The Effects of a Systematic Manipulation of Mindfulness Practice on Self-Reported Levels of Mindfulness and Stress, Displacement Behaviors, and Heart Rate

Cassandra Jin Dikes

A Dissertation Submitted to the Faculty of

The Chicago School of Professional Psychology

In Partial Fulfillment of the Requirements

For the Degree of Doctor of Philosophy in Applied Behavior Analysis

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2016

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Dedication

This research is dedicated to all the young people around the world who dream of receiving an education.

Abstract

The purpose of the current study was to explore the immediate effects of guided mindfulness practice, and to determine whether longer durations of practice would have proportionally greater effects than shorter practices on heart rate, mindfulness scores, stress scores, and/or displacement behaviors. Participants listened to audio recordings of guided mindfulness practices and biographical books on tape. Levels of mindfulness and stress were measured before and after audio, and heart rate and displacement behaviors were measured during audio. Results of the current study showed that some individuals may reap benefits from practices as short as 5 minutes, and, interestingly, that longer practices, for these participants, did not produce significantly greater effects. The current research builds on previous studies that demonstrate mindfulness practice can have numerous beneficial effects. There were significant differences in heart rate for four of the six participants who completed the study, where the average heart rate was lowest in the final condition of the session. Scores on the Mindful Attention Awareness Scale (MAAS) and Perceived Stress Scale (PSS) did not change reliably as a function of the duration of the mindfulness practices, but there was a reliable decrease in rate and duration of displacement behaviors for the majority of participants when comparing the mindfulness conditions to the other conditions, especially prose, which was the comparison condition. There was not a difference based on the length of the mindfulness practices. The majority of the participants in the current study indicated that the mindfulness practice was at least somewhat helpful in managing stress, specifically in regards to their jobs or schooling and in dealing with challenges.

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Chapter 1: Nature of the Study

Background

Mindfulness is a meditation practice that has been successful in reducing stress. Its roots are in Buddhist philosophy, and it "has been called 'the heart' of Buddhist meditation" (Kabat-Zinn, 2003, p. 145). Although it dates back approximately 2,500 years, it has recently been making its way to the forefront of clinical and empirical domains (Lykins & Baer, 2009). Mindfulness meditation can lead to reduced suffering and increased well-being by "bringing one's complete attention to the present moment's experiences in a nonjudgmental or accepting way" (Lykins & Baer, 2009, p. 226). Kabat-Zinn (2003) explained mindfulness as "the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment" (p. 145).

Kabat-Zinn (2003) noted that mindfulness is not a quick fix of any kind, but rather an "art form" that must be practiced regularly for it to truly develop and deepen. The purpose of mindfulness is not to educate individuals in Buddhist teachings or traditional meditation, but rather to provide a safe space for exploring methods of relieving suffering of both the mind and body and creating awareness of one's own inherent power in the mind/body connection. Practitioners of mindfulness potentially grow to accept responsibility for their own well-being and take more of an active role in moving towards higher levels of health (Kabat-Zinn, 2003).

Kabat-Zinn (2003) developed the widely-used and respected Mindfulness-Based Stress Reduction (MBSR) program. This program is typically a group workshop that meets with a live, certified instructor weekly for 2-hour sessions, for a total of 8 weeks. In addition, a retreat day is usually scheduled between the sixth and seventh sessions, which last 6 to 8 hours. Participants are also asked to practice independently outside of sessions for 30 to 45 minutes per day, at least 5 days per week. During the weekly sessions, retreat day, and independent practice, participants

engage in three formal activities: meditation, body scans, and yoga. The meditation portions consist of the instructor guiding participants through focusing their attention and bringing to the forefront the present moment. Body scans consist of the instructor guiding participants through bringing their attention to each part of their body, starting with the toes and moving up to the head. Independent practice is usually guided by an audio recording, but participants can also choose to engage in a silent meditation. Participants are typically also asked to incorporate mindfulness into their daily activities and routines, such as during meal times and while walking. Clinicians and researchers have adapted Kabat-Zinn's (2003) program in a number of ways to suit their needs, including shortening the weekly session, shortening the number of weeks, and/or eliminating the retreat day.

The positive effects of mindfulness practice have been demonstrated in many studies. For example, Lykins and Baer (2009) sent questionnaires to a group of meditators and a group of non-meditators and found that regular meditation practice was associated with a number of well-being benefits: self-reports of increased mindfulness, decreased rumination, decreased fear of emotion, increased behavioral self-regulation, and increases in adaptive functioning. Rasmussen and Pidgeon (2011) also found that higher levels of mindfulness were predictive of lower levels of self-reported social anxiety and higher levels of self-esteem.

Mindfulness as an intervention has been successful in helping an array of individuals improve their lives, including breast cancer survivors (Dobkin, 2008; Lengacher et al., 2009) and other medical populations (Gregg et al., 2007; Nyklícek, Dijksman, Lenders, Fonteijn, & Koolen, 2012; Schneider et al., 2012), survivors of childhood trauma (Kimbrough, Magyari, Langenberg, Chesney, & Berman, 2010), expectant mothers (Goodman et al., 2014), clinical populations (Courbasson et al., 2011; Hick & Furlotte, 2010; Proulx, 2008; Singh et al., 2007),

residential group home populations (Adkins et al., 2010; Singh et al., 2004, 2009, 2011), students in multiple countries (Aggs & Bambling, 2010; Birnbaum, 2008; Christopher et al., 2006; Collard et al., 2008; Hassed et al., 2009; Heppner et al., 2008; Jain et al., 2007; Kaviani et al., 2011; Langer et al., 2010; Rasmussen & Pidgeon, 2011; Schure et al., 2008; Shapiro et al., 2007; Warnecke et al., 2011; Zeidan et al., 2010), a range of professionals (Galantino et al., 2005; Gold et al., 2010; Klatt et al., 2009; Mackenzie et al., 2006; Minor et al., 2006; Moore, 2008; Noone & Hastings, 2011; Oken et al., 2010; Richards et al., 2010; Shapiro et al., 2005; Smith et al., 2011; Walach et al., 2007), and people who seek out assistance in handling personal stress (Fernros et al., 2008; Kumar et al., 2008; Singh et al., 2006).

Mindfulness training has demonstrated significant benefits for treating a wide variety of symptoms, including clinical symptoms such as stress, anxiety and perinatal anxiety, depression, and tension (Aggs & Bambling, 2010; Dobkin, 2008; Gold et al., 2010; Goodman et al, 2014; Jain et al., 2007; Kaviani et al., 2011; Klatt et al., 2009; Kumar et al., 2008; Langer et al., 2010; Lengacher et al., 2009; Minor et al., 2006; Oken et al., 2010; Proulx, 2008; Shapiro et al., 2007; Smith et al., 2011; Smith et al., 2008; van der Oord et al., 2012; Warnecke et al., 2011), anger (Heppner et al., 2008; Singh et al., 2007; Wongtongkam, Ward, Day, & Winefield, 2014), symptoms related to posttraumatic stress disorder (Kimbrough, Magyari, Langenberg, Chesney, & Berman, 2010), insomnia (Cincotta, Gehrman, Gooneratne, & Baime, 2011), deficits involving cognition and attention (Zeidan et al., 2010), self-awareness (Birnbaum, 2008; Christopher et al., 2006; Collard et al., 2008; Moore, 2008; Walach et al., 2007), eating disorders (Courbasson et al., 2011), quality of life (Fernros et al., 2008; Galantino et al., 2005; Hassed et al., 2009; Hick & Furlotte, 2010; Mackenzie et al., 2006; Richards et al., 2010), coronary symptoms (Schneider et al., 2012), and physical symptoms (Gregg et al., 2007; Lengacher et al.,

2009; Singh et al., 2011) including chronic illness and pain (Baer, Carmody, & Hunsinger, 2012).

In one study, Keune and Fortinos (2010) used self-report questionnaires to evaluate the correlation between mindfulness meditation, participants' self-reported trait mindfulness, and their prognostic value for overall psychological well-being. Although these authors examined frequency and duration of mindfulness practice, they did so through self-reports and correlations only and not using a within-subject experimental design. The findings revealed that high levels of mindfulness were significantly and positively correlated with several components of the personality cluster (i.e., positive affect, positive emotion, joviality, attentiveness, and vitality) and negatively correlated with anxiety. When the authors directly compared meditators to non-meditators, the meditators scored substantially higher on four scales of the positive emotion cluster. Longer durations of meditation sessions were positively correlated with positive affect, high levels of attentiveness, positive emotion, and vitality. Higher frequencies of meditation sessions (two, three, or more times per week) were also positively correlated with positive affect, high levels of attentiveness, positive emotion, and vitality. Fourteen of the meditators who were evaluated reported that they practiced mindfulness not only during meditation sessions, but also during everyday life activities. These 14 meditators scored even higher on positive scales than the average of the entire meditating group. Keune and Fortinos (2010) concluded that those who meditate, and especially those who meditate more frequently and for longer durations, are likely to have a higher level of emotional well-being than those who do not meditate or do so sporadically.

Preliminary research has also found that regular meditation can have effects on the physical composition of the brain. Lazar et al. (2005) compared the prefrontal cortex of groups

of self-identified meditators and nonmeditators and found that the meditators had a thicker prefrontal cortex, and this difference was more pronounced in older participants. Further, the researchers found that the thickness of the prefrontal cortex and the right anterior insula was positively correlated with meditation experience. Lazar et al. (2005) concluded that regular meditation might be associated with changes in the structure of parts of the brain, and may affect age-related declines in the cortical structure of the brain. Luders et al. (2009) also compared the brain structures of meditators to nonmeditators and found that the meditators presented with larger volumes of gray matter in the right orbito-frontal cortex and larger volumes of the right hippocampus. Both of these areas of the brain have been implicated in response control and emotional regulation. Although this area of research is currently in its infancy, the evidence that regular meditation practice has very detectable changes is emerging.

Problem Statement

The stress of graduate school, work, and everyday life can take its toll on one's overall well-being. Birnbaum (2008) reported that students in social work could become overwhelmed by their responsibilities, experiencing "significant physical and emotional stress" (p. 837). Christopher et al. (2006) discussed the topic of burnout and reported that individuals who work in health care, especially mental health professions, are subject to extremely high levels of stress. As such, these individuals are very susceptible to burnout symptoms. These authors suggested that mental health professionals engage in regular self-care to "promote good health and well-being" (Christopher et al., 2006, p. 196). Hassed et al. (2009) explained that the stress of high-demand schooling and employment can lead to serious consequences, such as concerns with anxiety and depression, abuse of alcohol and other drugs, and sleep instability. These symptoms can hinder one's ability to achieve expectations in the classroom, home, or workplace.

Purpose of the Study

The purpose of the current study was to determine if longer durations of audio-recorded guided mindfulness practice would have proportionally greater effects on dependent variables indicative of mindfulness and stress than shorter durations. Two assessment tools, the 15-item Mindful Attention Awareness Scale (MAAS) and a modified version of the 10-item Perceived Stress Scale (PSS), a behavioral measure of displacement behaviors (e.g., touching the face and/or head, scratching the body, supporting the head in the hand), and heart rate were utilized to determine effectiveness of different durations of mindfulness practice. Seven participants were recruited and were exposed to three different schedules in a single subject parametric design involving replication of three conditions: control (5 minutes of sitting with no audio), prose (40 to 60 minutes of sitting while audio recorded biographical book on tape is played), and mindfulness (5 to 60 minutes of sitting while audio recorded guided mindfulness practice is played). The duration of mindfulness practice was systematically manipulated to determine if longer practices produced more significant positive results as evidenced by increases in self-reported levels of mindfulness (as determined by the MAAS), decreases in self-reported levels of stress (as determined by the PSS); decreases in rate and/or duration of displacement behaviors, and decreases in heart rate. Participants included graduate students in the field of social services who plan to work with children, adolescents, and adults with a variety of intellectual, developmental, physical, and learning disabilities.

Research Questions

1. Will engaging in guided mindfulness practice have an effect on participant self-reported levels of mindfulness and stress?

   a. Specifically, will levels of mindfulness increase, as determined by the MAAS?
   b. Specifically, will levels of stress decrease, as determined by the PSS?
2. Will engaging in guided mindfulness practice have an effect on participants' rate and/or duration of displacement behaviors?
   a. Specifically, will the rate and/or duration be lower during mindfulness than during the control or prose conditions?
3. Will engaging in guided mindfulness practice have an effect on participants' heart rate, as recorded by a Polar H7 Heart Rate Sensor ™?
4. Will longer durations of guided mindfulness practice have proportionally greater effects on dependent variables than shorter durations? Or will shorter durations of practice have similar or greater effects for some participants as compared to longer durations?
5. Are self-report measures reliable in that they are functionally related to guided mindfulness practice?
6. Will participants find mindfulness to be a useful tool for decreasing stress and/or increasing mindfulness or awareness?

Chapter 2: Literature Review

Introduction

The literature review will cover the topics of direct and indirect effects of mindfulness practice and also the different parameters of mindfulness that have been studied.

Direct and Indirect Effects of Mindfulness Practice in Human Service Fields

Mindfulness training has been shown to have direct benefits for participants who work in challenging fields. Galantino et al. (2005) found that health care professionals benefited from a mindfulness training program, describing a decline in self-reported emotional exhaustion and an improvement in mood. The training program consisted of eight weekly sessions, each 2 hours in length, which was adapted from MBSR and also included some components of cognitive therapy. During weekly sessions, there were presentations, training and practice in mindfulness techniques, interactive exercises, and group discussions. In addition, participants were asked to practice independently outside of sessions for 30 minutes each day, using readings and audio recordings. The researchers used a physiological measure of salivary cortisol as well as three psychological measures of mood, burnout, and empathy.

Gold et al. (2010) found that primary school teachers self-reported a decrease in stress, anxiety, and depression following mindfulness training. This training program consisted of eight weekly sessions, each 2.5 hours in length, plus a 5-hour silent retreat day. The instructor was an experienced MBSR instructor and closely followed Kabat-Zinn's (1990) protocol. Three psychological measures were used to measure emotional status and stress, perception of problems, and mindfulness level, before and after the training.

Similarly, Schure et al. (2008) found that graduate students in counseling programs reported positive physical, emotional, mental, spiritual, and interpersonal changes following a

mindfulness-based stress reduction course (MBSR). They also reported substantial positive effects on their counseling skills and interpersonal relationships. Because these participants were students enrolled in a MBSR graduate university course, the training lasted 15 weeks, with two 75-minute classes per week. Training consisted of yoga, sitting meditation, and "qigong (an ancient Chinese method that combining gentle physical movement with meditation, and relaxation techniques. In addition, participants were asked to practice independently (45 minutes four times per week outside of class), assigned readings, conducted research, and kept a journal.

Mindfulness training has also been shown to have indirect benefits for the individuals with whom participants have regular contact, including children and other family members, and clients. Singh et al. (2006) evaluated the effects of a mindfulness training program with three mother-child dyads; the children had a history of aggression towards self, aggression towards others, and non-compliance. Training consisted of informational reading, followed by 2-hour sessions each week for 12 weeks, where the mothers were taught mediation techniques and exercises to practice those techniques. Following mindfulness training for the mothers, the mothers reported a decrease in the problem behaviors of their children to zero or near-zero levels. In the first dyad, the average number of aggressive behaviors decreased from 8.8 per week during baseline to 0.9 per week following training and practice, and the average number of noncompliant behaviors decreased from 53.6 per week during baseline to 11.2 per week following training and practice. In the second dyad, the average number of aggressive behaviors reported decreased from 17.1 per week during baseline to 4.9 per week following training and practice, and the average number of noncompliant behaviors decreased from 37.2 per week during baseline to 11.8 per week following training and practice. In the third dyad, the average number of aggressive behaviors decreased from 8.0 per week during baseline to 1.1 per week

following training and practice, and the average number of self-injurious behaviors decreased from 10.4 per week during baseline to 4.2 per week following training and practice. The mothers also reported an increase in self-satisfaction with their own parenting skills. The authors stated that "mindful parenting aims to change the nature of the mother's behavior, and as a result, the interactions with their children" (Singh, et al., 2006, p. 174).

A few studies have been conducted in which both members of parent-child dyads completed mindfulness training. Singh et al. (2010) provided mindfulness training to both the mothers and sons in two mother-child dyads. The mothers completed 12 weeks of mindfulness training similar to the training described above (Singh et al, 2006). In addition, the children completed a similar, interactive training that was adapted to account for the childrens' ages. The mothers collected data on their children's' compliance to their requests (i.e., the number of requests delivered versus the number of requests complied with). During and following training, the percent of compliance by the children increased as compared to pre-treatment compliance scores. The authors suggested that the improvement was due to a positive enhancement in the behavior of both the mothers and the children, but also in the interactions they shared.

In a similar study, van der Oord et al. (2012) provided mindfulness training based on Kabat-Zinn's 8-week program to parents and separately to their children diagnosed with ADHD, with a few of the sessions being joint sessions. The parent training focused on how to be present with their children, how to care for themselves, how to accept difficulties (specifically related to their children), and how to answer their children instead of react to them. The child training focused on focusing their attention, awareness, and self-control. Following training, the parents reported a significant reduction in their children's inattentiveness and hyperactivity/impulsivity. The parents also reported a decrease in their own over-reactivity (to their children's behaviors)

and stress symptoms. The authors proposed that the positive interactions between the parents and children increased due to their simultaneous participation in the training and practicing together.

Similarly, Singh et al. (2004) found significant increases in ratings of happiness for three adult residents with profound mental retardation after mindfulness training of three staff members who were employed for the daytime shift in the residents' group homes. "Happiness" was defined individually for each of the adult residents, specific to behaviors exhibited by each. These behaviors included "grinning; eyes opened wide in excitement; open mouth together with furrows high on forehead, eyelids close together, drooling, and happy vocalization; high-pitched shrieks; clapping or arm-waving; humming or singing; body contortions together with loud, happy vocalizations; and happy growling sounds" (Singh et al., 2004, p. 211-212). The three staff members each read a book on mindfulness, completed six 1-hour training sessions that consisted of guided meditations and discussions with the experimenter, and were instructed to continue individual mindfulness practice after formal training ended. There were also three other staff in the residential home who did not complete any mindfulness training, but met with the experimenter on the same schedule as the participants. The authors recruited staff members from different group homes (i.e., they were not associated with the group homes participating in the study) to collect observational data in the presence of the study participants and in the presence of the other staff. Adult residents' behaviors that were indicative of happiness increased significantly in the presence of the study participants (i.e., staff members who completed mindfulness training) only, and not in the presence of other staff, as compared to baseline measures (Singh et al., 2004). The authors claim that training the staff members in mindfulness techniques enabled them to interact with the home residents in a fashion that increased the behaviors indicative of happiness.

Hallman, O'Connor, Hasenau, and Brady (2014) investigated the effects of MBSR on the stress and mindfulness of staff in an acute child and adolescent psychiatric unit within an academic medical center. Participants included direct care staff, nurses, teachers, social worker, activity therapist, physician, and psychiatrist assigned to the unit. Training occurred across 8 days in four 45-minute sessions, and consisted of didactic activities and experiential activities that focused on topics such as using the breath and body scanning. Following training, staff reported lower levels of stress and higher levels of mindfulness. In addition, the unit saw a decrease in the number of staff call-ins, a decrease in one-to-one staffing needs, and a decrease in the use of physical restraint. Hallman et al. (2014) emphasized the results' impact on the increased overall safety of the staff and patients in the unit.

Waters, Barskey, Ridd, and Allen (2015) conducted a review of meditation interventions utilized in schools. Of the 15 peer-reviewed studies included, six of them implemented a mindfulness-based intervention, and a seventh included a mindfulness component. The mindfulness-based interventions followed Kabat-Zinn's (1990) MBSR program or utilized a simpler meditation that focused on attention only. Waters et al. (2015) considered three specific student outcomes – well-being, social competence, and academic achievement – and found that transcendental meditation was the most effective. This method included "Silently repeating a word or mantra to achieve a meditative state. When distracting thoughts arise, attention is repeatedly redirected back to the mantra" (p. 105). However, the conclusion was that both methods, transcendental meditation and mindfulness, had positive effects on the student outcomes.

