Participant 3 missed the first session, for Participants 1 and 2, the first training session was presented on Saturday, April 6th, 2019 and for Participant 3, on Saturday, April 13th. All participants attended the second training session on Saturday, April 20th, 2019. A booster session was presented to all participants on the third Saturday following the second session, May 11th, 2019. The procedures used to observe and record procedural fidelity of DTT sessions were identical to those used in the baseline phase and continued throughout training.

Training session group size and composition. Flaxman et al. (2013) state that their training program can be effectively delivered to smaller groups (as few as 2 or 3 attendees) and to larger groups (up to 60 or more attendees). As mentioned in the preceding paragraph, because Participant 3 missed the first session, Session 1 consisted of Participants 1 and 2. A St. Amant employee also attended Session 1. Participant 3 attended Session 1 one week later. To reach the minimum desired group size, three graduate students and a research assistant attended. Session 2 consisted of all three participants as well as the same three graduate students and research assistant. Session 3 consisted of the same attendees as Session 2 in addition to the same St. Amant research employee who attended Session 1.

Trainer background and experience. The facilitator who delivered Flaxman et al.'s (2013) mindfulness training program, was Dr. James Ediger, a registered clinical psychologist with over 20 years of experience and who also has training in Applied Behaviour Analysis. He incorporates ACT strategies and techniques in his practice and has previously delivered Flaxman et al.'s (2013) training program.

Handouts and home practice assignments. Handouts described brief exercises that participants completed either during a training session or at home between sessions. Appendix F lists all handouts, their contents, and when they were completed. In summary, throughout Sessions 1, 2, and 3, participants worked on Handouts 1 and 2: *Define your values and Values, Goals, and Actions Worksheet*. Between Sessions 1 and 2, participants completed Handout 3 which included three home practice assignments. During Session 2, participants worked on one handout: *Untangling from Thought Barriers to Values-Based Action*. Between Sessions 2 and 3, participants completed three more home practice assignments. During Session 3, participants completed Handout 6: *Assessing Value Consistency*. Finally, three more home practice

assignments were distributed to participants as ongoing practice following completion of the mindfulness training sessions. During the first observation session following the last mindfulness training session, autism tutors completed the PHLMS a second time and a social validity questionnaire.

Follow-up. Approximately 9 weeks following the termination of the training phase, observations and recording of procedural fidelity of DTT sessions resumed for 30 min a day for 2 days. These procedures were identical to those used in the baseline phase.

Inter-Observer Agreement (IOA)

The principal investigator observed and recorded DTT procedural fidelity for all 68 observation sessions. One of three research assistants independently (i.e., without conferring with the principal investigator) observed and recorded procedural fidelity for 31% of observation sessions (21/68). At least one session with two observers was included for each participant as well as for each phase of the study (i.e., Baseline and Training).

To calculate IOA, the trained research assistants' DTTEF score was compared to the principal investigator's DTTEF score. Specifically, each of the DTTEF items per trial were compared. An agreement was scored when both observers recorded an autism tutor's performance of a given item identically (i.e., as correct or incorrect). A disagreement was scored when both observers recorded different behaviours for a DTTEF item (i.e., one observer recorded the correct performance of a DTTEF item while the other observer recorded that the same item was incorrectly performed). IOA was calculated by dividing the number of agreements by the number of agreements plus disagreements, and expressing the result as a percentage (Martin & Pear, 2015). IOAs during observation sessions averaged 97.9% (range: 92.9% - 100%).

Before beginning data collection, three research assistants were instructed in the DTTEF and were trained by scoring videos of confederates playing the roles of an autism tutor conducting a DTT session with a client. Scores were compared to those of an experienced observer (i.e., principal investigator). Training and feedback occurred until a minimum score of 85% was obtained and agreement was consistently high. During data collection, the minimum acceptable value for IOAs was 85%. When a score of 85% was not reached, the research assistant and principal investigator discussed discrepancies in scoring until an agreement was reached.

Treatment Fidelity of the Mindfulness Training Sessions

Treatment fidelity was assessed to measure the degree to which the trainer adhered to the training procedures and practices. To assess treatment fidelity, a trained research assistant attended and scored all three training sessions using a checklist (see Appendix G). This checklist specified each component of the training program so that the observer could determine whether each component was implemented. To compute a treatment fidelity score, the number of items on the checklist completed by the trainer was divided by the number of items specified by the checklist and the result was expressed as a percentage. Treatment fidelity was observed for 75% of the training sessions and averaged 100%. Participant 3's first training session was the only session where fidelity was not observed.

Results

DTT procedural fidelity

Figure 1 displays participant procedural fidelity as measured in the baseline, training, and follow-up observation sessions. All participants showed high fidelity during baseline, and higher fidelity during training and follow-up.

Data from each phase were evaluated using the guidelines for visual inspection described by Kazdin (2011). According to Kazdin (2011), visual inspection relies on four primary characteristics to judge whether there is a change in behaviour and whether that change can be attributed to the intervention. These include: (a) changes in the mean performance across phases, (b) changes in the level of performance at the point that a new phase is introduced, (c) changes in trend (differences in the direction of the slope from prior or subsequent phases; the slope before a phase change should not be in the direction of the observed change in behaviour during the subsequent phase) and (d) latency (amount of time) of change at the point that the intervention is introduced (Kazdin, 2011).