Duration and Frequency of Mindfulness Practice

Although mindfulness practice has been shown to be highly beneficial in a wide variety of studies, frequency and duration of mindfulness practice have not been studied systematically as independent variables, although duration and frequency typically vary from study to study. Many authors have found the standard 8-week program developed by Kabat-Zinn (2003) to be very effective in treating stress, anxiety, and depression (e.g., Dobkin, 2008; Galantino et al., 2005; Gold et al., 2010; Robins et al., 2012). In this program, participants meet for 1.5 to 2.5 hours per week and typically are instructed to practice and complete homework assignments on their own time outside of sessions for up to 60 minutes per day. Some programs include an additional "retreat day" that requires 6 to 8 hours. Some authors have also evaluated the effects of a time-intensive program, ranging from 14 hours per day for 7 days (Fernros et al., 2008) to 10-12 hours per day for 1 month (Orzech et al., 2009). Although these time-intensive programs produce reports of positive effects, the intense time commitment can be unrealistic or unappealing for some individuals.

Because some individuals have reported that the above mentioned programs are too time intensive to fit into their schedules, some authors have evaluated the effects of brief mindfulness practice as a more accessible intervention. For example, Mackenzie et al. (2006) found that nurses and nurse aides working in a geriatric hospital experienced significant improvements in burnout symptoms, measures of relaxation, and life satisfaction as a result of brief mindfulness practice. These participants practiced mindfulness during 30-minute sessions once per week for 4 weeks, and were also instructed to complete 10 minutes of individual practice five times per week. Moore (2008) found that clinical psychologists in their first year of training reaped benefits of mindfulness practice in 10-minute segments, between eight and 14 times in a 1-month

time period. Zeidan et al. (2010) found that students at the University of North Carolina experienced improvements in cognitive tasks and executive functioning after a total of only 80 minutes of mindfulness practice (20 minutes per day over 4 days).

Intervention parameters vary widely in the current literature on mindfulness practice. In the research cited in this paper, the total duration of mindfulness practice (total time both within sessions and independent practice outside of sessions) ranged from 80 minutes (Zeidan et al., 2010) to 372 hours (Orzech et al., 2009), and all participants reported varying levels of benefits. Because of the high demands many people are facing from different facets of their lives, some may not be interested in an intervention that requires much of their time. On the other hand, some may not be interested in an intervention if its parameters have not been shown to be effective. Additional research on mindfulness practice will be helpful in determining if longer practices produce greater beneficial effects, and if the effects from shorter practices are proportional. In other words, it would be helpful to determine if practicing for 60 minutes produces three times the effects as practicing for 20 minutes, or if shorter practices still produce significant effects. These results can then be disseminated to individuals who show interest in mindfulness but cannot or would not commit extended periods of time to an intervention. In addition, Fernando (2014) wrote a short editorial on the importance of focus and mindfulness in the medical field and recommends that surgeons practice mindfulness, starting at just 5 minutes per day. The potential benefits have implications for the surgeons and their patients alike.

Chapter 3: Research Design and Method

Chapter Overview

The purpose of the current study was to determine if longer mindfulness practices in the form of guided mindfulness meditation using audio recordings would result in greater effects than shorter practices. Outlined below are the participants, setting, apparatus and materials, experimental design and independent variables, dependent variables and response measurement, observer training and interobserver agreement, procedures, social validity, and treatment integrity.

Participants

Participants in the current study were recruited from the community and a graduate school in the Chicago area of Illinois. Community members who were recruited (Participants 1, 2, 3, and 4) ranged in education level and were recruited via Internet postings. Students who were recruited (Participants 5, 6, and 7) included masters and doctoral level students (and one recent graduate) and were recruited on campus through fliers in common areas. Participants could range in age from 18 to 70 years old, could be of any gender, and could be of any ethnicity, race, or cultural background.

Participant 1 was a white female community member, 31 years of age, and employed full-time. Participant 2 was a white male community member, 68 years of age, and employed part-time. Participant 3 was an African-American female community member, 28 years of age, and a student. Participant 4 was a white female community member, 28 years of age, and employed full-time. Participant 5 was a white female student, 24 years of age, and not otherwise employed. Participant 6 was an Indian female graduate, 24 years of age, and employed full-time. Participant 7 was a white female student, 29 years of age, and a student. Participant 1 withdrew

from the study after three sessions due to increasing responsibilities at her job. The principal investigator was previously familiar with Participants 5, 6, and 7 as they were enrolled or previously enrolled in the same graduate program. These three participants volunteered for the study and were not actively recruited. Prior to beginning sessions, the principal investigator clearly stated to these participants that any professional or personal relationship would not change due to their participation. Participant 6 was aware of mindfulness prior to participating, but had not previously practiced. Participant 7 was aware of mindfulness and had practiced informally prior to participating, but did not have a formal practice.

A screening email (Appendix A) was sent to all potential participants, and individuals were excluded from participation based one or more of the following exclusionary criteria: self-reporting a current formal mindfulness meditation practice (at least one scheduled practice per week, lasting at least 1 hour per week, for at least six consecutive months), self-reporting significant experience with Acceptance and Commitment Therapy (ACT; spending at least a total of 12 hours researching ACT, taking and passing at least two higher education courses specializing in ACT), self-reporting a current therapeutic relationship with a therapist who specializes in ACT or mindfulness-based strategies, or scoring an average of 4 or higher on the MAAS. These exclusion criteria were included to recruit participants with low levels of mindfulness, allowing maximum opportunity for increases in mindfulness following the guided practices.

Setting

Participants met with the principal investigator on The Chicago School of Professional Psychology campus in an empty available room for all experimental sessions. The rooms contained tables, chairs, computer equipment, white boards with markers and erasers, and

experimental apparatus and materials; some rooms had windows, whereas others did not. Sessions were conducted in at least two different rooms for all participants, due to availability.

Apparatus

Polar H7™ heart rate sensors with Bluetooth capabilities were used to monitor heart rate throughout all sessions. The H7™ consisted of the sensor and an adjustable fabric chest strap. The participants placed a small amount of water on the electrodes, and then placed the sensor against their skin, under their shirt, and over the sternum. Data were uploaded via Bluetooth from an Apple iPhone 6™ mobile device to an Apple MacBook Pro™ laptop computer, via the Polar Beat™ application. An Apple 3rd generation iPad™ tablet was used to video record all sessions, and a CTA Digital Height-Adjustable Gooseneck Floor Stand™ was used to hold the iPad™ during recording. Videos were then uploaded to the laptop computer, and transferred to external 8GB USB flash drives and a Toshiba Canvio Connect™ II 3TB Portable Hard Drive.

Materials

Materials included consent forms (Appendix B), treatment integrity checklists (Appendices C-E), the MAAS and PSS questionnaires (Appendices F-G), data recording sheets for displacement behaviors (Appendices H-I), debriefing script (Appendix J), social validity questionnaires (Appendix K), audio reference questions (Appendix L), audio recordings of guided mindfulness practice (downloaded from http://www.freemindfulness.org), audio recordings of non-mindfulness prose (downloaded from https://librivox.org), portable USB drives, various magazines and puzzle books, a cup of water and paper towels, and pens, paper, and an IKEA Fantast timer. See Table M1 for titles of audio recordings.

The guided mindfulness practices included 5-, 20-, and 60-minute audio recordings of instructor-lead meditations. These included body scans, guided imagery, present moment focus,

awareness, and extended silences. Participants were instructed to sit comfortably and close their eyes while meditating. The non-mindfulness prose included 40-, 55-, and 60-minute audio recordings of biographical books on tape. These focused on the lives and accomplishments of several prominent historical figures.

Experimental Design

This study utilized a parametric alternating treatments design, and the order of experimental conditions was counterbalanced across participants with up to two sessions held per week. See Table M2 for complete order of sessions and conditions. Due to scheduling, some sessions were postponed such that some weeks consisted of zero or one session for some participants. The independent variable of interest in this study was the duration of mindfulness practice, which was systematically manipulated across three experimental conditions for six sessions each as follows for five of the seven participants: 60 minutes, 20 minutes, and 5 minutes. The remaining two participants completed sessions involving 60 minutes and 0 minutes of mindfulness. Every session began with a 5-minute control condition, as outlined in the Procedures section, below.

The first session served as a baseline for all participants and included 60 minutes of non-mindfulness prose audio recording (i.e., "prose"). The next six sessions consisted of experimental sessions for Participants 1-5, in which the 60 minutes of audio consisted of one of the following: 60 minutes of guided mindfulness practice (i.e., "mindfulness"), 20 minutes of mindfulness and 40 minutes of prose (in either order), or 5 minutes of mindfulness and 55 minutes of prose (in either order). The participant then repeated each of these three sessions in a counterbalanced order. The six sessions after baseline for Participants 6 and 7 consisted of extended baselines for four sessions, and 60 minutes of mindfulness for two sessions (Sessions 5

and 7 for Participant 6, and Sessions 6 and 7 for Participant 7). The eighth session served as a return to baseline for all participants and included 60 minutes of prose. The principal investigator completed a treatment integrity checklist throughout each session (see Appendices C-E). All sessions were video recorded for data collection purposes.

Dependent Variables and Response Measurement

The first dependent variable was the participant's self-reported levels of mindfulness. Participants completed the MAAS (Appendix F) at the beginning and end of each session, and during experimental sessions when applicable, as outlined in the Procedures section below. The MAAS contained 15 items, and participants were asked to rate each item on a Likert scale with item scores ranging from 1-6. The average of the 15 items was then calculated to determine the participant's mindfulness score. The possible range of scores on the MAAS was 1 to 6, with higher means reflecting higher levels of mindfulness.

The second dependent variable was the participant's self-reported levels of stress. Participants completed the PSS (Appendix G) at the beginning and end of each session, and during some of the experimental sessions (with 5 or 20 minutes of mindfulness audio). The PSS contained 10 items, and participants were asked to rate each item on a Likert scale with item scores ranging from 0-4. Scores for the PSS were calculated by reversing items 4, 5, 7, and 8, and then adding all responses. The possible range of scores on the PSS was 0 to 40, with higher scores reflecting higher levels of stress.

The MAAS and PSS scores were used to determine overall changes pre- and post-intervention for each session. Questionnaires were in paper and pen format, and participants were asked to answer the questions honestly and according to the current moment in time. After

each session, the principal investigator scored the questionnaires and entered the results into an Excel spreadsheet.

The third dependent variable was the rate of displacement behaviors during each condition. Troisi (2002) found that displacement behavior, for humans and nonhuman primates, is a valid and useful measure for stress, as they occur more frequently under conditions of social tension, and may be more reliable than self-report. Data were collected as count for discrete displacement behaviors and the principal investigator then calculated the average rate per minute. Duration data were also collected for continuous displacement behaviors identified for this study. All operational definitions for displacement behaviors are listed in Table M3.

The principal investigator (and second observer for approximately 50% of sessions) watched the video recorded sessions and tallied the count of discrete displacement behaviors on a data sheet within 10-second intervals (see Appendix H). The overall count was then used to calculate the rate (average number of responses per minute) for each condition in each session. The principal investigator (and second observer for approximately 50% of sessions) then watched the video recorded sessions a second time to record the duration of each occurrence of continuous displacement behaviors on a data sheet by recording the time the behavior started and ended from the time stamp on the video (see Appendix I). All data were entered into an Excel™ spreadsheet.

The fourth dependent variable was heart rate, which was monitored and recorded using a Polar H7™ Heart Rate Sensor. The H7™ is a device that measures heart rate variability (HRV), which is the interval between individual heart beats in milliseconds. These data are then used to provide a second-by-second reading of heart rate in beats per minute (bpm; W. Vartabedian, personal communication, July 13, 2016). Data were recorded via Bluetooth to an Apple iPhone

6™ equipped with the Polar Beat™ app, and then uploaded to Polar's Diary™ website. Data were then downloaded on a laptop computer and entered into an Excel™ spreadsheet.

Observer Training and Interobserver Agreement

The second observer for this study was a graduate of a Masters program and a current student in a doctoral program in Applied Behavior Analysis. Prior to scoring participant data on questionnaires, the second observer met with the principal investigator for training on scoring questionnaires. The second observer viewed several copies of sample questionnaires that were completed by confederates. The second observer scored three questionnaires and the scores were compared to the results obtained by the principal investigator. Interobserver agreement (IOA) for questionnaire responses was calculated by dividing the number of matching answers (scored identically by the principal investigator and the second observer) by the total number of items on the questionnaire, and then multiplying by 100. IOA was 100% on all three sample questionnaires, and the second observer began experimental data collection.

If IOA had been under 100% on one or more questionnaires, the second observer would have received additional training by discussing the disagreement(s) with the principal investigator, and then would have received a second set of three questionnaires to score. If IOA would have been 100% on this second set of sample questionnaires, the second observer would have begun experimental data collection. These same procedures would have been used to retrain the second observer if IOA fell below 100% during any point of the study; additional training was conducted once during the study. Additional second observers would have been recruited to replace any who did not meet the training criterion; however, this was not necessary.

Prior to recording participant data from video recorded sessions, the second observer watched a 15-minute sample video and recorded count and duration of discrete and continuous

displacement behaviors, respectively. Results were then compared to those of the principal investigator and IOA was calculated for discrete displacement behaviors using total count (smaller count / larger count x 100) and continuous displacement behaviors using total duration (smaller duration / longer duration x 100). The second observer scored below 90% agreement with the principal investigator, and disagreements were discussed. The second observer then watched a second sample video and scored above 90% agreement, and subsequently began scoring experimental videos. Agreement did fall below 90% during the course of the study, and retraining was conducted as outlined above until agreement reached above 90%. Retraining occurred on four separate occasions.

IOA was calculated for three of the dependent variables: mindfulness scores, stress scores, and displacement behaviors. The second observer collected data for approximately 50% of all sessions, in all experimental conditions, for each dependent variable, and for each participant (with the exception of Participant 1, due to her early withdrawal). Results were returned to the principal investigator for calculations (IOA was calculated as stated above). If any disagreements on scoring arose that could not be settled, the principal investigator retained her recorded value. IOA for mindfulness scores and stress scores were calculated in the same way. After each IOA session, the principal investigator made a copy of each MAAS and PSS questionnaire, scored the original, and then gave the unmarked copy to the second observer to score. After both copies were scored, IOA was calculated by dividing the number of agreements by the total number of items and then multiplying by 100 (agreements / total x 100). IOA for all questionnaires was 100%. Retraining was necessary once during the study when IOA fell below 90% due to incorrect scoring by the second observer. The principal investigator returned the scored copy of the questionnaire to the second observer and requested that she re-score all of the

items, without pointing out which items were scored incorrectly. She then scored all items correctly and IOA increased to 100%.

IOA for discrete displacement behaviors was calculated using exact count-per-interval IOA, mean count-per-interval IOA, and scored-interval IOA. After each IOA session, the principal investigator re-recorded the video recorded session with a visible 10-second interval timer and transferred this recording to a USB drive, which she then gave to the second observer with the corresponding data sheets. After both the principal investigator and the second observer collected data from the video recording, the principal investigator collected the data sheets. Exact count-per-interval and mean count-per-interval IOA required the total number of intervals per condition: 30 intervals for each 5-minute control and each 5-minute mindfulness, 120 intervals for each 20-minute mindfulness, 240 intervals for each 40-minute prose, 330 intervals for each 55-minute prose, and 360 intervals for each 60-minute mindfulness and each 60-minute prose. Exact count-per-interval IOA was calculated by dividing the number of intervals for which both individuals counted the exact same number of responses by the total number of intervals in that condition and then multiplying by 100 (intervals agreed / total intervals x 100). Exact count-per-interval IOA for the control conditions ranged from 90% to 100% with an average of 96%, the mindfulness conditions ranged from 93% to 100% with an average of 98%, and the prose conditions ranged from 93% to 98% with an average of 95%.

Mean count-per-interval IOA was calculated by adding the agreement for each interval (I1 smaller / larger + I2 smaller / larger + I3 smaller / larger + I*n* smaller / larger), dividing by the total number of intervals, and then multiplying by 100 (I1 IOA + I2 IOA + I3 IOA + I*n* IOA / total intervals x 100). Mean count-per-interval IOA for the control conditions ranged from 90% to 100% with an average of 97%, the mindfulness conditions ranged from 95% to 100% with an

average of 98%, and the prose conditions ranged from 95% to 100% with an average of 97%. Scored-interval IOA was calculated by dividing the number of intervals for which both individuals counted the exact same number of responses (other than zero) by the number of intervals with an occurrence counted by at least one observer in that condition and then multiplying by 100 (intervals with an occurrence agreed on / intervals with an occurrence x 100). Scored-interval IOA for the control conditions ranged from 0% to 100% with an average of 76%, the mindfulness conditions ranged from 0% to 100% with an average of 65%, and the prose conditions ranged from 53% to 86% with an average of 79%. Low values for scored-interval IOA (especially 0%) occurred when one observer recorded very low rates of behavior within a condition and the other observer recorded no instances of behavior within that condition. For example, in the 60-minute mindfulness condition in Session 2 for Participant 2, the principal investigator recorded one occurrence and the second observer recorded no occurrences, thus resulting in 0% scored-interval IOA.

IOA for the duration of displacement behaviors was calculated using total duration IOA for each category (see Table M3 for list of categories). The principal investigator and second observer collected data on the duration of each occurrence by noting the start and stop time, and then calculating the duration. All durations for each category in each condition were then added to obtain a total, and IOA was calculated for each category by dividing the smaller value by the larger value and then multiplying by 100 (smaller duration / larger duration x 100). Total duration IOA for the control conditions ranged from 98% too 100% with an average of 100%, the mindfulness conditions ranged from 95% to 100% with an average of 98%, and the prose conditions ranged from 90% to 100% with an average of 96%.

For Participant 1, IOA was calculated for 33% of sessions (one of the three sessions she completed). MAAS and PSS IOA scores were 100%. Exact count-per-interval IOA for discrete displacement behaviors ranged from 94% to 97% with an average of 96%, mean count-per-interval IOA ranged from 95% to 98% with an average of 97%, and scored-interval IOA ranged from 52% to 88% with an average of 70%. IOA the duration of for continuous displacement behaviors ranged from 97% to 100% with an average of 99%.

For Participant 2, IOA was calculated for 50% of sessions. MAAS and PSS IOA scores were 100%. Exact count-per-interval IOA for discrete displacement behaviors ranged from 90% to 100% with an average of 96%, mean count-per-interval IOA ranged from 90% to 100% with an average of 97%, and scored-interval IOA ranged from 0% to 100% with an average of 61%. IOA for the duration of continuous displacement behaviors ranged from 90% to 100% with an average of 99%.

For Participant 3, IOA was calculated for 50% of sessions. MAAS and PSS IOA scores were 100%. Exact count-per-interval IOA for discrete displacement behaviors ranged from 93% to 100% with an average of 97%, mean count-per-interval IOA ranged from 93% to 100% with an average of 98%, and scored-interval IOA ranged from 38% to 100% with an average of 70%. IOA for the duration of continuous displacement behaviors ranged from 92% to 100% with an average of 99%.

For Participant 4, IOA was calculated for 50% of sessions. MAAS and PSS IOA scores were 100%. Exact count-per-interval IOA for discrete displacement behaviors ranged from 93% to 97% with an average of 96%, mean count-per-interval IOA ranged from 93% to 100% with an average of 97%, and scored-interval IOA ranged from 56% to 94% with an average of 81%. IOA

for the duration of continuous displacement behaviors ranged from 90% to 100% with an average of 97%.

For Participant 5, IOA was calculated for 50% of sessions. MAAS and PSS IOA scores were 100%. Exact count-per-interval IOA for discrete displacement behaviors ranged from 93% to 100% with an average of 97%, mean count-per-interval IOA ranged from 96% to 100% with an average of 99%, and scored-interval IOA ranged from 0% to 100% with an average of 70%. IOA for the duration of continuous displacement behaviors ranged from 93% to 100% with an average of 98%.