Participant 1's procedural fidelity averaged 80.5% in baseline and 85.7% during the training phase. Follow-up observations occurred 66 days following the end of the training phase and the performance accuracy score averaged 85.7%. Visual inspection showed that criterion c) (no pre-training trend in the direction of observed change) was not met: the data showed a slight increasing trend during baseline. Criterion d) (latency of change in performance) was also not met: Between the end of baseline and the beginning of training, a rapid change in performance was not evident. Criterion b) (changes in level across phases), however was met: Performance shifted from baseline to training, although the change in level was small. Participant 1's performance remained at a high level during follow-up.

Participant 2's procedural fidelity averaged 69% in baseline and 82.9% during the training phase. Follow-up observations occurred 67 days following the end of the training phase and the performance accuracy score averaged 86.6%. Visual inspection of the data showed that criterion b) was met. Criterion c) was also met: there was a decreasing trend in performance during baseline, before the training was implemented. Criterion d) was met: Between the end of

baseline and the beginning of the training there was a rapid change (or jump) in performance. Participant 2's performance remained at a high level during follow-up.

Participant 3's procedural fidelity averaged 69.9% in baseline and 81.5% during the training phase. Follow-up observations were not completed because the tutor was no longer working with St.Amant at that time. Visual inspection of the data showed that criterion b) was met. Criterion c) was met: there was no improvement in DTT performance accuracy before training was implemented. Criterion d) was also met: Between the end of baseline and the beginning of training there was a rapid change (or jump) in performance.

Secondary Measures

Philadelphia Mindfulness Scale (PHLMS). Participants completed the PHLMS at the start of baseline and during the first observation session following the last training session. The mean pre-post change score for the Awareness subscale for all participants was 4.33 (range: 0-10). The mean pre-post change score for the Acceptance subscale was 2.33 (range -4 to +8) (see Table 4 for pre-post change scores for Awareness and Acceptance subscales).

Before training, the mean total score on the PHLMS was 57.3 of 100 and ranged from 48 to 63 for the three participants. The mean score for the Awareness subscale of the PHLMS was 31.3 (range 26-35) and the mean score for the Acceptance subscale was 26 (range 22-38). After training, the mean total score on the PHLMS was 64 and ranged from 62 to 66 for the three participants. The mean score for the Awareness subscale of the PHLMS was 35.6 (range 33-38) and the mean score for the Acceptance subscale was 28.3 (range 24-31) (see Table 4).

Social validity ratings. Table 5 shows participants' ratings of each statement in the social validity questionnaire. Upon completion of training sessions, the mean ratings across all three participants for the 14 statements was above 3.5. The majority (78.6%) of the ratings were

4 and above. When asked what the best feature or aspect of the training was, participants responded that their favourite aspect was the group discussions, participating in short exercises, learning mindfulness strategies, and being able to practice techniques to live in the moment both at work and in one's personal life. A participant added that they started to become more aware of things they previously were not. When asked about what feature or aspect of the training they found least helpful or most in need of change, they responded that they struggled with the long meditations and that less observation sessions and shorter mindfulness training would have been preferred to maintain a high level of attention. When asked what suggestions they had for improving the training, they responded providing the students with additional resources, such as research articles. Another suggestion for improvement was to include more hands on/live demonstrations. Finally, in the additional comments section, a participant mentioned that they very much liked the facilitator.

Discussion

Procedural fidelity plays a vital role in client outcomes (e.g., Noell, Gresham, & Gansle, 2002; Rhymer, Evans-Hampton, McCurdy, & Watson, 2002; Wilder, Atwell, & Wine, 2006). In other words, the more accurately autism tutors deliver DTT; the better client outcomes will be. Mindfulness has been shown to improve well-being and increase attention and is gaining an increasing amount of scientific attention (Bishop et al., 2004; Keng et al., 2011; Shapiro et al., 2008). However, there is a shortage of research on the effects of mindfulness on health care provider behaviour and procedural fidelity. Furthermore, there is no research to date on the effects of mindfulness training on procedural fidelity in DTT. Therefore, the purpose of the present study was to evaluate the effect of a mindfulness training program on procedural fidelity in DTT as conducted by autism tutors.

I hypothesized that a brief mindfulness intervention would increase the accuracy with which autism tutors conduct DTT sessions with their clients. Overall, all three participants were already delivering DTT sessions with a high level of accuracy even before training was implemented. Nevertheless, procedural fidelity increased relative to baseline for all three participants. Results were maintained over an extended period for both participants for whom follow-up observations were conducted.

Participants completed the PHLMS before and after training. According to the PHLMS scores, participants were more mindful following training, however the effect was small. Inferential statistics could not be applied due to the small sample size, and these results must be interpreted with caution.

In a multiple baseline design across participants, the intervention is typically applied at different points in time for each person (Kazdin, 2011). An effect due to the intervention is demonstrated when the behaviour changes only when the intervention is applied and only to that specific person. The other baselines are expected to remain unchanged until the intervention is extended to them. This allows the researcher to conclude that the intervention was the cause of the change in performance rather than some extraneous variable (e.g., maturation, history) (Kazdin, 2011).