For Participant 6, IOA was calculated for 50% of sessions. MAAS and PSS IOA scores were 100%. Exact count-per-interval IOA for discrete displacement behaviors ranged from 93% to 100% with an average of 96%, mean count-per-interval IOA ranged from 95% to 100% with an average of 98%, and scored-interval IOA ranged from 60% to 100% with an average of 81%. IOA for the duration of continuous displacement behaviors ranged from 93% to 100% with an average of 98%.

For Participant 7, IOA was calculated for 50% of sessions. MAAS and PSS IOA scores were 100%. Exact count-per-interval IOA for discrete displacement behaviors ranged from 93% to 97% with an average of 95%, mean count-per-interval IOA ranged from 93% to 98% with an average of 97%, and scored-interval IOA ranged from 50% to 94% with an average of 82%. IOA for the duration of continuous displacement behaviors ranged from 93.6% to 100% with an average of 97%.

Procedures

Baseline (Session 1)

At the beginning of the first session, the principal investigator informed the participant that the session would be video recorded, and then turned on the recording device. The principal investigator handed an informed consent form (Appendix B) to the participant, asked them to follow along, and read the contents of the form, including all information related to their involvement, the risks, the expected time commitment, and the materials that were provided. The principal investigator asked the participant if they had any questions, answered accordingly, and then asked them to sign the form if they agreed to participate. Participants were encouraged to ask any questions for clarification. This study involved minimal risk to all participants, and they were permitted to withdraw from the study at any time with no negative repercussions. Participants received a signed copy of the consent form.

After participants gave their informed consent to participate, the principal investigator asked them if they had engaged in behaviors that could elevate their heart rate (exercising, drinking caffeinated beverages, etc.) in the 3 hours prior to the start time. All participants answered no, and the investigator asked them to refrain from these behaviors in the 3 hours prior to all future sessions. The principal investigator then asked them complete the pre-session MAAS and PSS. Next, the principal investigator asked the participants to place the Polar H7 on their chest (on top of the bottom portion of the sternum, below the pectoral muscles) and tighten the strap (around the lower portion of the ribs) until it was comfortable but stable. Participants chose either to go to the washroom to connect the monitor, have the principal investigator leave the room, or have the principal investigator turn away. The principal investigator then returned to the room, turned on the Polar Beat app, and ensured the device was functioning. The principal

investigator then asked the participants to engage in a low-stress activity for 5 minutes to collect heart rate data for control purposes. Magazines and/or puzzle books were provided in order to maintain consistency, and participants were informed that they could choose to engage with them or not. After the 5 minutes, the principal investigator then paused the Polar Beat app and asked the participants if they would like a break. Next, the principal investigator informed the participants that the next 60 minutes would consist of them listening to an audio recording and that they were permitted to stand if they wished. Throughout the study, if participants asked about their specific responsibilities, the principal investigator stated that their only obligation was to remain seated in the room (standing when they wished) and listen to the audio. No further instructions were given. After participants stated they were ready to commence, the principal investigator started the 60-minute prose audio, left the room, and started the timer to indicate when to return. At the end of the session, the principal investigator entered the room, stopped the Polar Beat app, and asked the participant to fill out the MAAS (see Appendix F), PSS (see Appendix G), and audio questions (see Appendix L). Upon completion of this first session, participants were given $5 and thanked for their time.

Experimental Sessions (Sessions 2-7)

At the beginning of experimental sessions, the principal investigator turned on the video recording device. Experimental sessions began with the pre-session MAAS and PSS questionnaires, and the remainder of the session followed the same format as in baseline. The 60 minutes of audio included varying durations of mindfulness and prose as outlined in Table M2. For Participants 1-5, during the sessions that included 5 or 20 minutes of mindfulness, the recording was paused, and the principal investigator entered the room and asked the participant to complete the mid-session MAAS and PSS. Next, the principal investigator started the second

part of the audio and left the room. For Participants 1-3, the first part of the audio was mindfulness and the second part was prose, and for Participants 4-5, the first part of the audio was prose and the second part was mindfulness. When the session included 60 minutes of mindfulness (two sessions each for all participants), and during all sessions for Participants 6 and 7, there was no pause and no mid-session completion of the questionnaires.

During sessions for Participants 1-4, the principal investigator did not remove the materials available to the participants in the control condition (puzzle books) once the audio portion of the sessions started. Participants 3 and 4 engaged with the books during the prose condition of Session 1, and after consultation with the principal investigator's dissertation Chair, it was decided to leave the books for all remaining sessions for these two participants for consistency, and to remove them after the control condition for all sessions for Participants 5-7. Participants 1 and 2 did not engage with the books during the audio conditions. The puzzle books were available during all control conditions for all participants.

Baseline (Session 8)

The final baseline session followed the same format as the experimental sessions, with the audio being 60 minutes of prose with no pause. After completing the post-session MAAS, PSS, and audio questions, participants were asked to fill out the social validity questionnaire, were debriefed on the purpose of the study and given $5, and were thanked for their participation.

Social Validity

Participants 2-7 were asked to complete a social validity questionnaire to determine the extent to which they agreed or disagreed with several statements about the study (see Appendix K; Participant 1 withdrew from the study after Session 3 and therefore did not complete the

social validity questionnaire). Participant 2 indicated that the mindfulness practice was somewhat effective in reducing stress and anxiety, but was neutral about whether or not it was helpful specifically in regards to his job, dealing with challenges, or accepting things one cannot change. He strongly agreed that the time commitment for this study was reasonable, and did not spend time outside of sessions finding information on mindfulness. He somewhat preferred the 20-minute mindfulness practice over the 5- or 60-minute practice, and somewhat agreed that it was the most effective for him. He agreed somewhat with the statement that he would continue to practice independently upon conclusion of the study.

Participant 3 strongly agreed that the mindfulness practice was effective in reducing stress and anxiety, was helpful specifically with her schooling, job, and family, was helpful in dealing with challenges, and was helpful in accepting things that one cannot change. She also strongly agreed that the time commitment was reasonable, and reported that she spent more than 3 hours outside of sessions finding information on mindfulness. She strongly preferred the 60-minute mindfulness practice and also strongly agreed that it was the most effective for her. She strongly agreed that she would continue to practice independently.

Participant 4 somewhat agreed that the mindfulness practice was effective in reducing stress and anxiety, strongly agreed that it was helpful with her job, somewhat agreed that it was helpful in dealing with challenges, and was neutral about it helping to accept things that one cannot change. She strongly agreed that the time commitment was reasonable and spent less than 1 hour outside of sessions finding information on mindfulness. She strongly preferred the 60-minute mindfulness practice and also strongly agreed that it was the most effective for her. She somewhat agreed that she would continue to practice independently.

Participant 5 somewhat agreed that the mindfulness practice was effective in reducing stress and anxiety, was neutral about whether it was helpful with her schooling, job, and family, somewhat agreed that it was helpful in dealing with challenges, and somewhat disagreed that it was helpful in accepting things that one cannot change. She strongly agreed that the time commitment was reasonable and did not spend time outside of sessions finding information on mindfulness. She somewhat preferred the 20-minute mindfulness, but was neutral about whether it was the most effective for her. She strongly disagreed that she would continue to practice independently.

Participant 6 somewhat agreed that the mindfulness practice was effective in reducing stress and anxiety, but strongly agreed that it was helpful with her job. She also somewhat agreed that it was helpful in dealing with challenges, and was neutral about whether it was helpful in accepting things that one cannot change. She was neutral about the time commitment and spent 1 to 3 hours outside of sessions finding information on mindfulness. She somewhat agreed that she preferred the mindfulness conditions over the prose conditions, and that it was the most effective for her (please note that Participant 6 did not experience 5- or 20-minute mindfulness conditions). She strongly agreed that she would continue to practice independently.

Participant 7 somewhat disagreed that the mindfulness practice was effective in reducing stress and anxiety, was helpful with her schooling or job, was helpful in dealing with challenges, or was helpful in accepting things that one cannot change. She somewhat agreed that the time commitment was reasonable and spent less than 1 hour outside of sessions finding information on mindfulness. She was neutral about which condition she preferred, but somewhat agreed that the mindfulness condition was more effective for her than the prose condition (please note that

Participant 6 did not experience 5- or 20-minute mindfulness conditions). She somewhat agreed that she would continue to practice independently.

Treatment Integrity

The principal investigator completed a treatment integrity checklist (Appendices C-E) during each session for all items to be completed. As each step was completed, the item was checked off. Treatment integrity was then calculated by dividing the number of checked items by the total number of items, and then multiplying by 100 (checked items / total items x 100). Treatment integrity was 100% for all sessions for Participants 1, 2, 4, 5, 6, and 7. Treatment integrity was 100% for six sessions for Participant 3. It was 66% for Session 3 due to experimenter error in which the principal investigator neglected to bring the heart rate monitor, resulting in all steps involving heart rate being not completed (see Appendix D for checklist; steps 3, 5, 6, and 10). Treatment integrity was 93% for Session 7 due to experimenter error in which the principal investigator neglected to ask Participant 3 to remove the heart rate monitor at the end of the session, resulting in Step 10 being not completed.

The second observer also completed a treatment integrity checklist for approximately 50% of all sessions (33% for Participant 1), and treatment integrity IOA was calculated by dividing the number of items agreed upon by the total number of items, and then multiplying by 100 (agreements / total items x 100). Treatment integrity IOA was 100% for Participants 1-6. Treatment integrity IOA ranged from 92% to 100% for Participant 7, with an average of 96%.

After each session, all participants answered three “YES/NO” questions about the content of the audio recording as a measure of treatment integrity (see Appendix L). No feedback was provided about their answers and there were no penalties for incorrect answers. An answer key was created by the principal investigator, and used to score the answers. Participant 1’s scores

ranged from 66% to 100% with an average of 89%. Participant 2's scores ranged from 33% to 100% with an average of 87%. Participant 3's scores ranged from 66% to 100% with an average of 87%. Participant 4's scores ranged from 66% to 100% with an average of 87%. Participant 5's scores ranged from 66% to 100% with an average of 96%. Participant 6's scores ranged from 66% to 100% with an average of 90%. Participant 7's scores ranged from 66% to 100% with an average of 96%. The principal investigator copied the answers after 50% of the sessions with each participant and gave the unmarked copy to the second observer for IOA. An additional second observer was recruited to score a small portion of the audio questionnaires due to the unavailability of the original second observer. This additional second observer was trained on how to read the answer key, how to read the questionnaires, and how to score the questionnaires. IOA was then calculated by dividing the smaller score by the larger score and then multiplying by 100 (smaller / larger x 100), and was 100% for all participants.

Chapter 4: Findings

Introduction

Included below are the results of the current study, including data on heart rate, MAAS scores, PSS scores, and discrete and continuous displacement behaviors for each individual participant. All graphs and figures are presented in Appendix N.

Results

Participant 1. Participant 1 withdrew after completing three sessions, consisting of initial baseline, 60 minutes of mindfulness, and 20 minutes of mindfulness followed by 40 minutes of prose. Figure N1 displays heart rate values across seconds for Participant 1. During Session 1 (first panel), values ranged from 0 to 155 bpm with most values between 60 and 80 bpm; values during Session 2 (second panel) ranged from 0 to 206 bpm, with most values between 60 and 80 bpm and high variability toward the end of the control, and during the final one-third of the mindfulness audio (likely due to a malfunction in the device); and values in during Session 3 (third panel) ranged from 0 to 177 bpm with most values between 70 and 90 bpm. Figure N2 displays revised heart rate values across seconds. Due to the extreme low and high values, values outside of the normal resting heart rate for adult humans (50-100 bpm) were omitted. During Session 1, revised values range from 55 to 99 bpm; revised values during Session 2 ranged from 50 to 99 bpm; and revised values during Session 3 ranged from 63 to 99 bpm.

Figure N3 displays the average heart rate for each condition during each session (top panel), as well as revised averages after the omission of extreme values (bottom panel) for Participant 1. The top panel shows that during Session 1, the original average heart rate was 64 bpm for the 5-minute control condition and 66 bpm for the 60-minute prose condition. During Session 2, the average was 77 bpm for the 5-minute control and 75 bpm for the 60-minute

mindfulness. During Session 3, the average was 77 bpm for the 5-minute control, 76 bpm for the 20-minute mindfulness, and 75 bpm for the 40-minute prose. The bottom panel shows that during Session 1, the revised average heart rate remained at 64 bpm for the 5-minute control condition and 66 bpm for the 60-minute prose condition. During Session 2, the average remained at 77 bpm for the 5-minute control and decreased to 71 bpm for the 60-minute mindfulness. During Session 3, the average remained at 77 bpm for the 5-minute control and 76 bpm for the 20-minute mindfulness, and decreased to 74 bpm for the 40-minute prose. Both of the values that changed from the original average after being revised for outliers were lower than the original data value, with decreases of 4 bpm for one and 1 bpm for the other.

Figure N4 displays the differences in the average heart rate from the final 2 minutes of each control condition compared to the average heart rate from the final 2 minutes of each mindfulness and prose condition for each session, for both original and revised values. The top panel shows that the original difference in the final 2 minutes for Session 1 was a decrease of 0.3 bpm from control to prose; for Session 2 there was an increase of 10.3 bpm from control to mindfulness; for Session 3 there was a decrease of 2.9 bpm from control to mindfulness and a decrease of 5.8 bpm from control to prose. Both of the two differences after prose were decreases, and of the two differences after mindfulness, one was an increase and the other was a decrease. The bottom panel shows that the difference in the revised average heart rate for the final 2 minutes for Session 1 was a decrease of 0.2 bpm from control to prose; for Session 2 there was a decrease of 3.4 bpm from control to mindfulness; for Session 3 there was a decrease of 2.9 bpm from control to mindfulness and a decrease of 6.7 bpm from control to prose. All four differences, two from control to prose and two from control to mindfulness, were decreases ranging from 0.2 to 6.7 bpm.

Figure N5 displays the differences in the average heart rate from the final 1 minute of each control condition compared to the average heart rate from the final 1 minute of each mindfulness and prose condition for each session, for both original and revised values. The top panel shows that the original difference in the final 1 minute for Session 1 was an increase of 1.4 bpm from control to prose; for Session 2 there was a decrease of 15.9 bpm from control to mindfulness; for Session 3 there was a decrease of 2.6 bpm from control to mindfulness and a decrease of 5.5 bpm from control to prose. Of the two differences after prose, one was an increase and one was a decrease. Both of the differences after mindfulness were decreases. The bottom panel shows that the difference in the revised average heart rate for the final 1 minute for Session 1 was an increase of 1.5 bpm from control to prose; for Session 2 there was a decrease of 3.5 bpm from control to mindfulness; for Session 3 the difference remained the same at a decrease of 2.6 bpm from control to mindfulness and there was a decrease of 8.3 bpm from control to prose. Of the two differences after prose, one was an increase and one was a decrease. Both of the differences after mindfulness were decreases.

Figure N6 displays MAAS scores for Participant 1. The MAAS consists of 15 items, each answered on a Likert scale of 0-6; the total is then divided by 15 to obtain an average score between 0 and 6, with higher scores reflecting a higher level of mindfulness. For Session 1, the score remained the same from 3.0 pre-session to 3.0 post-session after 60 minutes of prose. For Session 2, the score increased from 3.3 pre-session to 3.4 post-session after 60 minutes of mindfulness. For Session 3, the score increased from 3.1 pre-session to 3.5 mid-session after 20 minutes of mindfulness, and then decreased to 3.3 post-session after 40 minutes of prose. Although it is difficult to determine any meaningful trends with data points from only three

sessions, the MAAS score for Participant 1 did increase after both mindfulness conditions, and the one decrease in score occurred in Session 3 after the prose portion at the end of the session.

Figure N7 displays the differences in MAAS scores pre-session to post-mindfulness, pre-session to post-prose, and post-mindfulness to post-prose for Participant 1. There was no difference in Session 1's score after 60 minutes of prose; Session 2's difference was an increase of 0.1 after 60 minutes of mindfulness; Session 3's was an increase of 0.4 after 20 minutes of mindfulness and then a decrease of 0.2 after 40 minutes of prose.

Figure N8 displays PSS scores for Participant 1. The PSS consists of 10 items, each answered on a 0-4 Likert scale; the items are added to obtain a total score between 0 and 40, with higher sores reflecting a higher level of stress. For Session 1, the score decreased from 27 pre-session to 25 post-session after 60 minutes of prose. For Session 2, the score decreased from 26 pre-session to 22 post-session after 60 minutes of mindfulness. For Session 3, the score decreased from 24 pre-session to 21 mid-session after 20 minutes of mindfulness, and then remained at 21 post-session after 40 minutes of prose. As with the MAAS score, it is difficult to determine trends with data points from three sessions. However, the two largest decreases occurred after the mindfulness conditions.

Figure N9 displays the differences in PSS scores pre-session to post-mindfulness, pre-session to post-prose, and post-mindfulness to post-prose for Participant 1. Session 1's difference was a decrease of 2 after 60 minutes of prose; Session 2's difference was a decrease of 4 after 60 minutes of mindfulness; Session 3's was a decrease of 3 after 20 minutes of mindfulness and then no further change after 40 minutes of prose.

Figure N10 displays the number of displacement behaviors emitted during each 10-second interval, and Figure N11 shows the cumulative record of the same data, showing the

cumulative number of responses emitted across 10-second intervals for Participant 1. The first panels of Figures N10 and N11 show that during the Session 1 5-minute control, two responses were emitted across two of the 30 intervals, near the beginning and end of the condition. During the 60-minute prose condition, 233 responses were emitted across 124 of the 360 intervals, with responding fairly evenly dispersed across the session. The second panels of Figures N10 and N11 show that during the Session 2 5-minute control, nine responses were emitted across eight of the 30 intervals, evenly dispersed throughout the condition. During the 60-minute mindfulness, 52 responses were emitted across 41 of the 360 intervals, also evenly dispersed. The third panels of Figures N10 and N11 shows that during the Session 3 5-minute control, three responses were emitted across three of the 30 intervals, near the beginning and end of the condition. During the 20-minute mindfulness, eight responses were emitted across six of the 120 intervals, with the majority of responses evenly dispersed throughout the middle one third of the condition. During the 40-minute prose, video recording was cut off after approximately 15 minutes; during these 87 intervals, 88 responses were emitted across 39 intervals, with three bursts near the beginning, middle, and end of the observation. Figure 12 shows the same data as Figure N11, but with the pen reset every 5 minutes to better demonstrate response patterns across time. This figure shows that responding is visually significantly higher in the prose conditions, compared especially to the mindfulness conditions. Responding across 5-minute periods is inconsistent, with higher responding toward the beginning of some periods and toward the end of others.

Figure N13 displays the average frequency (responses per minute) of discrete displacement behaviors (top panel) as well as percent of session engaged in continuous displacement behaviors (bottom panel) per condition for each session for Participant 1. The top

panel shows that during the Session 1 control, Participant 1 emitted an average of 0.4 responses per minute and during the 60-minute prose she emitted an average of 3.9 responses per minute. During the Session 2 control, she emitted an average of 1.8 responses per minute and during the 60-minute mindfulness she emitted an average of 0.9 responses per minute. During the Session 3 control, she emitted an average of 0.6 responses per minute, during the 20-minute mindfulness she emitted an average of 0.4 responses per minute, and during the 40-minute prose she emitted an average of 6.0 responses per minute. Overall, the level for the mindfulness conditions is consistently lower than in the control and prose conditions. Data in the mindfulness conditions have low variability, with frequencies ranging from 0.4 to 0.9 responses per minute. The control conditions also have low variability with frequencies ranging from 0.4 to 1.8 responses per minute. The prose conditions have the largest range with frequencies ranging from 3.9 to 6 responses per minute.

The bottom panel of Figure N13 shows that during the Session 1 control, Participant 1 did not engage in continuous displacement behaviors. During the 60-minute prose, she engaged with her phone 9.8% of the time, stood up 3.4%, turned 90 degrees in her chair 15.9%, and supported her head for 10.3%, for a total of 39.4% of the condition. During the Session 2 5-minute control, she did not engage in continuous displacement behaviors, and during the 60-minute mindfulness she stood up for 0.9% of the condition. During the Session 3 control, she did not engage in continuous displacement behaviors; during the 20-minute mindfulness she engaged with her phone 4.0% of the time; and during the prose she engaged with her phone 8.8% of the time and supported her head 9.3% for a total of 18.1% during the 15 minutes the video recording was functional. Overall, the levels for the control and mindfulness conditions were lower than the prose conditions. The variability for the mindfulness conditions was low, ranging from 0.9%

to 4.0%, and the variability was moderate for the prose conditions, ranging from 18.1% to 39.4 %. Participant 1 did not engage in more than one continuous displacement behavior simultaneously, and therefore the percentages were added for all continuous displacement behaviors in each condition. Other participants did engage in more than one continuous displacement behavior simultaneously at times, and therefore some percentages are added for a total, with an additional percentage noted for behaviors that occurred at least partially during another.

Participant 2. Figure N14 displays heart rate values across seconds for Participant 2. During Session 1 (first panel), values ranged from 56 to 75 bpm; values during Session 2 (second panel) ranged from 61 to 80 bpm; values during Session 3 (third panel) ranged from 0 to 74 bpm with most values between 52 and 74 bpm; values during Session 4 (fourth panel) ranged from 62 to 78 bpm; values during Session 5 (fifth panel) ranged from 58 to 79 bpm; values during Session 6 (sixth panel) ranged from 60 to 76 bpm; values during Session 7 (seventh panel) ranged from 0 to 175 bpm with most values between 60 and 70 bpm, and Participant 2 requested to end the session after approximately 37 minutes due to noise interference from the hallway; and values during Session 8 (eighth panel) ranged from 54 to 69 bpm. Figure N15 displays revised heart rate values across seconds. Values were revised only for Sessions 3 and 7, as the other sessions did not include values outside of 50-100 bpm. During Session 3 (third panel), revised values ranged from 52 to 74 bpm and revised values during Session 7 (seventh panel) ranged from 55 to 99 bpm.

Figure N16 displays the average heart rate for each condition during each session (top panel), as well as revised averages after the omission of extreme values (bottom panel) for Participant 2. The top panel shows that during Session 1, the original average heart rate was 69

bpm for the 5-minute control condition and 63 bpm for the 60-minute prose condition. During Session 2, the average was 76 bpm for the 5-minute control and 68 bpm for the 60-minute mindfulness. During Session 3, the average was 66 bpm for the 5-minute control, 62 bpm for the 5-minute mindfulness, and 58 bpm for the 55-minute prose. During Session 4, the average was 73 bpm for the 5-minute control, 69 bpm for the 20-minute mindfulness, and 66 bpm for the 40-minute prose. During Session 5, the average was 74 bpm for the 5-minute control, 71 bpm for the 5-minute mindfulness, and 66 bpm for the 55-minute prose. During Session 6, the average was 70 bpm for the 5-minute control, 68 bpm for the 20-minute mindfulness, and 65 bpm for the 40-minute prose. During Session 7, the average was 93 bpm for the 5-minute control and 62 bpm for the 60-minute mindfulness. During Session 8, the average was 65 bpm for the 5-minute control and 59 for the 60-minute prose. The bottom panel shows that averages were not revised for Session 1, Session 2, Session 4, Session 5, Session 6, and Session 8. For Session 3, the average remained at 66 bpm for the 5-minute control and 58 bpm for the 55-minute prose, and increased to 63 bpm for the 5-minute mindfulness. For Session 7, the revised average decreased to 71 bpm for the 5-minute control and remained at 62 bpm for the 60-minute mindfulness. Of the two values that changed from the original average after being revised for outliers, one was an increase of 1 bpm for Session 3's mindfulness condition and the other was a decrease of 12 bpm for Session 7's control condition.

Figure N17 displays the differences in the average heart rate from the final 2 minutes of each control condition compared to the average heart rate from the final 2 minutes of each mindfulness and prose condition for each session. The difference in the final 2 minutes for Session 1 was a decrease of 7.4 bpm from control to prose; for Session 2 there was a decrease of 10.7 bpm from control to mindfulness; for Session 3 there was a decrease of 2.9 bpm from

control to mindfulness and a decrease of 7.9 from control to prose; for Session 4 there was a decrease of 4.7 bpm from control to mindfulness and a decrease of 7.6 from control to prose; for Session 5 there was a decrease of 3.8 bpm from control to mindfulness and a decrease of 11.5 from control to prose; for Session 6 there was a decrease of 3.2 bpm from control to mindfulness and a decrease of 4.1 bpm from control to prose; for Session 7 there was a decrease of 2.2 bpm from control to mindfulness; and for Session 8 there is a decrease of 5.5 bpm from control to prose. All of the differences were decreases, ranging from 4.1 bpm to 11.5 bpm for the prose conditions (Session 7 and Session 5, respectively) and 2.2 bpm to 10.7 bpm for mindfulness conditions (Session 6 and Session 2, respectively). No values were revised during the final 2 minutes of any control, mindfulness, or prose conditions, and therefore all differences remain the same.

Figure N18 displays the differences in the average heart rate from the final 1 minute of each control condition compared to the average heart rate from the final 1 minute of each mindfulness and prose condition for each session. The original difference in the final 1 minute for Session 1 was a decrease of 7.5 bpm from control to prose; for Session 2 there was a decrease of 10.5 bpm from control to mindfulness; for Session 3 there was a decrease of 2.9 bpm from control to mindfulness and a decrease of 6.7 from control to prose; for Session 4 there was a decrease of 4.0 bpm from control to mindfulness and a decrease of 8.1 from control to prose; for Session 5 there was a decrease of 4.4 bpm from control to mindfulness and a decrease of 11.3 bpm from control to prose; for Session 6 there is a decrease of 1.8 bpm from control to mindfulness and a decrease of 4.0 bpm from control to prose; for Session 7 there was an increase of 2.6 bpm from control to mindfulness; and for Session 8 there is a decrease of 3.0 bpm from control to prose. All of the differences except one were decreases, ranging from 3.0 bpm to 11.3

bpm for the prose conditions (Session 8 and Session 5, respectively) and 1.8 bpm to 10.5 bpm for mindfulness conditions (Session 6 and Session 2, respectively). The single increase in difference was for Session 7's mindfulness condition, at a value of 2.6 bpm. No values were revised during the final 1 minute of any control, mindfulness, or prose conditions, and therefore all differences remain the same.

Figure N19 displays MAAS scores for Participant 2. For Session 1, the score remained the same from 3.6 pre-session to post-session after 60 minutes of prose. For Session 2, the score increased from 3.9 pre-session to 4.3 post-session after 60 minutes of mindfulness. For Session 3, the score increased from 4.1 pre-session to 4.3 mid-session after 5 minutes of mindfulness, and then increased to 4.4 post-session after 55 minutes of prose. For Session 4, the score remained the same from 4.1 pre-session to mid-session after 20 minutes of mindfulness, and then increased to 4.3 after 40 minutes of prose. For Session 5, the score increased from 4.1 pre-session to 4.7 mid-session after 5 minutes of mindfulness, and then decreased to 4.5 post-session after 55 minutes of prose. For Session 6, the score remained the same from 4.5 to mid-session after 20 minutes of mindfulness, and then increased to 4.6 post-session after 40 minutes of prose. For Session 7, the score decreased from 4.5 pre-session to 4.4 post-session after 37 minutes of mindfulness. For Session 8, the score increased from 4.5 pre-session to 4.7 post-session after 60 minutes of prose. The MAAS score increased following the mindfulness condition during five of the six sessions, with the two largest increases following 60 and 5 minutes of mindfulness. The only decrease pre- to post-session in MAAS score occurred in Session 7, after approximately 37 minutes of mindfulness. Participant 2 requested to end the 60-minute mindfulness early due to self-reported frustration over noise from the hallway. Overall, the MAAS scores have an

increasing trend, with each subsequent pre-session score equal to or higher than the previous pre-session score. Variability is low, with all scores between 3.9 and 4.7.

Figure N20 displays the differences in MAAS scores pre-session to post-mindfulness, pre-session to post-prose, and post-mindfulness to post-prose for Participant 2. There was no difference in Session 1's score after 60 minutes of prose; Session 2's was an increase of 0.4 after 60 minutes of mindfulness; Session 3's was an increase of 0.2 after 5 minutes of mindfulness and then an increase of 0.1 after 55 minutes of prose; there was no difference in Session 4's score after 20 minutes of mindfulness and then an increase of 0.2 after 40 minutes of prose; Session 5's was and increase of 0.6 after 5 minutes of mindfulness and then a decrease of 0.2 after 55 minutes of prose; there was no difference in Session 6's score after 20 minutes of mindfulness and then an increase of 0.1 after 40 minutes of prose; Session 7's was a decrease of 0.1 after 60 minutes of mindfulness; and Session 8's was an increase of 0.2 after 60 minutes of prose.

Figure N21 displays PSS scores for Participant 2. For Session 1, the score increased from 22 pre-session to 23 post-session after 60 minutes of prose. For Session 2, the score decreased from 22 pre-session to 19 post-session after 60 minutes of mindfulness. For Session 3, the score decreased from 23 pre-session to 22 mid-session after 5 minutes of mindfulness and then increased back to 23 post-session after 55 minutes of prose. For Session 4, the score remained the same from 21 pre-session to mid-session after 20 minutes of mindfulness, and then decreased to 19 after 40 minutes of prose. For Session 5, the score decreased from 20 pre-session to 19 mid-session after 5 minutes of mindfulness and then remained at 19 post-session after 55 minutes of prose. For Session 6, the score decreased from 19 pre-session to 18 mid-session after 20 minutes of mindfulness, and then decreased to 17 post-session after 40 minutes of prose. For Session 7, the score increased from 18 pre-session to 19 post-session after 37 minutes of

mindfulness. For Session 8, the score increased from 18 pre-session to 20 post-session after 60 minutes of prose. The PSS score decreased following four of the six mindfulness conditions, with the largest decrease following 60 minutes of mindfulness; the fifth session's score remained the same and the sixth session's score increased. The same was true for the prose conditions. Overall, Participant 2's PSS scores show a decreasing trend, with each subsequent pre-session score equal to or lower than the previous pre-session score. Variability is low, with all scores between 17 and 23.

Figure N22 displays the differences in PSS pre-session to post-mindfulness, pre-session to post-prose, and post-mindfulness to post-prose for Participant 2. Session 1's difference was an increase of 1 after 60 minutes of prose; Session 2's was a decrease of 3 after 60 minutes of mindfulness; Session 3's was a decrease of 1 after 5 minutes of mindfulness and then no change after 55 minutes of prose; there was no difference in Session 4's score after 20 minutes of mindfulness and then a decrease of 2 after 40 minutes of prose; Session 5's was a decrease of 1 after 5 minutes of mindfulness and then no change after 55 minutes of prose; Session 6's was a decrease of 1 after 20 minutes of mindfulness and then a decrease of 1 after 40 minutes of prose; Session 7's was an increase of 1 after 37 minutes of mindfulness; and Session 8's was an increase of 2 after 60 minutes of prose.

Figures N23 displays the number of displacement behaviors emitted during each 10-second interval, and Figure N24 shows a cumulative record of the same data, showing the cumulative number of responses emitted across 10-second intervals for Participant 2. The first panels of Figures N23 and N24 show that during the Session 1 5-minute control, three responses were emitted across three of the 30 intervals, near the beginning and end of the condition. During the 60-minute prose condition, 251 responses were emitted across 159 of the 360 intervals, with

responding fairly evenly dispersed throughout the session and several bursts. The second panels show that during the Session 2 5-minute control, four responses were emitted across four of the 30 intervals, near the middle and end of the condition. During the 60-minute mindfulness, no responses were emitted in any of the 360 intervals. The third panels show that during the Session 3 5-minute control, eight responses were emitted across six of the 30 intervals, near the beginning and middle of the condition, and one response at the end. During the 5-minute mindfulness, no responses were emitted during the 30 intervals of the condition. During the 55-minute prose, 191 responses were emitted across 116 of the 330 intervals with responding evenly dispersed across the condition and a lower frequency toward the beginning. The fourth panels show that during the Session 4 5-minute control, five responses were emitted across two of the 30 intervals, near the middle and end of the condition. During the 20-minute mindfulness, one response was emitted toward the beginning of the condition. During the 40-minute prose, 31 responses were emitted across 15 of the 240 intervals, with interspersed responding during the first half of the condition and toward the end. The fifth panels show that during the Session 5 5-minute control, five responses were emitted across five of the 30 intervals, at the beginning and toward to end of the condition. During the 5-minute mindfulness, two responses were emitted across two of the 30 intervals, near the beginning and end of the condition. During the 55-minute prose, 295 responses were emitted across 165 of the 330 intervals with steady responding across the condition. The sixth panels show that during the Session 6 5-minute control, 1 response was emitted in the second half of the condition. During the mindfulness condition, 5 responses were emitted across 5 intervals during the first half of the condition. After approximately 13 minutes, the lights in the room turned off due to a power-saving timer and remained off until the 101st interval, after which four responses were emitted across three intervals. During the 40-minute

prose, 176 responses were emitted across 96 of the 240 intervals, with denser responding in the second half of the condition. The seventh panels show that during the Session 7 5-minute control, two responses were emitted across two of the 30 intervals toward the middle of the condition. During the 37-minute mindfulness, 36 responses were emitted across 21 of the 219 intervals, interspersed throughout the condition. The eighth panels show that during the Session 8 5-minute control, 19 responses were emitted across 12 of the 30 intervals, evenly dispersed across the condition. During the 60-minute prose, 151 responses were emitted across 105 of the 360 intervals, with steady responding across most of the condition and a short period near the end with no responses. Figure N25 shows the same data as Figure N24, but with the pen reset every 5 minutes to better demonstrate response patterns across time. This figure shows higher responding during the prose conditions, especially compared to the mindfulness conditions. The majority of the 5-minute periods in prose conditions have fairly steady responding across the period, with low gradient slopes.

Figure N26 displays the average frequency (responses per minute) of discrete displacement behaviors (top panel) as well as percent of session engaged in continuous displacement behaviors (bottom panel) per condition for each session for Participant 2. The top panel shows that during the Session 1 control condition, he emitted an average of 0.6 responses per minute and during the 60-minute prose he emitted an average of 4.2 responses per minute. During the Session 2 control, he emitted an average of 0.8 responses per minute and during the 60-minute mindfulness he did not emit any responses. During the Session 3 control, he emitted an average of 1.6 responses per minute, during the 5-minute mindfulness he did not emit any responses, and during the 55-minute prose he emitted an average of 3.5 responses per minute. During the Session 4 control, he emitted an average of 1.0 responses per minute, during the 20-

minute mindfulness he emitted an average of 0.05 responses per minute, and during the 40-minute prose he emitted an average of 0.8 responses per minute. During the Session 5 control, he emitted an average of 1.0 responses per minute, during the 5-minute mindfulness he emitted an average of 0.4 responses per minute, and during the 55-minute prose he emitted an average of 5.4 responses per minute. During the Session 6 control, he emitted an average of 0.2 responses per minute, during the 12 minute and 40 seconds of mindfulness available on video he emitted an average of 0.7 responses per minute, and during the 40-minute prose he emitted an average of 4.4 responses per minute. During the Session 7 control, he emitted an average of 0.4 responses per minute and during the 37 minute of mindfulness he emitted an average of 1.0 responses per minute. During the Session 8 control, he emitted an average of 3.8 responses per minute and during the 60-minute prose he emitted an average of 2.5 responses per minute. Overall, the level for the mindfulness conditions are consistently lower than the prose conditions, and lower than the control conditions with the exception of Sessions 6 and 7. The mindfulness conditions have low variability, with frequencies ranging from 0 to 1.0 responses per minute. The control and prose conditions have moderate variability with frequencies ranging from 0 to 3.8 responses per minute and 0.8 to 5.4 per minute, respectively. The trends for the mindfulness and prose conditions maintain across sessions, whereas the control condition data show an increasing trend due to Session 8.

The bottom panel of Figure N26 shows that during the Session 1 control, Participant 2 did not engage in continuous displacement behaviors and during the 60-minute prose he supported his head 5.5% of the time. During Session 2, Session 3, and Session 4, he did not engage in continuous displacement behaviors. During the Session 5 control, he supported his head with his hand(s) 9.3% of time, during the 5-minute mindfulness he did not engage in

continuous displacement behaviors, and during the 55-minute prose he supported his head 7.8% of the time. During Session 6 and Session 7 he did not engage in any continuous displacement behaviors. During the Session 8 control, he supported his head 16.3% of the time, and during the 60-minute prose he did not engage in continuous displacement behaviors. The level for the mindfulness conditions was the lowest with no variability. The variability for the prose conditions was low, with the range being 0 for four sessions to 7.8%. The variability for the control conditions was moderate, ranging from 0% for six sessions to 16.3%. The trends for the mindfulness and prose conditions were maintaining, whereas the control conditions showed an increasing trend.

Participant 3. Figure N27 displays heart rate values across seconds for Participant 3. During Session 1 (first panel), values ranged from 0 to 128 bpm with most values between 60 and 80 bpm; values during Session 2 (second panel) ranged from 0 to 226 bpm, with many values around 60 bpm; values during Session 3 (third panel) are unavailable due to principal investigator error; values during Session 4 (fourth panel) ranged from 0 to 141 bpm with most values between 60 and 80 bpm; values during Session 5 (fifth panel) ranged from 0 to 200 bpm with most values between 60 and 80 bpm; values during Session 6 (sixth panel) ranged from 58 to 85 bpm and the device malfunctioned and ceased to collect data after approximately 41 minutes; values during Session 7 (seventh panel) ranged from 0 to 83 bpm with most values between 60 and 80 bpm; and values during Session 8 (eighth panel) ranged from 0 to 94 bpm with most values between 60 and 80 bpm.

Figure N28 displays revised heart rate values across seconds. During Session 1 (first panel), revised values range from 59 to 94 bpm; revised values during Session 2 (second panel) ranged from 39 to 99 bpm; values during Session 3 (third panel) are unavailable; revised values

during Session 4 (fourth panel) ranged from 60 to 99 bpm; revised values during Session 5 (fifth panel) ranged from 58 to 99 bpm; values during Session 6 (sixth panel) were not revised; revised values during Session 7 (seventh panel) ranged from 58 to 83 bpm; and revised values during Session 8 (eighth panel) ranged from 59 to 94 bpm.

Figure N29 displays the average heart rate for each condition during each session (top panel), as well as revised averages after the omission of extreme values (bottom panel) for Participant 3. The top panel shows that during Session 1, the original average heart rate was 69 bpm for the 5-minute control condition and 66 bpm for the 60-minute prose condition. During Session 2, the average was 111 bpm for the 5-minute control, 77 bpm for the 20-minute mindfulness, and 76 bpm for the 40-minute prose. Session 3 heart rate data are unavailable. During Session 4, the average was 70 bpm for the 5-minute control, 75 bpm for the 5-minute mindfulness, and 68 bpm for the 55-minute prose. During Session 5, the average was 85 bpm for the 5-minute control and 69 bpm for the 60-minute mindfulness. During Session 6, the average was 69 bpm for the 5-minute control, 63 bpm for the 20-minute mindfulness, and 62 bpm for the 40-minute prose. During Session 7, the average was 64 bpm for the 5-minute control, 65 bpm for the 5-minute mindfulness, and 63 bpm for the 55-minute prose. During Session 8, the average was 70 bpm for the 5-minute control and 69 for the 60-minute prose. The bottom panel shows that during Session 1, the revised average heart rate remained at 69 bpm for the 5-minute control condition and 66 bpm for the 60-minute prose condition. During Session 2, the average was 80 bpm for the 5-minute control, 69 bpm for the 20-minute mindfulness, and 73 bpm for the 40-minute prose. Session 3 heart rate data are unavailable. During Session 4, the average was 70 bpm for the 5-minute control, 76 bpm for the 5-minute mindfulness, and 67 bpm for the 55-minute prose. During Session 5, the average was 70 bpm for the 5-minute control and 62 bpm for

the 60-minute mindfulness. Session 6 data were not revised. During Session 7, the average remained at 64 bpm for the 5-minute control, 65 bpm for the 5-minute mindfulness, and 63 bpm for the 55-minute prose. During Session 8, the average remained at 70 bpm for the 5-minute control and 69 bpm for the 60-minute prose. Of the seven values that changed from the original average after being revised for outliers, six of them were lower than the original data values, ranging from a difference of 31 bpm for Session 2's control to a difference of 1 bpm for Session 4's prose. The seventh revised value was 1 bpm higher than the original data value for Session 4's mindfulness.