In the current study, the training was applied at the same time for Participants 1 and 2, and it was introduced one week later for Participant 3. This arrangement supports the conclusion of an experimental effect because Participant 3's baseline remained unchanged while the other participants received the training. Another strength of this design is that although the training was not applied at different points in time for Participants 1 and 2, the duration of the baselines for all participants was deliberately varied. That is, baselines began at different points in time for

each participant. This reduced the plausibility of alternative explanations for improvement during the training phase.

The high baseline levels and small training increases were limitations of this study: they make it less clear that the intervention was responsible for the increase in procedural fidelity. Another threat to internal validity was that some external variables could not be controlled by the researcher. Even though the researcher made efforts to check-in with the consultants regularly to ensure that correct behaviours were still being recorded, any corrective feedback given to the tutors by their supervisors (e.g., senior tutor, consultant) could have increased the accuracy with which tutors delivered DTT. It would be impossible to control for all external variables in a clinical and applied setting. A related point is the instructions given to Participant 2 about the steps and behaviours to be performed changed throughout data collection without the researcher's knowledge. Thus, this affected the recording and scoring of item 12 on the DTTEF: "Following a correct response, praise and present an additional reinforcer."

External validity (i.e., the extent to which the findings can be generalized to other individuals and settings) was improved by conducting the study in two different settings: the classroom and a family child care home. This arrangement also reduced the chance that one participant who had not yet undergone training would learn from another who had been trained. External validity was also supported by the fact that this study took place in the participants' natural environment rather than in a contrived setting, such as a laboratory setting where all extraneous variables are controlled.

Caution should be exercised when extending the results to conditions beyond those of the current experiment. The sample from which data were collected was homogeneous, in that all tutors displayed high baseline levels; it is therefore unknown whether the training would have the

same effect on tutors with lower baselines. In other words, these findings may not apply to autism tutors who don't display similar initial levels of procedural fidelity.

Another strength worth noting was that the training program used in this study was brief: it was only 9 hrs in duration (including breaks). Many mindfulness programs are long in duration requiring many hours and span several weeks. This brief training program has many advantages. According to Flaxman et al. (2013), organizations perceive the training to be less disruptive to employees' work schedules in comparison to delivering shorter sessions across the span of several weeks. Additionally, due to the training format of only three sessions, it is less probable that a participant will miss a session (Flaxman et al., 2013). Another advantage of this training format is the break between Session 2 and 3 allows the participants to practice and generalize the strategies learned to other areas of life (Flaxman et al., 2013).

Implications and Recommendations

This study increases scientific knowledge in several ways. As noted by several researchers (Noell et al., 2002; Rhymer et al., 2002; Wilder et al., 2006), procedural fidelity of DTT delivery impacts client learning outcomes. Previous studies (e.g., Catania et al., 2009; Digennaro-Reed et al., 2010; Fazzio et al., 2009) that evaluated strategies to improve DTT accuracy showed large increases. However, the context of these studies was that they provided initial training to teach DTT implementation. The objective in the current training program was to improve the accuracy of tutors who were already trained in the implementation of DTT.

Furthermore, there is very little literature on the effects of mindfulness on provider behaviour (Gilmartin et al., 2017). The present study is the first to evaluate mindfulness training as a method to improve procedural fidelity in autism tutors. The findings demonstrated that

direct observations of provider behaviours related to procedural fidelity could be used to evaluate the effect of a brief mindfulness intervention. Moreover, the current study extends the existing literature (e.g., Bond & Bunce, 2000; Flaxman & Bond, 2010a; Flaxman & Bond, 2010b) on the effectiveness of Flaxman et al.'s (2013) training program.

To improve internal validity (i.e., the clarity of the data and the reason for a change in performance), future multiple-baseline studies should include at least three baselines in which the training is introduced at different points in time (Kazdin, 2011). Additionally, future replications should try to recruit autism tutors who display lower baseline levels of DTT performance accuracy. As demonstrated by many researchers, treatment fidelity has an impact on client outcomes (e.g., Noell, Gresham, & Gansle, 2002; Rhymer, Evans-Hampton, McCurdy, & Watson, 2002; Wilder, Atwell, & Wine, 2006). Therefore, since mindfulness appears to improve DTT procedural fidelity, improvements in client outcomes should also be observed. I attempted to recruit each tutor's client and to measure their progress on learning objectives through retrospective data; however, recruitment was unsuccessful.

In summary, the purpose of this study was to use a single-subject modified multiple-baseline design across participants (autism tutors) to evaluate the effect of a brief mindfulness intervention on DTT procedural fidelity. Given that this was the first study to evaluate the effect of a mindfulness program on DTT procedural fidelity and that it was well-received by the participants, the present findings are promising in that they provide initial evidence that a mindfulness program may be an effective strategy to increase the accuracy with which autism tutors conduct DTT sessions. However, caution should be exercised before recommending the application of this training program: the training was expensive, and the high level of all three baselines limited the demonstration of a clear intervention effect. Therefore, it is important that

future research replicates the current study, especially with tutors who display low baseline levels.