Figure N30 displays the differences in the average heart rate from the final 2 minutes of each control condition compared to the average heart rate from the final 2 minutes of each mindfulness and prose condition for each session, for both original values (top panel) and revised values (bottom panel). The top panel shows that the original difference in the final 2 minutes for Session 1 was a decrease of 0.7 bpm from control to prose; for Session 2 there was a decrease of 48.2 bpm from control to mindfulness and a decrease of 35.2 bpm from control to prose; Session 3 data are unavailable; for Session 4 there was an increase of 3.1 bpm from control to mindfulness and a decrease of 0.8 from control to prose; for Session 5 there was an increase of 57 bpm from control to mindfulness; for Session 6 there is a decrease of 8.2 bpm from control to mindfulness and a decrease of 4.9 bpm from control to prose; for Session 7 there was an increase of 0.8 bpm from control to mindfulness and a decrease of 2.4 bpm from control to prose; and for Session 8 there is an increase of 2.9 bpm from control to prose. Of the six differences after prose, five of them were decreases ranging from 0.7 bpm for Session 1 to 35.2 bpm for Session 2; the sixth difference was an increase of 2.9 bpm for Session 8. Of the five differences after mindfulness, two of them were decreases ranging from 8.2 bpm for Session 6 to 48.2 bpm for

Session 2, and the three remaining differences were increases ranging from 0.8 bpm for Session 7 to 57 bpm for Session 5. The bottom panel shows that the difference in the revised average heart rate for the final 2 minutes for Session 1 remained the same at a decrease of 0.7 bpm from control to prose; for Session 2 there was a decrease of 8.9 bpm from control to mindfulness and an increase of 0.1 bpm from control to prose; Session 3 data are unavailable; for Session 4 the difference remained the same at an increase of 3.1 bpm from control to mindfulness and a decrease of 0.8 from control to prose; and for Session 5 there was a decrease of 8.7 bpm from control to mindfulness. The differences remained the same for Sessions 6, 7, and 8. Of the six differences after prose, four of them were decreases ranging from 0.7 bpm for Session 1 to 4.9 bpm for Session 6, and the remaining two differences were increases of 0.1 bpm for Session 1 and 2.9 for Session 8. Of the five differences after mindfulness, three of them were decreases ranging from 8.2 bpm for Session 6 to 8.9 bpm for Session 2, and the two remaining differences were increases ranging from 0.8 bpm for Session 7 to 3.1 bpm for Session 4.

Figure N31 displays the differences in the average heart rate from the final 1 minute of each control condition compared to the average heart rate from the final 1 minute of each mindfulness and prose condition for each session, for both original values (top panel) and revised values (bottom panel). The top panel shows that the original difference in the final 1 minute for Session 1 was a decrease of 0.6 bpm from control to prose; for Session 2 there was a decrease of 39.5 bpm from control to mindfulness and a decrease of 29.2 bpm from control to prose; Session 3 data are unavailable; for Session 4 there was an increase of 3.9 bpm from control to mindfulness and an increase of 0.8 from control to prose; for Session 5 there was an increase of 115.1 bpm from control to mindfulness; for Session 6 there is a decrease of 7.4 bpm from control to mindfulness and a decrease of 4.3 bpm from control to prose; for Session 7 there was an

increase of 1.6 bpm from control to mindfulness and a decrease of 3.4 bpm from control to prose; and for Session 8 there is an increase of 2.2 bpm from control to prose. Of the six differences after prose, four of them are decreases ranging from 0.6 bpm for Session 1 to 29.2 bpm for Session 2, and the remaining two differences were increases of 0.8 bpm for Session 4 and 2.2 bpm for Session 8. Of the five differences after mindfulness, two of them were decreases ranging from 7.4 bpm for Session 6 to 39.5 bpm for Session 2, and the three remaining differences were increases ranging from 1.6 bpm for Session 7 to 115.1 bpm for Session 5. The bottom panel shows that the difference in the revised average heart rate for the final 1 minute for Session 1 remained the same at a decrease of 0.6 bpm from control to prose; for Session 2 there was a decrease of 6.3 bpm from control to mindfulness and a decrease of 4.4 bpm from control to prose; Session 3 data are unavailable; for Session 4 the difference remained the same at an increase of 3.9 bpm from control to mindfulness and an increase of 0.8 from control to prose; for Session 5 there were no values within the normal resting heart rate for adult humans during the last 1 minute of mindfulness. The differences remained the same for Sessions 6, 7, and 8. Of the six differences after prose, four of them were decreases ranging from 0.6 bpm for Session 1 to 4.4 bpm for Session 2, and the remaining two differences were increases of 0.8 bpm for Session 4 and 2.2 for Session 8. Of the four differences after mindfulness, two of them were decreases ranging from 6.3 bpm for Session 2 to 7.4 bpm for Session 6, and the two remaining differences were increases ranging from 1.6 bpm for Session 7 to 3.9 bpm for Session 4.

Figure N32 displays MAAS scores for Participant 3. For Session 1, the score increased from 3.6 pre-session to 4.5 post-session after 60 minutes of prose. For Session 2, the score increased from 4.7 pre-session to 5.3 mid-session after 20 minutes of mindfulness, and then decreased to 5.1 post-session after 40 minutes of prose. For Session 3, the score increased from

3.7 pre-session to 6.0 post-session after 60 minutes of mindfulness. For Session 4, the score increased from 4.5 pre-session to 5.1 mid-session after 5 minutes of mindfulness, and then decreased to 5.0 after 55 minutes of prose. For Session 5, the score increased from 2.1 pre-session to 4.4 post-session after 60 minutes of mindfulness. For Session 6, the score increased from 3.3 to 5.0 mid-session after 20 minutes of mindfulness, and then decreased to 3.9 post-session after 40 minutes of prose. For Session 7, the score increased from 2.9 pre-session to 4.8 mid-session after 5 minutes of mindfulness, and then remained at 4.8 post-session after 55 minutes of prose. For Session 8, the score increased from 3.1 pre-session to 4.5 post-session after 60 minutes of prose. The MAAS score increased during each of the eight sessions, with the two largest increases following 60 minutes of mindfulness, and the next two largest increases following 5 and 20 minutes of mindfulness. The only decreases in MAAS score occurred at the very end of three sessions, following both mindfulness and the prose. Overall, the MAAS scores are variable, with the level of the post-mindfulness scores higher than the pre-session scores, and with a decreasing trend for both.

Figure N33 displays the differences in MAAS scores pre-session to post-mindfulness, pre-session to post-prose, and post-mindfulness to post-prose for Participant 3. Session 1's difference was an increase of 0.9 after 60 minutes of prose; Session 2's was an increase of 0.6 after 20 minutes of mindfulness and then a decrease of 0.2 after 40 minutes of prose; Session 3's was an increase of 2.3 after 60 minutes of mindfulness; Session 4's was an increase of 0.6 after 5 minutes of mindfulness and then a decrease of 0.1 after 55 minutes of prose; Session 5's was and increase of 2.3 after 60 minutes of mindfulness; Session 6's was an increase of 1.7 after 20 minutes of mindfulness and then a decrease of 1.1 after 40 minutes of prose; Session 7's was an

increase of 1.9 after 5 minutes of mindfulness and then no change after 55 minutes of prose; and Session 8's was an increase of 1.4 after 60 minutes of prose.

Figure N34 displays PSS scores for Participant 3. For Session 1, the score decreased from 17 pre-session to 12 post-session after 60 minutes of prose. For Session 2, the score increased from 10 pre-session to 11 mid-session after 20 minutes of mindfulness, and then decreased to 10 post-session after 40 minutes of prose. For Session 3, the score decreased from 16 pre-session to 2 post-session after 60 minutes of mindfulness. For Session 4, the score decreased from 10 pre-session to 9 mid-session after 5 minutes of mindfulness, and then decreased to 6 after 55 minutes of prose. For Session 5, the score decreased from 19 pre-session to 12 post-session after 60 minutes of mindfulness. For Session 6, the score decreased from 13 to 6 mid-session after 20 minutes of mindfulness, and then increased to 12 post-session after 40 minutes of prose. For Session 7, the score decreased from 20 pre-session to 10 mid-session after 5 minutes of mindfulness, and then decreased to 8 post-session after 55 minutes of prose. For Session 8, the score decreased from 19 pre-session to 12 post-session after 60 minutes of prose. The PSS score decreased during seven of the eight sessions, with the largest decreases following 60 and 5 minutes of mindfulness, and the next largest decreases following 20 and 60 minutes of mindfulness and 60 minutes of prose. Increases in PSS score occurred after 20 minutes of mindfulness and at the very end of a session following both mindfulness and prose. Overall, the PSS scores are variable, with the level of the post-mindfulness scores lower than the pre-session scores, and an increasing trend for both.

Figure N35 displays the differences in PSS scores pre-session to post-mindfulness, pre-session to post-prose, and post-mindfulness to post-prose for Participant 3. Session 1's difference was a decrease of 5 after 60 minutes of prose; Session 2's was an increase of 1 after 20 minutes

of mindfulness and then a decrease of 1 after 40 minutes of prose; Session 3's was a decrease of 14 after 60 minutes of mindfulness; Session 4's was a decrease of 1 after 5 minutes of mindfulness and then a decrease of 3 after 55 minutes of prose; Session 5's was a decrease of 7 after 60 minutes of mindfulness; Session 6's was a decrease of 7 after 20 minutes of mindfulness and then an increase of 6 after 40 minutes of prose; Session 7's was a decrease of 10 after 5 minutes of mindfulness and then a decrease of 2 after 55 minutes of prose; and Session 8's was a decrease of 7 after 60 minutes of prose.

Figure N36 displays the number of displacement behaviors emitted during each 10-second interval, and Figure N37 shows a cumulative record of the same data, showing the cumulative number of responses emitted across 10-second intervals for Participant 3. The first panels of Figures N36 and N37 show that data are not available for the Session 1 control due to experimenter error. During the 60-minute prose condition, 138 responses were emitted across 46 of the 360 intervals, with responding fairly evenly dispersed across the session. The second panels show that during the Session 2 5-minute control, 12 responses were emitted across three of the 30 intervals, near the beginning and end of the condition. During the 20-minute mindfulness, 22 responses were emitted across 11 of the 120 intervals, with a short burst near the very beginning of the condition and then several responses near the end. During the 40-minute prose, 51 responses were emitted across 16 of the 240 intervals, with responding fairly evenly dispersed. The third panels show that data are not available for the Session 3 control. During the 60-minute mindfulness, 49 responses were emitted across 17 of the 360 intervals, with a very short burst at the beginning of the session, a burst at the end of the session, and several responses evenly dispersed across the middle of the session. The fourth panels show that during the Session 4 5-minute control, 13 responses were emitted across four of the 30 intervals, at the beginning

and near the end of the condition. During the 5-minute mindfulness, no responses were emitted, and during the 55-minute prose, 142 responses were emitted across 63 of the 330 intervals, with steady responding during the last two thirds of the condition. The fifth panels show that during the Session 5 5-minute control, 25 responses were emitted across 12 of the 30 intervals, evenly dispersed. During the 60-minute mindfulness, 63 responses were emitted across 27 of the 360 intervals with short bursts occurring near the beginning, middle, and end of the session and a few responses dispersed in between. The sixth panels show that during the Session 6 5-minute control, 16 responses were emitted across seven of the 30 intervals, with a few responses near the beginning of the condition and a short burst close to the end. During the 20-minute mindfulness, 16 responses were emitted across five of the 120 intervals, four of which were at the beginning of the condition. During the 40-minute prose, 60 responses were emitted across 20 of the 240 intervals, concentrated in six bursts throughout the condition. The seventh panels show that during the Session 7 5-minute control, no responses were emitted, and during the 5-minute mindfulness two responses were emitted at the beginning of the condition. During the 55-minute prose, 116 responses were emitted across 40 of the 330 intervals, dispersed evenly across the final two thirds of the condition. The eighth panels show that during the Session 8 5-minute control, six responses were emitted across four of the 30 intervals across the second half of the condition in two small bursts. During the 60-minute prose, 112 responses were emitted across 40 of the 360 intervals, with steady responding across the first fifth of the condition, a longer burst across the fourth fifth, and two short bursts near the end of the observation. Figure N38 shows the same data as Figure N37, but with the pen reset every 5 minutes to better demonstrate responses patterns across time. This figure shows that responding that is visually lower during prose conditions, compared especially to mindfulness conditions. Responding within the prose

conditions is inconsistent, with several successive 5-minute periods with no responding in some sessions and more regular responding in others.

Figure N39 displays the average frequency (responses per minute) of discrete displacement behaviors (top panel) as well as percent of session engaged in continuous displacement behaviors (bottom panel) per condition for each session for Participant 3. The top panel shows that during the Session 1 control, data are unavailable and during the 60-minute prose she emitted an average of 2.3 responses per minute. During the Session 2 control, she emitted an average of 2.4 responses per minute, during the 20-minute mindfulness she emitted an average of 1.1 responses per minute, and during the 40-minute prose she emitted an average of 1.3 responses per minute. During the Session 3 control, data are unavailable and during the 60-minute mindfulness she emitted an average of 0.8 responses per minute. During the Session 4 control, she emitted an average of 2.6 responses per minute, during the 5-minute mindfulness she emitted zero responses, and during the 55-minute prose she emitted an average of 2.6 responses per minute. During the Session 5 control, she emitted an average of 5.0 responses per minute and during the 60-minute mindfulness she emitted an average of 1.1 responses per minute. During the Session 6 control, she emitted an average of 3.2 responses per minute, during the 20-minute mindfulness she emitted an average of 0.8 responses per minute, and during the 40-minute prose she emitted an average of 1.5 responses per minute. During the Session 7 control, she emitted zero responses, during the 5-minute mindfulness she emitted an average of 0.4 responses per minute, and during the 55-minute prose she emitted and average of 2.1 responses per minute. During the Session 8 control, she emitted an average of 1.2 responses per minute and during the 60-minute prose she emitted an average of 1.9 responses per minute. Overall, the level for the mindfulness conditions are consistently lower than the prose conditions, and lower than the

control conditions with the exception of Session 7. The mindfulness conditions have low variability, with frequencies ranging from 0 to 1.1 responses per minute. The prose conditions also have low variability with frequencies ranging from 1.3 to 2.6 responses per minute. The control conditions have the highest variability with frequencies ranging from 0 to 5.0 responses per minute. All three conditions, control, mindfulness, and prose, show an overall maintaining trend.

The bottom panel of Figure N39 shows that during the Session 1 control, data are unavailable, and during the 60-minute prose, Participant 3 engaged with a book for 95.5% of the time and with her mobile phone 4.2% of the time, for a total of 99.7%. Within this time, she also supported her head 43.1% of the 60 minute. During the Session 2 5-minute control, she did not engage in continuous displacement behaviors. During the 20-minute mindfulness, she engaged with her phone 11.4% of the time and engaged with a book 58.5%, for a total of 69.9%. Within this time, she also supported her head 28.0% of the 20 minute. During the 40-minute prose she engaged with her phone 2.5% of the time and engaged with a book 96.9%, for a total of 99.4%. Within this time, she also supported her head 21.3% of the 40 minute. During the Session 3 control, data are unavailable; during the 60-minute mindfulness, she engaged with a book 0.6% of the time and engaged with her phone 0.8% of the time for a total of 1.4%, and she supported her head a negligible amount (5 seconds of 3,600 seconds). During the Session 4 5-minute control, she did not engage in continuous displacement behaviors; during the 5-minute mindfulness, she consumed food for 20.3% of the time; and during the 55-minute prose she engaged with a book 97.4% of the time, during which she also supported her head 44.7%. During the Session 5 control, she did not engage in continuous displacement behaviors, and during the 60-minute mindfulness, she engaged with her phone 2.0% of the time and with a book 3.7% for a

total of 5.7%. During the Session 6 control, she did not engage in continuous displacement behaviors; during the 20-minute mindfulness, she engaged with her phone 4.2% of the time; and during the 40-minute prose she engaged with her phone 33.1% of the time and with a book 37.3% for a total of 70.4%. During the Session 7 control, she did not engage in continuous displacement behaviors; during the 5-minute mindfulness, she did not engage in continuous displacement behaviors; and during the 55-minute prose, she engaged with her phone for 75.5% of the time and a book for 24.5% of the time for a total of 100%, during which she supported her head 28.7%. During the Session 8 control, she did not engage in continuous displacement behaviors, and during the 60-minute prose, she engaged with her phone 49.1% of the time and with a book 46.8% for a total of 95.9%. Overall, the level for the mindfulness conditions was lower than the prose conditions, with the exception of Session 2, and slightly higher than the control conditions. The variability for the control conditions was low, with the range being 0 for five sessions to 1.3% for one session. The variability for the prose conditions was moderate, ranging from 70.4% to 99.7%. The variability was high for the mindfulness conditions, ranging from 0 to 98.6%, although four of the six conditions ranged from 0 to 5.7%. The trend for the control and prose conditions is maintaining, whereas the mindfulness condition data show a decreasing trend.

Participant 4. Figure N40 displays heart rate values across seconds for Participant 4. During Session 1 (first panel), values ranged from 0 to 235 bpm with most values between 70 and 90 bpm; values during Session 2 (second panel) ranged from 68 to 103 bpm, with most values between 70 and 90 bpm; values during Session 3 (third panel) ranged from 67 to 134 bpm, with most values between 70 and 90 bpm (the device malfunctioned and failed to collect data after approximately 7 minutes of the prose condition); values during Session 4 (fourth

panel) ranged from 0 to 150 bpm with most values between 70 and 90 bpm; values during Session 5 (fifth panel) ranged from 0 to 234 bpm with most values between 70 and 90 bpm; values during Session 6 (sixth panel) ranged from 70 to 114 bpm with most values between 80 and 100 bpm; values during Session 7 (seventh panel) ranged from 71 to 109 bpm with most values between 70 and 90 bpm; and values during Session 8 (eighth panel) ranged from 66 to 106 bpm with most values between 70 and 90 bpm.

Figure N41 displays revised heart rate values across seconds. During Session 1 (first panel), revised values ranged from 66 to 99 bpm; revised values during Session 2 (second panel) ranged from 68 to 99 bpm; revised values during Session 3 (third panel) ranged from 67 to 99 bpm; revised values during Session 4 (fourth panel) ranged from 63 to 99 bpm; revised values during Session 5 (fifth panel) ranged from 54 to 99 bpm; revised values during Session 6 (sixth panel) ranged from 70 to 99 bpm; revised values during Session 7 (seventh panel) ranged from 71 to 99 bpm; and revised values during Session 8 (eighth panel) ranged from 66 to 99 bpm.