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Table 1

Participant Demographic Characteristics

Participant	Age range (Years)	Sex	Length of time worked as autism tutor (Months)	Length of time working with current client	Education
1	26-30	Female	12	>1 month but < 1 year	High School Diploma
2	18-25	Female	10	>1 month but < 1 year	University/college certificate
3	18-25	Male	12	>1 month but < 1 year	University/college certificate

Table 2

Participant Mindfulness Characteristics

Statements	Participant 1	Participant 2	Participant 3
1. Using the scale below ^a how would you rate your satisfaction with your current job performance and the progress you are making with your client?	2	-1	2
2. Have you ever participated in any mindfulness training programs or sessions? If yes, what kind? (Provide a brief description).	MPDSP ^c	No	No
3. Using the scale below ^b how would you rate your interest and enthusiasm in learning more about mindfulness?	3	3	1
4. Using the scale below ^b how would you rate how much you think mindfulness could improve your job performance.	3	3	1

Note.

^a-3 = not at all satisfied, +3 = very satisfied

^b-3 = not at all, +3 = a lot

^cMPDSP = Mindful Practice for Direct Service Providers

Table 3

Breakdown of Measures and Purpose Per Phase of Study

Phase	Measure	Purpose
Pre-baseline	1. Project description and Consent form	1. Consent
	2. Background survey	2. Descriptive information
Baseline	1. PHLMS	1. Baseline mindfulness
	2. DTT observations (4 x a week)	2. To measure accuracy of DTT delivery
Training	1. DTT ongoing (4x week)	1. To measure DTT delivery accuracy
	2. Mindfulness training delivery IOR	2. To measure training delivery accuracy
Post-Training Session 1	1. Mindfulness training Session 1 complete	1. X
	2. DTT ongoing (4x week)	2. To measure accuracy of DTT delivery
Post-Training Session 2	1. Mindfulness training Session 2 complete	1. X
	2. DTT ongoing (4x week)	2. To measure DTT delivery accuracy
Post-Training Session 3	1. Mindfulness training Session 3 complete	1. X
	2. DTT ongoing (4x week)	2. To measure DTT delivery accuracy
	3. PHLMS	3. Post mindfulness
	4. Social validity questionnaire	4. Gauge training satisfaction
Follow-up	1. DTT resume (4x)	1. Examine maintenance of effects

Table 4

Philadelphia Mindfulness Scale Pre- Post-Training and Change Scores

Participant	Awareness			Acceptance		
	Pre	Post	Change	Pre	Post	Change
1	26	36	+10	22	30	+8
2	35	38	+3	28	24	-4
3	33	33	0	28	31	+3

Table 5

Participant Mean Ratings of Social Validity Questionnaire Items

Statements	Min	Max	Mean ^a
1. Overall, how useful was this workshop for you?	3	5	4.3
2. Overall, how would you rate the teaching quality, and the way in which the material was presented?	4	5	4.7
3. How much of the knowledge and techniques you learned through the training will you actually use?	3	5	4
4. Overall, how useful were the in-session exercises for helping you understand and apply the skills being taught?	4	5	4.3
5. Overall, how useful were the take home assignments for helping you understand and apply the skills being taught?	4	5	4.3
6. Overall, how useful were the hand-outs and other presentation materials in helping you understand and apply the skills being taught?	3	5	4.3
7. How likely are you to recommend this training to your coworkers?	4	5	4.7
8. Do you feel more attentive and aware while working with clients?	3	4	3.7
9. Do you feel like your work performance has improved? That is, the accuracy with which you conduct DTT sessions?	3	4	3.3
10. How much of the knowledge and techniques learned through the training have you actually used?	3	4	3.7
11. How satisfied are you with your participation in this research project?	3	5	4
12. Do you feel that this was an acceptable intervention for autism tutors?	2	5	3.7
13. Would you recommend participation in this study to other autism tutors?	4	5	4.3
14. How important are the goals of this study to you?	3	5	4

Note. 1 = Not at all; 5 = Very much.

^an = 3.