Figure N42 displays the average heart rate for each condition during each session (top penal), as well as revised averages after the omission of extreme values (bottom panel) for Participant 4. The top panel shows that during Session 1, the original average heart rate was 84 bpm for the 5-minute control condition and 85 bpm for the 60-minute prose condition. During Session 2, the average was 89 bpm for the 5-minute control, 82 bpm for the 20-minute mindfulness, and 85 bpm for the 40-minute prose. During Session 3, the average was 87 bpm for the 5-minute control, 82 bpm for the 7 minutes of prose the device was functional, and data for the 5-minute mindfulness are not available due to the malfunction. During Session 4, the average was 83 bpm for the 5-minute control and 81 bpm for the 60-minute mindfulness. During Session 5, the average was 119 bpm for the 5-minute control, and 80 bpm for the 5-minute mindfulness,

and 93 for the 55-minute prose. During Session 6, the average was 94 bpm for the 5-minute control and 88 bpm for the 60-minute mindfulness. During Session 7, the average was 95 bpm for the 5-minute control, 85 bpm for the 20-minute mindfulness, and 88 bpm for the 40-minute prose. During Session 8, the average was 84 bpm for the 5-minute control and 85 for the 60-minute prose. The bottom panel shows that during Session 1, the revised average heart rate remained at 84 bpm for the 5-minute control condition and decreased to 78 bpm for the 60-minute prose condition. During Session 2, the revised averages were all the same as the original averages. During Session 3, the revised average for the 5-minute control remained at 87 bpm, and the average for the 7 minutes of prose decreased to 81 bpm. During Session 4, the average for the 5-minute control remained at 83 bpm and the average for the 60-minute mindfulness decreased to 80 bpm. During Session 5, the average for the 5-minute control decreased to 83 bpm, the average for the 5-minute mindfulness increased to 81 bpm, and the average for the 55-minute prose decreased to 79 bpm. During Session 6, revised averages for both the 5-minute control and 60-minute mindfulness decreased to 93 bpm and 87 bpm, respectively. During Session 7, the average for the 5-minute control decreased to 94 bpm, and the averages for the 20-minute mindfulness and 40-minute prose remained the same at 85 bpm and 88 bpm, respectively. During Session 8, the averages for the 5-minute control and 60-minute prose remained the same. Of the nine values that changed rom the original average after being revised for outliers, eight of them were lower than the original data values, ranging from a difference of 36 bpm for Session 5's control to a difference of 1 bpm for several conditions. The ninth revised value was an increase of 1 bpm in Session 5's mindfulness condition.

Figure N43 displays the differences in the average heart rate from the final 2 minute of each control condition compared to the average heart rate from the final 2 minute of each

mindfulness and prose condition for each session, for both original values (top panel) and revised values (bottom panel). The top panel shows that the original difference in the final 2 minutes for Session 1 was a decrease of 3.0 bpm from control to prose; for Session 2 there was a decrease of 4.2 bpm from control to prose and a decrease of 8.0 bpm from control to mindfulness; Session 3's data were not enough to determine a difference; for Session 4 there was a decrease of 3.9 bpm from control to mindfulness; for Session 5 there was an increase of 20.2 bpm from control to prose and a decrease of 5.3 from control to mindfulness; for Session 6 there is a decrease of 9.1 bpm from control to mindfulness; for Session 7 there was an increase of 4.2 bpm from control to prose and an increase of 2.0 bpm from control to mindfulness; and for Session 8 there is a decrease of 0.1 bpm from control to prose. Of the five differences after prose, two of them were decreases ranging from 0.1 bpm for Session 8 to 4.2 bpm for Session 2; the other three differences were increases ranging from 3.0 for Session 1 to 20.2 bpm for Session 5. Of the five differences after mindfulness, four of them were decreases ranging from 3.9 bpm for Session 4 to 9.1 bpm for Session 6, and the remaining difference was an increase of 2.0 bpm for Session 7. The bottom panel shows that the difference in the revised average heart rate for the final 2 minutes for Session 1 was a decrease of 5.0 bpm from control to prose; for Session 2 there was a decrease of 4.8 bpm from control to prose and the decrease from control to mindfulness remained at 8.0 bpm; there were not enough data in Session 3 to determine a difference; for Session 4 there was a decrease of 2.7 bpm from control to mindfulness; for Session 5 there was a decrease of 2.4 bpm from control to prose and a decrease of 2.3 from control to mindfulness; for Session 6 there is a decrease of 8.3 bpm from control to mindfulness; for Session 7 there was a decrease of 5.8 bpm from control to prose and a decrease of 8.0 bpm from control to mindfulness; and for Session 8 there is a decrease of 0.4 bpm from control to prose. All of the

five differences after prose were decreases, ranging from 0.4 bpm for Session 8 to 5.8 bpm for Session 7. All of the five differences after mindfulness were decreases, ranging from 2.3 bpm for Session 5 to 8.3 bpm for Session 6.

Figure N44 displays the differences in the average heart rate from the final 1 minute of each control condition compared to the average heart rate from the final 1 minute of each mindfulness and prose condition for each session, for both original values (top panel) and revised values (bottom panel). The top panel shows that the original difference in the final 1 minute for Session 1 was an increase of 0.2 bpm from control to prose; for Session 2 there was a decrease of 6.8 bpm from control to prose and a decrease of 8.0 bpm from control to mindfulness; Session 3's data were not enough to determine a difference; for Session 4 there was a decrease of 2.0 bpm from control to mindfulness; for Session 5 there was an increase of 51.2 bpm from control to prose and a decrease of 3.1 from control to mindfulness; for Session 6 there was a decrease of 9.0 bpm from control to mindfulness; for Session 7 there was a decrease of 4.9 bpm from control to prose and an increase of 7.5 bpm from control to mindfulness; and for Session 8 there is an increase of 1.3 bpm from control to prose. Of the five differences after prose, two of them were decreases ranging from 4.9 bpm for Session 7 to 6.8 bpm for Session 2; the other three differences were increases ranging from 0.2 for Session 1 to 51.2 bpm for Session 5. All of the five differences after mindfulness were decreases, ranging from 2.0 bpm for Session 4 to 9.0 bpm for Session 6, and the remaining difference was an increase of 2.0 bpm for Session 7. The bottom panel shows that the difference in the revised average heart rate for the final 1 minute for Session 1 was a decrease of 5.5 bpm from control to prose; for Session 2 the decreases remained the same at 6.8 bpm from control to prose and 8.0 bpm from control to mindfulness; Session 3's data were not enough to determine a difference; for Session 4 the decrease remained the same at

2.7 bpm from control to mindfulness; for Session 5 there was an increase of 1.3 bpm from control to prose and a decrease of 3.4 from control to mindfulness; for Session 6 there is a decrease of 7.2 bpm from control to mindfulness; for Session 7 the decreases remained the same at 4.9 bpm from control to prose and 7.5 bpm from control to mindfulness; and for Session 8 there is an increase of 0.7 bpm from control to prose. Of the five differences after prose, three of them were decreases ranging from 4.9 bpm for Session 7 to 6.8 bpm for Session 2 and the other two were increases of 0.7 bpm for Session 8 and 1.3 bpm for Session 5. All of the five differences after mindfulness were decreases, ranging from 2.0 bpm for Session 4 to 8.3 bpm for Session 2.

Figure N45 displays MAAS scores for Participant 3. For Session 1, the score increased from 2.5 pre-session to 2.8 post-session after 60 minutes of prose. For Session 2, the score increased from 4.1 pre-session to 5.4 mid-session after 40 minutes of prose, and then decreased to 4.9 post-session after 20 minutes of mindfulness. For Session 3, the score decreased from 4.2 pre-session to 4.0 mid-session after 55 minutes of prose, and then did not change after 5 minutes of mindfulness. For Session 4, the score increased from 3.6 pre-session to 3.7 post-session after 60 minutes of mindfulness. For Session 5, the score remained at 3.5 pre-session, mid-session after 55 minutes of prose, and post-session after 5 minutes of mindfulness. For Session 6, the score increased from 4.3 to 5.0 post-session after 60 minutes of mindfulness. For Session 7, the score increased from 4.5 pre-session to 4.8 mid-session after 40 minutes of prose, and then decreased to 4.3 post-session after 20 minutes of mindfulness. For Session 8, the score remained at 4.5 pre-session to post-session after 60 minutes of prose. The MAAS score increased during five of the eight sessions, with the two largest increases following 40 minutes of prose and 60

minutes of mindfulness. The score decreased during three sessions, following both mindfulness and prose and prose alone. Overall, the MAAS scores are variable, with an increasing trend.

Figure N46 displays the differences in MAAS scores pre-session to post-prose, pre-session to post-mindfulness, and post-prose to post-mindfulness for Participant 4. Session 1's difference was an increase of 0.3 after 60 minutes of prose; Session 2's was an increase of 1.3 after 40 minutes of prose and then a decrease of 0.5 after 20 minutes of mindfulness; Session 3's was a decrease of 0.2 after 55 minutes of prose and then no change after 5 minutes of mindfulness; Session 4's was an increase of 0.1 after 60 minutes of mindfulness; there was no change in score during Session 5; Session 6's was an increase of 0.7 after 60 minutes of mindfulness; Session 7's was an increase of 0.3 after 40 minutes of prose and then a decrease of 0.5 after 20 minutes of mindfulness; and there was no change in score during Session 8.

Figure N47 displays PSS scores for Participant 4. For Session 1, the score decreased from 28 pre-session to 24 post-session after 60 minutes of prose. For Session 2, the score decreased from 16 pre-session to 12 mid-session after 40 minutes of prose, and then increased to 16 post-session after 20 minutes of mindfulness. For Session 3, the score remained at 19 pre-session, mid-session after 55 minutes of prose, and post-session after 5 minutes of mindfulness. For Session 4, the score decreased from 30 pre-session to 25 post-session after 60 minutes of mindfulness. For Session 5, the score decreased from 26 pre-session, to 21 mid-session after 55 minutes of prose, and then increased to 23 post-session after 5 minutes of mindfulness. For Session 6, the score decreased from 20 pre-session to 15 post-session after 60 minutes of mindfulness. For Session 7, the score decreased from 15 pre-session to 14 mid-session after 40 minutes of prose, and then increased to 18 post-session after 20 minutes of mindfulness. For Session 8, the score decreased from 18 pre-session to17 post-session after 60 minutes of prose.

The PSS score decreased during seven of the eight sessions, with the largest decreases following 60 minutes of mindfulness, in Session 4 and Session 6, and 55 minutes of prose. Increases in PSS score occurred at the very end of three sessions, following both prose and mindfulness. Overall, the PSS scores are variable, with a decreasing trend across the last five sessions.

Figure N48 displays the differences in PSS pre-session to post-prose, pre-session to post-mindfulness, and post-prose to post-mindfulness for Participant 4. Session 1's difference was a decrease of 4 after 60 minutes of prose; Session 2's was a decrease of 4 after 40 minutes of prose and then an increase of 4 after 20 minutes of mindfulness; there was no change in score during Session 3; Session 4's was a decrease of 5 after 60 minutes of mindfulness; Session 5's was a decrease of 5 after 55 minutes of prose and then an increase of 2 after 5 minutes of mindfulness; Session 6's was an decrease of 5 after 60 minutes of mindfulness; Session 7's was a decrease of 1 after 40 minutes of prose and then an increase of 4 after 20 minutes of mindfulness; and Session 8's was a decrease of 1 after 60 minutes of prose.

Figures N49 displays the number of displacement behaviors emitted during each 10-second interval, and Figure N50 shows a cumulative record of the same data, showing the cumulative number of responses emitted across 10-second intervals for Participant 4. The first panels of Figures N49 and N50 show that during the Session 1 5-minute control, 12 responses were emitted across 10 of the 30 intervals, mostly during the first two-thirds of the condition. During the 60-minute prose condition, 256 responses were emitted across 144 of the 360 intervals, with responding fairly evenly dispersed across the session and denser toward the middle and end. The second panels show that during the Session 2 5-minute control, 17 responses were emitted across nine of the 30 intervals, mostly during the first two-thirds of the condition. During the 40-minute prose, 54 responses were emitted across 24 of the 240 intervals,

with most of the responding allocated to the first, middle, and last several intervals. During the 20-minute mindfulness, 31 responses were emitted across 11 of the 120 intervals, with some responding interspersed throughout the first one-third of the session and several responses near the end. The third panels show that during the Session 3 5-minute control, 28 responses were emitted across 19 of the 30 intervals, with denser responding toward the second half of the condition. During the 55-minute prose, 315 responses were emitted across 145 of the 330 intervals, with responding fairly evenly dispersed. During the 5-minute mindfulness, 13 responses were emitted across seven of the 30 intervals, mostly in the second half of the condition. The fourth panels show that during the Session 4 5-minute control, 13 responses were emitted across nine of the 30 intervals, evenly dispersed throughout the condition. During the 60-minute mindfulness, 165 responses were emitted across 82 of the 360 intervals, with denser responding toward the middle of the condition. The fifth panels show that during the Session 5 5-minute control, 29 responses were emitted across 16 of the 30 intervals, with the majority of responding in the first two-thirds of the condition. During the 55-minute prose, 202 responses were emitted across 112 of the 330 intervals, with fairly evenly dispersed responding and a short period of inactivity toward the second half of the condition. During the 5-minute mindfulness, 11 responses were emitted across four of the 30 intervals, with a single burst at the beginning and a few responses toward the end. The sixth panels show that during the Session 6 5-minute control, 18 responses were emitted across 14 of the 30 intervals, evenly dispersed. During the 60-minute mindfulness, 144 responses were emitted across 58 of the 360 intervals, evenly dispersed throughout. The seventh panels show that during the Session 7 5-minute control, 34 responses were emitted across 17 of the 30 intervals, with more responding in the second half of the condition. During the 40-minute prose, 120 responses were emitted across 58 of the 240

intervals, with denser responding in the first half. During the 20-minute mindfulness, 25 responses were emitted across nine of the 120 intervals, concentrated mostly in two bursts toward the beginning and near the end of the condition. The eighth panels show that during the Session 8 5-minute control, 27 responses were emitted across 16 of the 30 intervals, with a burst near the beginning and steady responding in the second half. During the 60-minute prose, 169 responses were emitted across 85 of the 360 intervals, with responding evenly dispersed throughout. Figure N51 shows the same data as Figure N50, but with the pen reset every 5 minutes to better demonstrate responses patterns across time. This figure shows that there was some responding during mindfulness conditions, but typically at lower rates than during prose conditions.

Figure N52 displays the average frequency (responses per minute) of discrete displacement behaviors (top panel) as well as percent of session engaged in continuous displacement behaviors (bottom panel) per condition for each session for Participant 4. The top panel shows that during the Session 1 control, Participant 4 emitted an average of 2.4 responses per minute and during the 60-minute prose she emitted an average of 4.3 responses per minute. During the Session 2 control, she emitted an average of 3.4 responses per minute, during the 40-minute prose she emitted an average of 1.4 responses per minute, and during the 20-minute mindfulness she emitted an average of 1.6 behaviors per minute. During the Session 3 control, she emitted an average of 5.6 responses per minute, during the 55-minute prose she emitted an average of 5.7 responses per minute, and during the 5-minute mindfulness she emitted an average of 2.6 responses per minute. During the Session 4 control, she emitted an average of 2.6 responses per minute and during the 60-minute mindfulness she emitted an average of 2.8 responses per minute. During the Session 5 control, she emitted an average of 5.8 responses per

minute, during the 55-minute prose she emitted an average of 3.7 responses per minute, and during the 5-minute mindfulness she emitted an average of 2.2 responses per minute. During the Session 6 control, she emitted an average of 3.6 responses per minute and during the 60-minute mindfulness she emitted an average of 2.4 responses per minute. During the Session 7 control, she emitted an average of 6.8 responses per minute, during the 40-minute prose she emitted an average of 3.0 responses per minute, and during the 20-minute mindfulness she emitted an average of 1.3 responses per minute. During the Session 8 control, she emitted an average of 5.4 responses per minute and during the 60-minute prose she emitted an average of 2.8 responses per minute. Overall, the level for the mindfulness condition is consistently low with a maintaining trend and low variability, with frequencies ranging from an average of 1.3 to 2.8 responses per minute. The prose conditions have a slightly higher level with a maintaining trend and moderate variability, with frequencies ranging from an average of 1.4 to 5.9 responses per minute. The control condition shows a moderate level with an increasing trend and moderate variability with frequencies ranging from an average of 0.6 to 6.6 responses per minute.

The bottom panel of Figure N52 shows that during the Session 1 5-minute control, Participant 4 did not engage in continuous displacement behaviors, and during the 60-minute prose she crossed her arms 7.5% of the time and engaged with a book 47.3%, for a total of 54.8%. Within this time, she also supported her head 37.3% of the 60 minutes. During the Session 2 5-minute control, she did not engage in continuous displacement behaviors; during the 40-minute prose she crossed her arms 71.4% of the time and supported her head 7.0% of the time; and during the 20-minute mindfulness, she crossed her arms 11.3% of the time and supported her head 1.3% of that time. During the Session 3 control, she did not engage in continuous displacement behaviors; during the 55-minute prose she crossed her arms 12.9% of

the time and supported her head 50.7%; and during the 5-minute mindfulness she did not engage in continuous displacement behaviors. During the Session 4 5-minute control, she did not engage in continuous displacement behaviors, and during the 60-minute mindfulness she crossed her arms 7.7% of the time, during which she also supported her head 16.6%. During the Session 5 control, she supported her head 3% of the time; during the 55-minute prose she crossed her arms 22.6% of the time and supported her head 53.2%; and during the 5-minute mindfulness, she not engage in continuous displacement behaviors. During the Session 6 control, she not engage in continuous displacement behaviors, and during the 60-minute mindfulness she stood up 3.1% of the time and supported her head 18.6%, for a total of 21.7% and crossed her arms a negligible amount (26 seconds out of 3,600 seconds). During the Session 7 control, she did not engage in continuous displacement behaviors; during the 40-minute prose, she crossed her arms 37.5% and supported her head 64.2%; and during the 20-minute mindfulness, she crossed her arms 7.2% of the time and supported her head 6.7%. During the Session 8 control, she did not engage in continuous displacement behaviors, and during the 60-minute prose, she crossed her arms 38.5% of the time and supported her head 49.5%. Overall, the level for the prose conditions was higher than the mindfulness and control conditions during all sessions. The data paths for the control and mindfulness conditions overlap, with the control condition level consistently lower than the mindfulness condition level. The variability for the control conditions is low, ranging from 0 to 3%, and the variability for the mindfulness conditions is moderate, ranging from 0 to 11.3%. The prose conditions have the highest variability, ranging from 12.9% to 71.4%. The trends for the control and mindfulness conditions are maintaining, while the trend for the prose conditions is somewhat decreasing.

Participant 5. Figure N53 displays heart rate values across seconds for Participant 5. During Session 1 (first panel), values ranged from 0 to 118 bpm with most values between 60 and 80 bpm; values during Session 2 (second panel) ranged from 50 to 111 bpm, with most values between 60 and 80 bpm; values during Session 3 (third panel) ranged from 56 to 107 bpm, with most values between 60 and 80 bpm; values during Session 4 (fourth panel) ranged from 56 to 105 bpm with most values between 60 and 80 bpm; values during Session 5 (fifth panel) ranged from 46 to 104 bpm with most values between 50 and 70 bpm; values during Session 6 (sixth panel) ranged from 0 to 112 bpm with most values between 60 and 80 bpm; values during Session 7 (seventh panel) ranged from 53 to 109 bpm with most values between 60 and 80 bpm; and values during Session 8 (eighth panel) ranged from 52 to 110 bpm with most values between 50 and 70 bpm.

Figure N54 displays revised heart rate values across seconds. During Session 1 (first panel), revised values range from 50 to 98 bpm; revised values during Session 2 (second panel) ranged from 50 to 99 bpm; revised values during Session 3 (third panel) ranged from 56 to 99 bpm; revised values during Session 4 (fourth panel) ranged from 56 to 99 bpm; values during Session 5 (fifth panel) were not revised; revised values during Session 6 (sixth panel) data ranged from 59 bpm to 99 bpm; revised values during Session 7 (seventh panel) ranged from 53 to 99 bpm; and revised values during Session 8 (eighth panel) ranged from 52 to 99 bpm.

Figure N55 displays the average heart rate for each condition during each session (top panel), as well as revised averages after the omission of extreme values (bottom panel) for Participant 5. The top panel shows that during Session 1, the original average heart rate was 73 bpm for the 5-minute control condition and 66 bpm for the 60-minute prose condition. During Session 2, the average was 67 bpm for the 5-minute control, 70 bpm for the 5-minute

mindfulness, and 68 bpm for the 55-minute prose. During Session 3, the average was 71 bpm for the 5-minute control, 66 bpm for the 20-minute mindfulness, and 72 bpm for the 40-minute prose. During Session 4, the average was 84 bpm for the 5-minute control and 73 bpm for the 60-minute mindfulness. During Session 5, the average was 57 bpm for the 5-minute control, 63 for the 20-minute mindfulness, and 60 bpm for the 40-minute prose. During Session 6, the average was 66 bpm for the 5-minute control, 74 bpm for the 5-minute mindfulness, and 72 bpm for the 55-minute prose. During Session 7, the average was 65 bpm for the 5-minute control and 69 bpm for the 60-minute mindfulness. During Session 8, the average was 74 bpm for the 5-minute control and 65 for the 60-minute prose. The bottom panel shows that the revised heart rate values resulted in negligible differences in the revised averages; only one average changed, from 65 bpm to 64 bpm, for the 60-minute prose in Session 8.