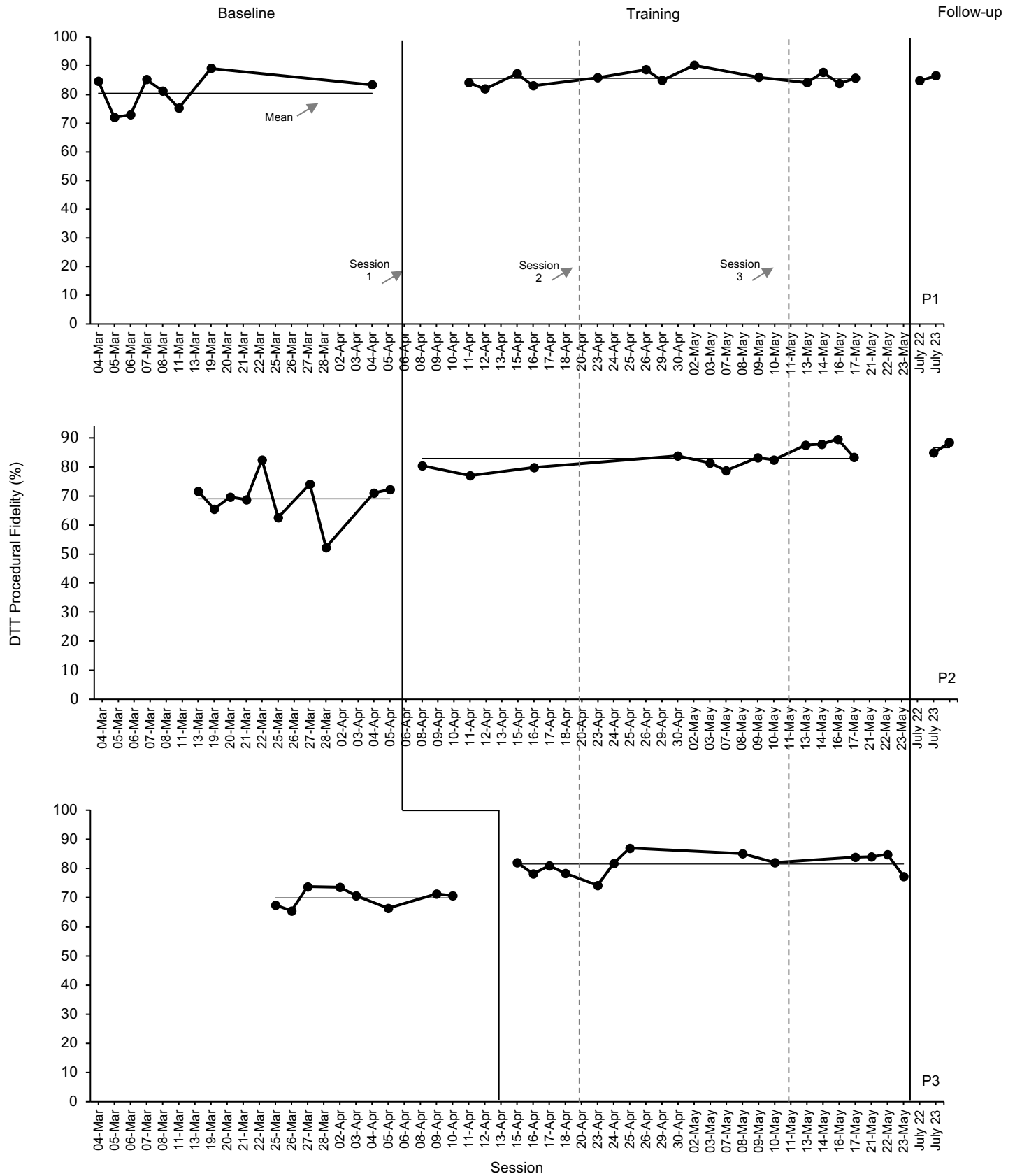


Figure 1. DTT Procedural Fidelity (%). P1= Participant 1; P2 = Participant 2; P3 = Participant 3.

Appendix A
Autism Tutor Background Questionnaire

As indicated in your consent form, there are some questions regarding background characteristics that we would like to collect for research purposes. Please complete this questionnaire by checking the appropriate boxes or writing in the spaces provided.

Demographics

1. Name:

2. Age

- 18-25
- 26-30
- 31-35
- 36-40
- 41-45
- 46-50
- Over 50

3. Sex

- Female
- Male
- Other

4. Length of time worked (anywhere) as an autism tutor

- 6 months to 1 year
- 2 years
- 3 years
- 4 years and up

5. Length of time worked at St.Amant as an autism tutor

- 1 year
- 2 years
- 3 years
- 4 years and up

6. Length of time working with your current classroom client

- 1 month or less
- Greater than one month but less than one year
- More than one year

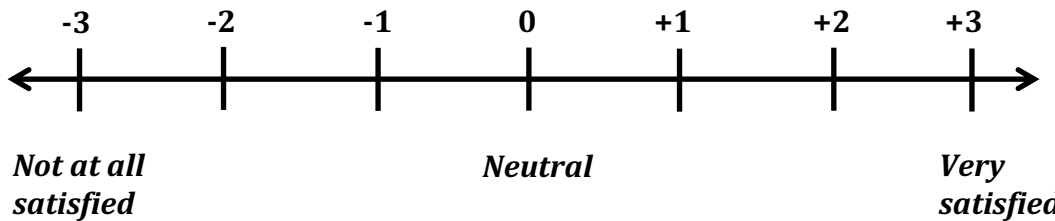
7. Education level

- High school diploma
- University/college certificate
- Trade/apprenticeship qualification

Other (please specify): _____

Mindfulness

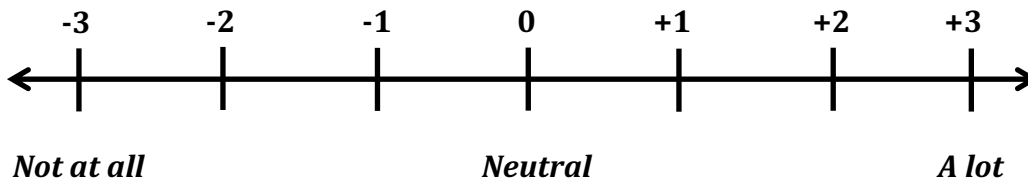
8. Using the scale below (-3 being *not at all satisfied* and +3 being *very satisfied*) how would you rate your satisfaction with your current job performance and the progress you are making with your client?