Figure N56 displays the differences in the average heart rate from the final 2 minutes of each control condition compared to the average heart rate from the final 2 minutes of each mindfulness and prose condition for each session, for both original values (top panel) and revised values (bottom panel). The top panel shows that the difference in the final 2 minutes for Session 1 was a decrease of 12.7 bpm from control to prose; for Session 2 there was an increase of 12.2 bpm from control to mindfulness and a decrease of 9.3 bpm from control to prose; for Session 3 there was a decrease of 3.9 bpm from control to mindfulness and a decrease of 7.5 bpm from control to prose; for Session 4 there was a decrease of 8.4 bpm from control to mindfulness; for Session 5 there was an increase of 12.5 bpm from control to mindfulness and a decrease of 1.1 bpm from control to prose; for Session 6 there was an increase of 7.6 bpm from control to mindfulness and an increase of 2.2 bpm from control to prose; for Session 7 there was an increase of 7.0 bpm from control to mindfulness; and for Session 8 there is a decrease of 9.1 bpm

from control to prose. Of the six differences after prose, five of them were decreases ranging from 1.1 bpm for Session 5 to 12.7 bpm for Session 1; the sixth difference was an increase of 2.2 bpm for Session 6. Of the six differences after mindfulness, two of them were decreases ranging from 3.9 bpm for Session 3 to 8.4 bpm for Session 4, and the four remaining differences were increases ranging from 7.0 bpm for Session 7 to 12.5 bpm for Session 5. The bottom panel shows that the differences in the revised average heart rate for the final 2 minutes remained the same for Session 1, Session 3, Session 5, Session 6, and Session 8. The values that changed were all for mindfulness conditions. For Session 2, the difference from control to prose remained the same at a decrease of 9.3 bpm, and the difference from control to mindfulness was an increase of 10.7 bpm. For Session 4, there was a decrease of 9.3 bpm from control to mindfulness, and for Session 7 there was an increase of 5.0 bpm from control to mindfulness. The six differences from control to prose remained the same. Of the six differences after mindfulness, two of them were decreases ranging from 3.9 bpm for Session 3 to 9.3 bpm for Session 4, and the four remaining differences were increases ranging from 5.0 bpm for Session 7 to 12.5 bpm for Session 5.

Figure N57 displays the differences in the average heart rate from the final 1 minute of each control condition compared to the average heart rate from the final 1 minute of each mindfulness and prose condition for each session, for both original values (top panel) and revised values (bottom panel). The top panel shows that the original difference in the final 1 minute for Session 1 was a decrease of 12.3 bpm from control to prose; for Session 2 there was an increase of 14.2 bpm from control to mindfulness and a decrease of 7.8 bpm from control to prose; for Session 3 there was a decrease of 4.1 bpm from control to mindfulness and a decrease of 10.5 bpm from control to prose; for Session 4 there was a decrease of 10.0 bpm from control to mindfulness; for Session 5 there was an increase of 12.1 bpm from control to mindfulness and a

decrease of 6.6 from control to prose; for Session 6 there was an increase of 8.8 bpm from control to mindfulness and an increase of 1.5 bpm from control to prose; for Session 7 there was an increase of 6.5 bpm from control to mindfulness; and for Session 8 there was a decrease of 9.1 bpm from control to prose. Of the six differences after prose, five of them were decreases ranging from 6.6 bpm for Session 5 to 12.3 bpm for Session 1, and the remaining difference was an increase of 1.5 bpm for Session 6. Of the six differences after mindfulness, two of them were decreases ranging from 4.1 bpm for Session 3 to 10.0 bpm for Session 4, and the four remaining differences were increases ranging from 6.5 bpm for Session 7 to 14.2 bpm for Session 3. The bottom panel shows that the differences in the revised average heart rate for the final 1 minute remained the same for Session 1, Session 3, Session 5, Session 6, and Session 8. The values that changed were all for mindfulness conditions. For Session 2, the difference from control to prose remained the same at a decrease of 7.8 bpm, and the difference from control to mindfulness was an increase of 12.6 bpm. For Session 4, there was a decrease of 11.9 bpm from control to mindfulness, and for Session 7 there was an increase of 2.2 bpm from control to mindfulness. The six differences from control to prose remained the same. Of the six differences after mindfulness, two of them were decreases ranging from 4.1 bpm for Session 3 to 11.9 bpm for Session 4, and the four remaining differences were increases ranging from 2.2 bpm for Session 7 to 12.6 bpm for Session 2.

Figure N58 displays MAAS scores for Participant 5. For Session 1, the score increased from 2.1 pre-session to 2.2 post-session after 60 minutes of prose. For Session 2, the score increased from 1.9 pre-session to 2.4 mid-session after 55 minutes of prose, and then increased further to 2.9 post-session after 5 minutes of mindfulness. For Session 3, the score increased from 2.2 pre-session to 2.3 mid-session after 40 minutes of prose, and then increased further to

2.5 post-session after 20 minutes of mindfulness. For Session 4, the score increased from 2.1 pre-session to 2.8 post-session after 60 minutes of mindfulness. For Session 5, the score remained the same from 2.1 pre-session to mid-session after 40 minutes of prose, and then increased to 2.5 after 20 minutes of mindfulness. For Session 6, the score increased from 1.9 to 2.1 mid-session after 55 minutes of prose, and then remained at 2.1 post-session after 5 minutes of mindfulness. For Session 7, the score increased from 1.9 pre-session to 2.3 post-session after 60 minutes of mindfulness. For Session 8, the score remained the same at 3.1 from pre-session to post-session after 60 minutes of prose. The MAAS score either remained the same or increased during each of the eight sessions, with the largest increase following 60 minutes of mindfulness. Overall, the MAAS scores are variable, with a slightly decreasing trend across sessions.

Figure N59 displays the differences in MAAS scores pre-session to post-prose, pre-session to post-mindfulness, and post-prose to post-mindfulness for Participant 5. Session 1's difference was an increase of 0.1 after 60 minutes of prose; Session 2's was an increase of 0.5 after 55 minutes of prose and then an increase of 0.5 after 5 minutes of mindfulness; Session 3's was an increase of 0.1 after 40 minutes of prose and then an increase of 0.2 after 20 minutes of mindfulness; Session 4's was an increase of 0.7 after 60 minutes of mindfulness; there was no change in Session 5 after 40 minutes of prose and then there was an increase of 0.4 after 20 minutes of mindfulness; Session 6's was an increase of 0.2 after 55 minutes of prose and then no change after 5 minutes of mindfulness; Session 7's was an increase of 0.4 after 60 minutes of mindfulness; and there was no change in Session 8 after 60 minutes of prose.

Figure N60 displays PSS scores for Participant 5. For Session 1, the score decreased from 26 pre-session to 25 post-session after 60 minutes of prose. For Session 2, the score decreased from 30 pre-session to 23 mid-session after 55 minutes of prose, and then decreased further to 21

post-session after 5 minutes of mindfulness. For Session 3, the score decreased from 21 pre-session to 20 mid-session after 40 minutes of prose, and then decreased to 18 post-session after 20 minutes of mindfulness. For Session 4, the score decreased from 24 pre-session to 20 post-session after 60 minutes of mindfulness. For Session 5, the score decreased from 25 pre-session to 24 mid-session after 40 minutes of prose, and then decreased to 21 post-session after 20 minutes of mindfulness. For Session 6, the score decreased from 25 to 22 mid-session after 5 minutes of prose, and then decreased to 19 post-session after 5 minutes of mindfulness. For Session 7, the score decreased from 23 pre-session to 21 post-session after 60 minutes of mindfulness. For Session 8, the score decreased from 24 pre-session to 22 post-session after 60 minutes of prose. The PSS score decreased during all eight sessions, with the largest decrease following 55 minutes of prose, and the next largest decrease following 60 minutes of mindfulness. Overall, the PSS scores are variable, with the level of the post-mindfulness scores lower than the pre-session scores, and a decreasing trend.

Figure N61 displays the differences in PSS pre-session to post-prose, pre-session to post-mindfulness, and post-prose to post-mindfulness for Participant 5. Session 1's difference was a decrease of 1 after 60 minutes of prose; Session 2's was a decrease of 7 after 55 minutes of prose and then a decrease of 2 after 5 minutes of mindfulness; Session 3's was a decrease of 1 after 40 minutes of prose and then a decrease of 2 after 20 minutes of mindfulness; Session 4's was a decrease of 4 after 60 minutes of mindfulness; Session 5's was a decrease of 1 after 40 minutes of prose and then a decrease of 3 after 20 minutes of mindfulness; Session 6's was a decrease of 3 after 5 minutes of prose and then an increase of 3 after 5 minutes of mindfulness; Session 7's was a decrease of 2 after 60 minutes of mindfulness; and Session 8's was a decrease of 2 after 60 minutes of prose.

Figure N62 displays the number of displacement behaviors emitted during each 10-second interval, and Figure N63 shows a cumulative record of the same data, showing the cumulative number of responses emitted across 10-second intervals for Participant 5. The first panels of Figures N62 and N63 show that during the Session 1 5-minute control, 3 responses were emitted across three of the 30 intervals, in the middle and near the end of the condition. During the 60-minute prose condition, 157 responses were emitted across 68 of the 360 intervals, with responding fairly evenly dispersed across most of the session and tapering off near the end. The second panels show that during the Session 2 5-minute control, nine responses were emitted across three of the 30 intervals, near the middle and end of the condition. During the 55-minute prose, 135 responses were emitted across 64 of the 330 intervals, with responding fairly evenly dispersed across the condition and a few bursts throughout. During the 5-minute mindfulness, 1 response was emitted near the end of the condition. The third panels show that during the Session 3 5-minute control, two responses were emitted in one of the 30 intervals, near the middle of the condition. During the 40-minute prose, 175 responses were emitted across 61 of the 240 intervals, with evenly dispersed responding in the middle of the condition and a burst near the end. During the 20-minute mindfulness, six responses were emitted in one of the 120 intervals toward the end of the condition. The fourth panels show that during the Session 4 5-minute control, one response was emitted toward the end of the condition. During the 60-minute mindfulness, three responses were emitted in two intervals at the very beginning of the condition and two responses were emitted in one interval during the second half of the condition. The fifth panels show that during the Session 5 5-minute control, seven responses were emitted across six of the 30 intervals, in two bursts near the beginning and end of the condition. During the 40-minute prose, 188 responses were emitted across 83 of the 240 intervals with a prominent burst

in the beginning of the condition and evenly dispersed responding for the remainder. During the 20-minute mindfulness, no responses were emitted. The sixth panels show that during the Session 6 5-minute control, five responses were emitted across five of the 30 intervals, with a few responses near the beginning and middle of the condition. During the 55-minute prose, 121 responses were emitted across 44 of the 330 intervals, with the majority of responding occurring in the second half of the condition. During the 5-minute mindfulness, no responses were emitted. The seventh panels show that during the Session 7 5-minute control, no responses were emitted, and during the 60-minute mindfulness nine responses were emitted across four of the 360 intervals at the beginning and near the middle of the condition. The eighth panels show that during the Session 8 5-minute control, four responses were emitted across three of the 30 intervals toward the beginning and end of the condition. During the 60-minute prose, 176 responses were emitted across 69 of the 360 intervals, with responding fairly evenly dispersed across the session. Figure N64 shows that same data as Figure N 63, but with the pen reset every 5 minutes to better demonstrate response patterns across time. This figure shows that there was very little responding during mindfulness conditions, and much responding in prose conditions. During one of the prose conditions, responses reached nearly 100 responses in one 5-minute period.

Figure N65 displays the average frequency (responses per minute) of discrete displacement behaviors (top panel) as well as percent of session engaged in continuous displacement behaviors (bottom panel) per condition for each session for Participant 5.The top panel shows that during the Session 1 control, she emitted an average of 0.6 responses per minute and during the 60-minute prose she emitted an average of 2.6 behaviors per minute. During the Session 2 control, she emitted an average of 1.4 behaviors per minute, during the 55-

minute prose she emitted an average of 2.5 behaviors per minute, and during the 5-minute mindfulness she emitted an average of 0.2 behaviors per minute. During the Session 3 control, she emitted an average of 0.4 responses per minute, during the 40-minute prose she emitted an average of 4.4 responses per minute, and during the 20-minute mindfulness she emitted an average of 0.3 behaviors per minute. During the Session 4 control, she emitted an average of 0.4 behaviors per minute and during the 60-minute mindfulness she emitted an average of 0.08 behaviors per minute. During the Session 5 control, she emitted an average of 1.4 behaviors per minute, during the 40-minute prose she emitted an average of 4.7 responses per minute, and during the 20-minute mindfulness she did not emit any responses. During the Session 6 control, she emitted an average of 1.0 responses per minute, during the 55-minute prose she emitted an average of 2.2 responses per minute, and during the 5-minute mindfulness she did not emit any responses. During the Session 7 control, she emitted she did not emit any responses and during the 60-minute mindfulness she emitted and average of 0.2 behaviors per minute. During the Session 8 control, she emitted an average of 0.8 behaviors per minute and during the 60-minute prose she emitted an average of 2.9 behaviors per minute. Overall, the level for the mindfulness condition is consistently lower than the prose conditions, and lower than the control conditions with the exception of Session 7. The mindfulness conditions have low variability, with frequencies ranging from 0 to 0.3 responses per minute. The control conditions also have low variability with frequencies ranging from 0 to 1.4 responses per minute. The prose conditions have low variability with frequencies ranging from 2.2 to 4.7 responses per minute. The trends for all three conditions maintain across sessions.

The bottom panel of Figure N65 shows that during the Session 1 control, Participant 5 did not engage in continuous displacement behaviors, and during the 60-minute prose, she

supported her head 42.2% of the time and stood up 0.4% for a total of 42.6%. During the Session 2 5-minute control, she did not engage in continuous displacement behaviors; during the 55-minute prose, she consumed food for 25.3% of the time and supported her head 34.5% for a total of 59.8%; and during the 5-minute mindfulness she did not engage in continuous displacement behaviors. During the Session 3 control, she did not engage in continuous displacement behaviors; during the 40-minute prose she supported her head 30.7% of the time; and during the 20-minute mindfulness she did not engage in continuous displacement behaviors. During the Session 4 5-minute control and 60-minute mindfulness, she did not engage in continuous displacement behaviors. During the Session 5 control, she did not engage in continuous displacement behaviors; during the 40-minute prose she supported her head 46.1% of the time; and during the 20-minute mindfulness, she did not engage in continuous displacement behaviors. During the Session 6 control, she not engage in continuous displacement behaviors; during the 55-minute prose, she engaged with her phone 0.5% of the time, consumed food 22.7%, and supported her head 25.6% for a total of 48.8%; and during the 20-minute mindfulness she did not engage in continuous displacement behaviors. During the Session 7 5-minute control and 60-minute mindfulness, she did not engage in continuous displacement behaviors. During the Session 8 control, she did not engage in continuous displacement behaviors, and during the 60-minute prose, she supported her head 57.9% of the time. The control and mindfulness conditions had no variability and their levels remained at zero across all sessions. The variability for the prose conditions was moderate, ranging from 30.7% to 59.8%, with a maintaining trend.

Participant 6. Figure N66 displays heart rate values across seconds for Participant 6. During Session 1 (first panel), values ranged from 0 to 136 bpm with most values between 70 and 90 bpm; values during Session 2 (second panel) ranged from 0 to 102 bpm, with many

values between 80 and 100 bpm; values during Session 3 (third panel) ranged from 0 to 111 bpm, with many values between 80 and 100 bpm; values during Session 4 (fourth panel) ranged from 66 to 117 bpm with most values between 70 and 90 bpm; values during Session 5 (fifth panel) ranged from 76 to 112 bpm with most values between 80 and 100 bpm; values during Session 6 (sixth panel) ranged from 0 to 107 bpm with most values between 80 and 100 bpm; values during Session 7 (seventh panel) ranged from 67 to 116 bpm with most values between 60 and 80 bpm; and values during Session 8 (eighth panel) ranged from 0 to 113 bpm with most values between 80 and 100 bpm.

Figure N67 displays revised heart rate values across seconds. During Session 1 (first panel), revised values ranged from 67 to 99 bpm; revised values during Session 2 (second panel) ranged from 65 to 99 bpm; revised values during Session 3 (third panel) ranged from 73 to 99 bpm; revised values during Session 4 (fourth panel) ranged from 66 to 99 bpm; revised values during Session 5 (fifth panel) ranged from 76 to 99 bpm; revised values during Session 6 (sixth panel) ranged from 68 to 99 bpm; values during Session 7 (seventh panel) were not revised due to the participant's verbal self-report of frustration; and revised values during Session 8 (eighth panel) ranged from 76 to 99 bpm.

Figure N68 displays the average heart rate for each condition during each session (top panel), as well as revised averages after the omission of extreme values (bottom panel) for Participant 6. The top panel shows that during Session 1, the original average heart rate was 96 bpm for the 5-minute control condition and 93 bpm for the 60-minute prose condition. During Session 2, the average was 89 bpm for the 5-minute control and 88 bpm for the 60-minute prose. During Session 3, the average was 93 bpm for the 5-minute control and 92 bpm for the 60-minute prose. During Session 4, the average was 87 bpm for the 5-minute control and 86 bpm for

the 60-minute prose. During Session 5, the average was 96 bpm for the 5-minute control and 93 bpm for the 60-minute mindfulness. During Session 6, the average was 86 bpm for the 5-minute control and 86 bpm for the 60-minute prose. During Session 7, the average was 87 bpm for the 5-minute control and 85 bpm for the 60-minute mindfulness. During Session 8, the average was 97 bpm for the 5-minute control and 94 for the 60-minute prose. The bottom panel shows that during Session 1, the revised average heart rate was 95 bpm for the 5-minute control condition and 91 bpm for the 60-minute prose condition. During Session 2, the average remained at 89 bpm for the 5-minute control and was 87 bpm for the 60-minute prose. During Session 3, the average remained at 93 bpm for the 5-minute control and was 91 bpm for the 60-minute prose. During Session 4 the average remained at 87 bpm for the 5-minute control and was 85 bpm for the 60-minute prose. During Session 5 the average was 95 bpm for the 5-minute control and 92 bpm for the 60-minute mindfulness. Session 6 and Session 7 data were not revised. During Session 8, the average was 96 bpm for the 5-minute control and 92 bpm for the 60-minute prose. All nine of the values that changed from the original average after being revised for outliers were 1 or 2 bpm lower than the original data values.

Figure N69 displays the differences in the average heart rate from the final 2 minutes of each control condition compared to the average heart rate from the final 2 minutes of each mindfulness and prose condition for each session, for both original values (top panel) and revised values (bottom panel). The top panel shows that the difference in the final 2 minutes for Session 1 was an increase of 0.3 bpm from control to prose; for Session 2 there was a decrease of 5.8 bpm from control to prose; for Session 3 there was an increase of 1.6 bpm from control to prose; for Session 4 there was an increase of 3.2 bpm from control to prose; for Session 5 there was an increase of 0.3 bpm from control to mindfulness; for Session 6 there is a decrease of 0.1 bpm

from control to prose; for Session 7 there was an increase of 1.0 bpm from control to mindfulness; and for Session 8 there is an decrease of 4.8 bpm from control to prose. Of the six differences after prose, three of them were decreases ranging from 0.1 bpm for Session 6 to 5.8 bpm for Session 2; the remaining three differences were increases ranging from 0.3 bpm for Session 1 to 3.2 bpm for Session 4. Both of the differences after mindfulness were increases, ranging from 0.3 bpm for Session 5 to 1.0 bpm for Session 7. The bottom panel shows that the difference in the revised average heart rate for the final 2 minutes for Session 1 was a decrease of 2.4 bpm from control to prose; the difference for Session 2 remained the same; for Session 3 there was an increase of 0.5 bpm control to prose; for Session 4 there was an increase of 3.0 bpm from control to prose; for Session 5 there was an increase of 0.5 bpm from control to mindfulness; for Session 6 and Session 7 the differences remained the same; and for Session 8 there was a decrease of 3.8 bpm. Of the six differences after prose, four of them were decreases ranging from 0.1 bpm for Session 6 to 5.8 bpm for Session 2, and the remaining two differences were increases of 0.5 bpm for Session 3 and 3.0 for Session 4. Both of the differences after mindfulness were increases, ranging from 0.5 bpm for Session 5 to 1.0 bpm for Session 7.