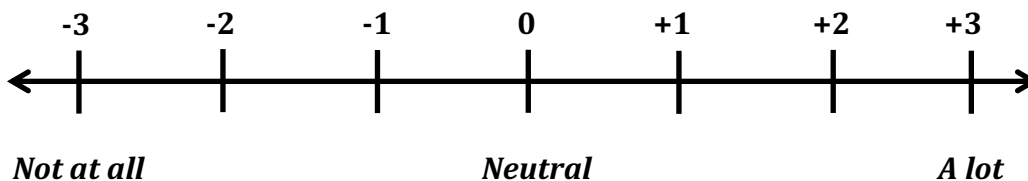
9. Have you ever participated in any mindfulness training programs or sessions? If yes, what kind? (Provide a brief description).

Yes No

10. Using the scale below (-3 being *not at all* and +3 being *a lot*) how would you rate your interest and enthusiasm in learning more about mindfulness?



11. Using the scale below (-3 being *not at all* and +3 being *a lot*) how would you rate how much you think mindfulness could improve your job performance.



Appendix B
DTTEF Score Form

SCORING: Y = performed correctly; N = performed incorrectly; n/a = not applicable

COMPONENTS**SCORE**

/

Part I: Preparing to Conduct a Teaching Session	
1. Determine Teaching Task(s)	
2. Gather Materials	
3. Select at Least 3 Reinforcer(s)	
4. Arrange the Teaching Setting	
5. Determine the Prompt-Fading Procedure and the Initial Fading Step	n/a
6. Invite Child to the Table and Give a Reinforcer Choice	

Part II: On Standard Trials, Manage Antecedents		1	2	3	4	5	6	7	8	9	10	11	12
7.	Check data sheet for arrangement of teaching materials &/or response to model.												
8.	Secure the child's attention before proceeding												
9.	Present the teaching materials, or model response (<i>if Imitation</i>).												
10.	Present the correct instruction.												
11.	Present prompts.												
<i>Record prompt level (F/P1/P2/NP):</i>													
Part III: On Standard Trials, Manage Consequences & Record Data													
Score #12 OR #13 -	12. Following a correct response, praise & present an additional reinforcer.												
Not both!	13. Following an incorrect response, block gently if possible, remove materials or stop gesturing & show a neutral expression for 2-3 s.												
14.	Record the response immediately AND accurately.												
15.	Allow brief inter-trial interval of 3-10 s.												
Part IV: An Error Correction Trial Following an Error													
16.	Secure the child's attention												
17.	Re-present the correct materials (<i>or model, if Imitation task</i>)												
18.	Re-present the instruction & prompt immediately to guarantee correct response												
19.	Praise only												
20.	(cf. 14) Record the response immediately AND accurately												
21.	(cf. 15) Allow brief inter-trial interval of 3-10 s.												
22.	Fade prompts across trials (correct fading steps & rules on \geq 80% of trials)												

Scoring Date: _____ Scorer: _____ Participant #: _____

Appendix C

PHLMS©

Instructions: Please circle how often you experienced each of the following statements *within the past week*.

1. I am aware of what thoughts are passing through my mind.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

2. I try to distract myself when I feel unpleasant emotions.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

3. When talking with other people, I am aware of their facial and body expressions.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

4. There are aspects of myself I don't want to think about.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

5. When I shower, I am aware of how the water is running over my body.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

6. I try to stay busy to keep thoughts or feelings from coming to mind.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

7. When I am startled, I notice what is going on inside my body.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

8. I wish I could control my emotions more easily.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

9. When I walk outside, I am aware of smells or how the air feels against my face.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

10. I tell myself that I shouldn't have certain thoughts.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

11. When someone asks how I am feeling, I can identify my emotions easily.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

12. There are things I try not to think about.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

13. I am aware of thoughts I'm having when my mood changes.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

14. I tell myself that I shouldn't feel sad.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

15. I notice changes inside my body, like my heart beating faster or my muscles getting tense.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

16. If there is something I don't want to think about, I'll try many things to get it out of my mind.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

17. Whenever my emotions change, I am conscious of them immediately.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

18. I try to put my problems out of mind.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

19. When talking with other people, I am aware of the emotions I am experiencing.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

20. When I have a bad memory, I try to distract myself to make it go away.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

Appendix D
Social Validity Questionnaire

Please circle the number beside each statement that best reflects your opinion.

	<i>1 = not at all</i>		<i>5 = very much</i>		
1. Overall, how useful was this workshop for you?	1	2	3	4	5
2. Overall, how would you rate the teaching quality, and the way in which the material was presented	1	2	3	4	5
3. How much of the knowledge and techniques you learned through the training will you actually use?	1	2	3	4	5
4. Overall, how useful were the in-session exercises for helping you understand and apply the skills being taught?	1	2	3	4	5
5. Overall, how useful were the take home assignments for helping you understand and apply the skills being taught?	1	2	3	4	5
6. Overall, how useful were the hand-outs and other presentation materials in helping you understand and apply the skills being taught?	1	2	3	4	5
7. How likely are you to recommend this training to your coworkers?	1	2	3	4	5
8. Do you feel more attentive and aware while working with clients?	1	2	3	4	5
9. Do you feel like your work performance has improved? That is, the accuracy with which you conduct DTT sessions?	1	2	3	4	5
10. How much of the knowledge and techniques learned through the training have you actually used?	1	2	3	4	5
11. How satisfied are you with your participation in this research project?	1	2	3	4	5
12. Do you feel that this was an acceptable intervention for autism tutors?	1	2	3	4	5
13. Would you recommend participation in this study to other autism tutors?	1	2	3	4	5
14. How important are the goals of this study to you?	1	2	3	4	5

What was the best feature or aspect of this training?

What feature or aspect of the training did you find least helpful or most in need of changing?

What suggestions do you have for improving this training?

Additional comments:

Appendix E
Session Overview

	Topic	Primary Activity	Approx. time (mins.)
Session 1	Welcome and Introductions	<ul style="list-style-type: none"> • Mindfulness warm up exercise 	20
	Overview of Training	<ul style="list-style-type: none"> • Presentation of 2-skills organizing diagram 	20
	Introduction to Mindfulness	<ul style="list-style-type: none"> • Mindful listening • Mindful drinking task • Brief mindfulness of body & breath 	30
	Introduction to Values-Based Actions	<ul style="list-style-type: none"> • Definition of values from ACT perspective • Values card sort • The compass metaphor • Writing a values statement • Define values and translate into action • Anticipate internal barriers to values-based actions 	60
	Presentation of rationale for program	<ul style="list-style-type: none"> • Two sheets of paper technique 	15
	Discussion of Homework Assignment	<ul style="list-style-type: none"> • Home practice handout • Environmental reminders 	15
Session 2	Opening Mindfulness practice	<ul style="list-style-type: none"> • Mindfulness of the hand 	10
	Hope Practice Review	<ul style="list-style-type: none"> • Group and pair discussions 	25
	Presentation of Training Rationale	<ul style="list-style-type: none"> • Passengers on a plane • Link to 2 sheets of paper 	15
	Untangling from thought barriers to valued actions	<ul style="list-style-type: none"> • Introducing defusion • Self-reflection on unhelpful thoughts content • Defusion techniques 	40
	Mindfulness of feelings	<ul style="list-style-type: none"> • Introducing expansion • Physicalizing exercise • Relationship to 2 page 	25
	Defining values and values-based goals and action planning	<ul style="list-style-type: none"> • Values & goals 	15
	Discussion of home practice assignment	<ul style="list-style-type: none"> • Review Home Practice assignment • Handouts & environmental reminders 	30
Session 3	Welcome Back	<ul style="list-style-type: none"> • 2-Skills diagram 	10
	Opening mindful practice	<ul style="list-style-type: none"> • Mindfulness of body & breath • 3 quick steps to mindful awareness 	15
	Home Practice Review	<ul style="list-style-type: none"> • Pairs and group discussion 	20
	Assessing vales consistency	<ul style="list-style-type: none"> • Self-reflection on values-consistent / inconsistent actions over the past 2 weeks 	30
	Mindfulness of thought and feeling	<ul style="list-style-type: none"> • Willingness and the Choice Point • Mindfulness of thoughts & feelings practice • Resilient Observer Self / Internal Struggles 	40
	Values-based goals and action planning	<ul style="list-style-type: none"> • Values Identification and action planning 	20
	Recommendations for continued practice	<ul style="list-style-type: none"> • Review tips 	10
	Final personal reflections on the training	<ul style="list-style-type: none"> • Summary of training • Final Thoughts • Questionnaires and feedback 	15

Appendix F

Detailed Description of the Training Handouts and Home Practice Assignments (Flaxman, Bond, & Livheim, 2013)

Handout #	Title	Session	Purpose	Description
1	Define your values	1, 2, 3	To become more aware of personal strengths and qualities participants want to express in their own behaviour.	Participants define their values for the area of life: work and career. Participants identify the qualities they want to pursue the most.
2	Values, Goals, and Actions Worksheet	1, 2, 3	Translate chosen goals into actions	Participants are invited to record words to remind them of their values and complete a section for capturing various values-consistent goals. Participants record three value-based actions that they will perform over the following week.
3	Home practice 1	1 to 2	To practice transferring mindfulness and values-based action skills into daily life.	<p>Participants are encouraged to engage mindfully in three value-based actions over the next week that they have identified during the session. If participants engage in their identified actions, they are asked to pay attention to what happens and to what it is like to engage in those behaviours. They are encouraged to attend to their thoughts and feelings before, during, and after they have performed each action and to notice consequences of their actions (e.g., how others respond).</p> <p>Conversely, if participants do not perform their chosen actions, they are encouraged to try and identify internal and external barriers that prevented them from carrying out those actions. Lastly, participants are asked to</p>

				record their experiences on the following page of this handout. They will then discuss these during session 2.
	Home practice 2	1 to 2		Participants are encouraged to practice mindfulness of breathing exercise at least three times over the following week and record their experiences in the mindfulness diary on the last page of this handout.
4	Untangling from Thought Barriers to Values-Based Action	2	To promote cognitive defusion	Participants are encouraged to record unhelpful thoughts that interfere with the pursuit of personally valued actions or goals.
	Home practice 1	2-3	Repeat of the values-based action exercise Engage mindfully in three value-based actions over the following week. Increase awareness of any interfering thoughts and feelings.	Participants engage mindfully in three value-based actions over the next week. Participants should select these actions from those identified in the preceding exercise. They are encouraged to use reminders to perform valued actions, and be attentive to internal and external events that occur before, during, and after performing the action.
	Home practice 2	2-3	Work towards four values-based goals before Session 3	Participants are encouraged to challenge themselves to achieve two values-based goals over the next week (before meeting for Session 3). Participants will focus on short-term goals recorded during Session 2. Participants are instructed to stay present and notice what happens as they pursue value and goals-based actions.

	Home practice 3	2-3	Mindfulness practice	<p>Participants are encouraged to practice mindfulness of the breath or of the body and breath three times during the following week (until Session 3).</p> <p>Participants are also encouraged to practice cartoon voices techniques when feeling influenced by unhelpful thoughts.</p> <p>Participants are encouraged to incorporate brief mindfulness practices into their daily lives such as becoming present for tasks that are normally performed on automatic pilot.</p> <p>Participants are instructed to record their experiences in the mindfulness diary on the final page of this handout.</p>
5	Assessing Value Consistency	3	Assess how values-consistent participants have been over the past week.	Participants are encouraged to record the values they want to pursue and the actions that have been either consistent or inconsistent with those values over the past week.
	Home practice 1	Post training-Ongoing	Engage mindfully in three values-based actions over the next week	Same instructions as before (e.g., handout 6 home practice 1).
	Home practice 2	Post training-Ongoing	Work through the values-based action process	Using some of the blank handouts, participants are invited to continue defining values in each area of life and identifying concrete goals and actions to help pursue them. Gradually increase patterns of values-based actions and keep looking for new opportunities to pursue values. Practice pursuing personal values even when interfered by unhelpful thoughts and feelings.

Home
practice 3

Post
training-
Ongoing

Mindfulness
practice

Participants are encouraged to
continue practicing mindfulness
of the breath or body and breath
three times per week.

Appendix G

Treatment Fidelity of Training Sessions Form

SCORING: ✓ = performed; X = not performed

	Topic	Primary Activity	Score
Session 1	Welcome and Introductions	• James: Introduce self	
		• Exercise 1: Introduce members of the group	
		• Gathering Hopes and Expectations	
		• Overview of training (basic format and content of training)	
	Overview of Training	• Commitment to confidentiality	
		• Presentation of 2-skills organizing diagram	
	Introduction to Mindfulness	• Exercise 2: Mindful listening	
		• Exercise 3: Mindful Drinking task	
		• Exercise 4: Mindfulness of Body and Breath	
	Introduction to Values-Based Actions	• Definition of Values from an ACT perspective	
		• Exercise 5: Values card sort	
		• The Compass metaphor	
		• Exercise 6: Writing a Values Statement	
		• Define values and translate into action	
	Presentation of rationale for program	• Anticipate internal barriers to values-based actions	
		• Two sheets of paper technique	
Discussion of Homework Assignment	• Home practice handout		
	• Environmental reminders		

	Topic	Primary Activity	Score
<i>Session 2</i>	Opening Mindfulness practice	• Reminder of the 2 skills diagram	
		• Mindfulness of the hand	
		• Play mindfulness of the hand recording	
		• Post mindfulness of the hand exercise discussion	
	Home Practice Review	• Discussions of Assignment 1	
		• Discussions of Assignment 2	
	Review of Training Rationale	• Passengers on a plane	
		• Play video	
		• Large group discussion	
		• Link to 2 sheets of paper	
	Untangling from thought barriers to valued actions	• Introducing defusion	
		• Self-reflection on unhelpful thoughts	
		• Reflect on your values related to Work & Career and write down the thoughts that get in the way of doing your values-based actions	
		• Defusion Techniques:	
		• I'm having the thought . . .	
		• Yellow Sticky Note	
		• Thoughts on a screen	
		• Discussion as a large group	
	Mindfulness of feelings	• Introducing Expansion	
		• Physicalizing exercise	
• Debriefing			
• Relationship to 2-page			
Defining values and values-based goals and action planning	• Revisit values statement		
	• Developing Values based goals		
Discussion of home practice assignment	• Review Home Practice assignments		
	• Handouts & environmental reminders		

	Topic	Primary Activity	Score
Session 3	Welcome Back	• Review of 2-skills diagram	
		• Summary of reason for practicing these skills (what influences your choices)	
	Opening Mindful Practice	• Try these together: <ul style="list-style-type: none"> • Body Scan Meditation 	
		• The Five Senses Exercise	
		• Mini-Mindfulness Exercise	
	Home Practice Review	• Pairs and group discussion	
		• Review of the home mindfulness practice	
		• Review of the Values-Based Actions and Goals home practice	
	Assessing Values Consistency	• Self-reflection on values-consistent/inconsistent actions over the past few weeks	
	Mindfulness of Thought and Feeling	• Willingness and the Choice Point	
		• Mindfulness of breath, sound, and body	
		• Resilient observer self/Internal struggles	
	Values-Based Goals and Action Planning	• Values identification and action planning to other areas of life (other than work & career)	
		• Provide Handout 3d: Define Your Values	
	Recommendations for Continued Practice	• Review tips:	
		• Continue defining your values	
		• Keep your values close	
		• Have values-based day	
		• Take some bold steps	
		• Take valued actions in the presence of unhelpful thoughts and feelings	
	Final Personal Reflections on the Training	• Know that you can reconnect with your values at any time	
• Summary of training			
• Final thoughts			
		• Questionnaires and feedback	