Figure N70 displays the differences in the average heart rate from the final 1 minute of each control condition compared to the average heart rate from the final 1 minute of each mindfulness and prose condition for each session, for both original values (top panel) and revised values (bottom panel). The top panel shows that the original difference in the final 1 minute for Session 1 was a decrease of 0.2 bpm from control to prose; for Session 2 there was a decrease of 5.7 bpm from control to prose; for Session 3 there was an increase of 0.5 bpm from control to prose; for Session 4 there was an increase of 3.3 bpm from control to prose; for Session 5 there was an increase of 1.7 bpm from control to mindfulness; for Session 6 there was an increase of

0.9 bpm from control to prose; for Session 7 there was an increase of 1.1 bpm from control to mindfulness; and for Session 8 there is an decrease of 3.5 bpm from control to prose. Of the six differences after prose, three of them were decreases ranging from 0.2 bpm for Session 1 to 5.7 bpm for Session 2; the remaining three differences were increases ranging from 0.5 bpm for Session 3 to 3.3 bpm for Session 4. Both of the differences after mindfulness were increases, ranging from 1.1 bpm for Session 7 to 1.7 bpm for Session 5. The bottom panel shows that the difference in the revised average heart rate for the final 1 minute for Session 1 was a decrease of 2.8 bpm from control to prose; the difference for Session 2 remained the same; for Session 3 there was a decrease of 0.1 bpm control to prose; the difference for Session 4 remained the same; for Session 5 there was an increase of 1.3 bpm from control to mindfulness; for Session 6 and Session 7 the differences remained the same; and for Session 8 there was a decrease of 2.2 bpm. Of the six differences after prose, four of them were decreases ranging from 0.1 bpm for Session 3 to 5.7 bpm for Session 2, and the remaining two differences were increases of 0.9 bpm for Session 6 and 3.3 for Session 4. Both of the differences after mindfulness were increases, ranging from 1.1 bpm for Session 7 to 1.3 bpm for Session 5.

Figure N71 displays MAAS scores for Participant 6. For Session 1, the score increased from 3.9 pre-session to 4.0 post-session after 60 minutes of prose. For Session 2, the score increased from 3.8 pre-session to 3.9 post-session after 60 minutes of prose. For Session 3, the score increased from 3.7 pre-session to 3.9 post-session after 60 minutes of prose. For Session 4, the score increased from 3.3 pre-session to 4.0 post-session after 60 minutes of prose. For Session 5, the score increased from 3.8 pre-session to 4.3 post-session after 60 minutes of mindfulness. For Session 6, the score decreased from 4.0 pre-session to 3.5 post-session after 60 minutes of prose. For Session 7, the score increased from 4.0 pre-session to 4.4 post-session after

60 minutes of mindfulness. For Session 8, the score increased from 3.7 pre-session to 3.9 post-session after 60 minutes of prose. The MAAS score increased during seven of the eight sessions; although the largest increase was during Session 4, following prose, the next two largest increases were following both of the mindfulness conditions, and the only decrease in score was during Session 6 following prose. Overall, the MAAS scores are variable with a maintaining trend, and post-mindfulness scores have a higher level than pre-session or post-prose scores.

Figure N72 displays the differences in MAAS scores pre-session to post-prose and pre-session to post-mindfulness for Participant 6. Session 1's difference was an increase of 0.1 after 60 minutes of prose; Session 2's was an increase of 0.1 after 60 minutes of prose; Session 3's was an increase of 0.2 after 60 minutes of prose; Session 4's was an increase of 0.7 after 60 minutes of prose; Session 5's was an increase of 0.5 after 60 minutes of mindfulness; Session 6's was a decrease of 0.5 after 60 minutes of prose; Session 7's was an increase of 0.4 after 60 minutes of prose; and Session 8's was an increase of 0.2 after 60 minutes of prose.

Figure N73 displays PSS scores for Participant 6. For Session 1, the score increased from 16 pre-session to 19 post-session after 60 minutes of prose. For Session 2, the score decreased from 24 pre-session to 20 post-session after 60 minutes of prose. For Session 3, the score decreased from 19 pre-session to 18 post-session after 60 minutes of prose. For Session 4, the score decreased from 17 pre-session to 13 post-session after 60 minutes of prose. For Session 5, the score decreased from 23 pre-session to 13 post-session after 60 minutes of mindfulness. For Session 6, the score increased from 14 pre-session to 15 post-session after 60 minutes of prose. For Session 7, the score decreased from 16 pre-session to 12 post-session after 60 minutes of mindfulness. For Session 8, the score decreased from 16 pre-session to 13 post-session after 60 minutes of prose. The PSS score decreased during six of the eight sessions, with the largest

decrease following 60 minutes of mindfulness. Increases in PSS score occurred after two of the prose conditions. Overall, the PSS scores are variable with a decreasing trend.

Figure N74 displays the differences in PSS pre-session to post-prose and pre-session to post-mindfulness for Participant 6. Session 1's difference was an increase of 3 after 60 minutes of prose; Session 2's was a decrease of 4 after 60 minutes of prose; Session 3's was a decrease of 1 after 60 minutes of prose; Session 4's was a decrease of 4 after 60 minutes of prose; Session 5's was a decrease of 10 after 60 minutes of mindfulness; Session 6's was an increase of 1 after 60 minutes of prose; Session 7's was a decrease of 4 after 60 minutes of prose; and Session 8's was a decrease of 3 after 60 minutes of prose.

Figure N75 displays the number of displacement behaviors emitted during each 10-second interval, and Figure N76 shows a cumulative record of the same data, showing the cumulative number of responses emitted across 10-second intervals for Participant 6. The first panels of Figures N75 and N76 show that during the Session 1 5-minute control, 19 responses were emitted across 12 of the 30 intervals, evenly dispersed across the condition. During the 60-minute prose, 314 responses were emitted across 111 of the 360 intervals, with responding evenly dispersed with the exception of an extended period of time during the first half of the condition. The second panels show that during the Session 2 5-minute control, 20 responses were emitted across 10 of the 30 intervals, mostly concentrated in the first two-thirds the condition. During the 60-minute prose, 259 responses were emitted across 95 of the 360 intervals, with responding evenly dispersed but slightly denser in the second half. The third panels show that during the Session 3 5-minute control, nine responses were emitted across five of the 30 intervals, mostly toward the middle of the condition. During the 60-minute prose, 212 responses were emitted across 100 of the 360 intervals, with denser responding in the first half of the

condition. The fourth panels show that during the Session 4 5-minute control, 19 responses were emitted across four of the 30 intervals, with a burst near the beginning and several responses interspersed in the second half of the condition. During the 60-minute prose, 180 responses were emitted across 63 of the 360 intervals, with steady responding during the second two-thirds of the condition and slow responding during the first one-third. The fifth panels show that during the Session 5 5-minute control, nine responses were emitted across five of the 30 intervals, evenly dispersed across the condition. During the 60-minute mindfulness, 156 responses were emitted across 65 of the 360 intervals, with responding concentrated near the beginning and end of the condition, and an extended period of non-activity in between. The sixth panels show that during the Session 6 5-minute control, seven responses were emitted across three of the 30 intervals, mostly toward the beginning and at the end of the condition. During the 60-minute prose, 194 responses were emitted across 89 of the 360 intervals, with responding evenly dispersed. The seventh panels show that during the Session 7 5-minute control, eight responses were emitted across six of the 30 intervals, concentrated mostly near the beginning and end of the condition. During the 60-minute mindfulness, 103 responses were emitted across 42 of the 360 intervals, with low responding toward the beginning of the condition, and more active responding during the final one-third. The eighth panels show that during the Session 8 5-minute control, 19 responses were emitted across 12 of the 30 intervals, with higher responding toward the beginning of the condition and then a decreasing trend. During the 60-minute prose, 249 responses were emitted across 125 of the 360 intervals, with responding fairly evenly dispersed across the observation. Figure N77 shows the same data as Figure N76, but with the pen reset every 5 minutes to better demonstrate response patterns across time. This figure shows that there was fairly consistent responding in both mindfulness and prose conditions. The only visually

significant difference is the extended periods with no responding during the two mindfulness conditions.

Figure N78 displays the average frequency (responses per minute) of discrete displacement behaviors (top panel) as well as percent of session engaged in continuous displacement behaviors (bottom panel) per condition for each session for Participant 6. The top panel shows that during the Session 1 control, she emitted an average of 3.8 responses per minute and during the 60-minute prose she emitted an average of 5.2 responses per minute. During the Session 2 control, she emitted an average of 4.0 responses per minute and during the 60-minute prose she emitted an average of 4.3 responses per minute. During the Session 3 control, she emitted an average of 1.8 responses per minute and during the 60-minute prose she emitted an average of 3.5 responses per minute. During the Session 4 control, she emitted an average of 3.8 responses per minute and during the 60-minute prose she emitted an average of 3.0 responses per minute. During the Session 5 control, she emitted an average of 1.8 responses per minute and during the 60-minute mindfulness she emitted an average of 2.6 responses per minute. During the Session 6 control, she emitted an average of 1.4 responses per minute and during the 60-minute prose she emitted an average of 3.1 behaviors per minute. During the Session 7 control, she emitted an average of 1.6 responses per minute and during the 60-minute mindfulness she emitted an average of 1.7 responses per minute. During the Session 8 control, she emitted an average of 3.8 behaviors per minute and during the 60-minute prose she emitted an average of 4.2 behaviors per minute. Overall, the level for the prose condition is consistently higher than the control and mindfulness conditions. The mindfulness condition has low variability, with frequencies ranging from 1.7 to 2.6 responses per minute and a maintaining trend. The prose condition has low to moderate variability with frequencies ranging from 3.1 to

5.2 responses per minute and a maintaining trend. The control condition has the highest variability with frequencies ranging from 1.4 to 4.0 responses per minute, with an overall maintaining trend.

The bottom panel of Figure N78 shows that during the Session 1 5-minute control, Participant 6 did not engage in continuous displacement behaviors, and during the 60-minute prose she engaged with her phone 54.4% of the time and crossed her arms 30.1% for a total of 84.5%. During this time, she also supported her head 39.6%. During the Session 2 5-minute control, she supported her head 24.7% of the time; during the 60-minute prose she engaged with her phone 85.1% of the time and crossed her arms 2.9%, for a total of 88.0%, and supported her head 11.4%. During the Session 3 control, she supported her head 5.0% of the time, and during the 60-minute prose she engaged with her phone 79.9% of the time and with personal items 7.1% for a total of 87.0%, and supported her head 17.8%. During the Session 4 5-minute control, she did not engage in continuous displacement behaviors, and during the 60-minute prose she engaged with her phone 52.5% of the time, supported her head 43.3%, and crossed her arms a negligible amount (30 seconds out of 3,600 seconds). During the Session 5 control, she supported her head 33.3% of the time, and during the 60-minute mindfulness she engaged with her phone 7.0% of the time, crossed her arms 47.3%, and supported her head 51.3%. During the Session 6 control, she did not engage in continuous displacement behaviors, and during the 60-minute prose she engaged with her phone 79.5% of the time and supported her head 9.3%. During the Session 7 control, she supported her head 7.7% of the time, and during the 60-minute mindfulness she engaged with her phone 28.7% of the time, crossed her arms 51.8%, and supported her head 53.2%. During the Session 8 control, she crossed her arms 2.0% of the time, and during the 60-minute prose she engaged with her phone 41.5% of the time, and with a book

9.6% for a total of 51.1%. She also crossed her arms 5.6%, and supported her head 23.0%. The mindfulness condition has very low variability, ranging from 51.3% to 53.2%, and the control and prose conditions have moderate to high variability, with control ranging from 0 to 33.3% and prose ranging from 52.5% to 88.0%. The level of the prose condition is higher than the mindfulness condition, although the data paths overlap, and the level of the mindfulness condition is higher than the control condition.

Participant 7. Figure N79 displays heart rate values across seconds for Participant 7. During Session 1 (first panel), values ranged from 50 to 96 bpm with most values between 50 and 70 bpm; values during Session 2 (second panel) ranged from 56 to 99 bpm, with most values between 60 bpm and 80 bpm; values during Session 3 (third panel) ranged from 50 to 99 bpm, with most values between 50 bpm and 70 bpm; values during Session 4 (fourth panel) ranged from 50 to 95 bpm with most values between 60 and 80 bpm; values during Session 5 (fifth panel) ranged from 54 to 107 bpm with most values between 60 and 80 bpm; values during Session 6 (sixth panel) ranged from 0 to 108 bpm, with most values between 60 and 80 bpm; values during Session 7 (seventh panel) ranged from 54 to 97 bpm with most values between 60 and 80 bpm; and values during Session 8 (eighth panel) ranged from 50 to 97 bpm with most values between 60 and 80 bpm.

Figure N80 displays revised heart rate values across seconds. Values for Session 1 (first panel), Session 2 (second panel), Session 3 (third panel), and Session 4 (fourth panel) were not revised. Revised values for Session 5 (fifth panel) ranged from 54 to 99 bpm and revised values for Session 6 (sixth panel) ranged from 58 bpm to 99 bpm. Values for Session 7 (seventh panel) and Session 8 (eighth panel) were not revised.

Figure N81 displays the average heart rate for each condition during each session for Participant 7. The figure shows that during Session 1, the original average heart rate was 73 bpm for the 5-minute control condition and 68 bpm for the 60-minute prose condition. During Session 2, the average was 82 bpm for the 5-minute control and 75 bpm for the 60-minute prose. During Session 3, the average was 72 bpm for the 5-minute control and 66 bpm for the 60-minute prose. During Session 4, the average was 76 bpm for the 5-minute control and 70 bpm for the 60-minute prose. During Session 5, the average was 76 bpm for the 5-minute control and 73 bpm for the 60-minute prose. During Session 6, the average was 76 bpm for the 5-minute control and 77 bpm for the 60-minute mindfulness. During Session 7, the average was 74 bpm for the 5-minute control and 70 bpm for the 60-minute mindfulness. During Session 8, the average was 66 bpm for the 5-minute control and 67 for the 60-minute prose. Revised values did not result in any changes in averages.

Figure N82 displays the differences in the average heart rate from the final 2 minutes of each control condition compared to the average heart rate from the final 2 minutes of each mindfulness and prose condition for each session, for both original values. The figure shows that the difference in the final 2 minutes for Session 1 was a decrease of 7.2 bpm from control to prose; for Session 2 there was a decrease of 9.5 bpm from control to prose; for Session 3 there was a decrease of 11.5 bpm from control to prose; for Session 4 there was a decrease of 5.8 bpm from control to prose; for Session 5 there was an increase of 3.3 bpm from control to prose; for Session 6 there is an increase of 2.6 bpm from control to mindfulness; for Session 7 there was a decrease of 6.0 bpm from control to mindfulness; and for Session 8 there is an decrease of 1.8 bpm from control to prose. All of the six differences after prose were decreases, ranging from 1.8 bpm for Session 8 to 11.5 bpm for Session 3. One of the differences after mindfulness was an

increase of 2.6 bpm for Session 6 and the other was a decrease of 6.0 bpm for Session 7. Revised values in heart rate did not result in any changes in the final 2 minutes of any control, prose, or mindfulness conditions.

Figure N83 displays the differences in the average heart rate from the final 1 minute of each control condition compared to the average heart rate from the final 1 minute of each mindfulness and prose condition for each session for both original values. The figure shows that the original difference in the final 1 minute for Session 1 was a decrease of 7.8 bpm from control to prose; for Session 2 there was a decrease of 10.4 bpm from control to prose; for Session 3 there was a decrease of 13.3 bpm from control to prose; for Session 4 there was a decrease of 7.2 bpm from control to prose; for Session 5 there was a decrease of 3.1 bpm from control to prose; for Session 6 there was an increase of 2.0 bpm from control to mindfulness; for Session 7 there was a decrease of 5.8 bpm from control to mindfulness; and for Session 8 there is an decrease of 4.3 bpm from control to prose. All of the six differences after prose were decreases, ranging from 3.1 bpm for Session 5 to 13.3 bpm for Session 3. One of the differences after mindfulness was an increase of 2.0 bpm for Session 6 and the other was a decrease of 5.8 bpm for Session 7. Revised values in heart rate did not result in any changes in the final 1 minute of any control, prose, or mindfulness conditions.

Figure N84 displays MAAS scores for Participant 7. For Session 1, the score decreased from 3.4 pre-session to 3.2 post-session after 60 minutes of prose. For Session 2, the score remained the same from 3.1 pre-session to post-session after 60 minutes of prose. For Session 3, the score remained the same from 3.1 pre-session to post-session after 60 minutes of prose. For Session 4, the score increased from 3.2 pre-session to 3.3 post-session after 60 minutes of prose. For Session 5, the score remained the same from 3.1 pre-session to post-session after 60 minutes

of prose. For Session 6, the score remained the same from 3.3 pre-session to post-session after 60 minutes of mindfulness. For Session 7, the score remained the same from 3.3 pre-session to post-session after 60 minutes of mindfulness. For Session 8, the score remained the same from 3.2 pre-session to post-session after 60 minutes of prose. The MAAS score increased during one of the eight sessions, by 0.1 following prose in Session 4, and decreased during one session, by 0.2 following prose in Session 1. Overall, the MAAS scores have little variability with a maintaining trend.

Figure N85 displays the differences in MAAS scores pre-session to post-prose and pre-session to post-mindfulness for Participant 7. Session 1's difference was a decrease of 0.2 after 60 minutes of prose; there was no difference in Session 2 or Session 3; Session 4's was an increase of 0.1 after 60 minutes of prose; there was no difference in Session 5, Session 6, Session 7, or Session 8.

Figure N86 displays PSS scores for Participant 7. For Session 1, the score increased from 14 pre-session to 15 post-session after 60 minutes of prose. For Session 2, the score decreased from 14 pre-session to 13 post-session after 60 minutes of prose. For Session 3, the score remained the same from 13 pre-session to post-session after 60 minutes of prose. For Session 4, the score remained the same from 14 pre-session to post-session after 60 minutes of prose. For Session 5, the score increased from 14 pre-session to 15 post-session after 60 minutes of prose. For Session 6, the score remained the same from 14 pre-session to post-session after 60 minutes of mindfulness. For Session 7, the score decreased from 14 pre-session to 13 post-session after 60 minutes of mindfulness. For Session 8, the score remained the same from 13 pre-session to post-session after 60 minutes of prose. The PSS score decreased during two of the eight sessions,

following prose and mindfulness, and decreased during two sessions, both following prose; all changes were of 1 point. Overall, the PSS scores have little variability with a maintaining trend.

Figure N87 displays the differences in PSS pre-session to post-prose and pre-session to post-mindfulness for Participant 7. Session 1's difference was an increase of 1 after 60 minutes of prose; Session 2's was a decrease of 1 after 60 minutes of prose; there was no difference in Session 3 or Session 4; Session 5's was an increase of 1 after 60 minutes of prose; there was no change in Session 6; Session 7's was a decrease of 1 after 60 minutes of prose; and there was no change in Session 8.

Figure N88 displays the number of displacement behaviors emitted during each 10-second interval, and Figure N89 shows a cumulative record of the same data, showing the cumulative number of responses emitted across 10-second intervals for Participant 7. The first panels of Figures N88 and N89 show that during the Session 1 5-minute control, 10 responses were emitted across nine of the 30 intervals, evenly dispersed across the condition. During the 60-minute prose, 383 responses were emitted across 168 of the 360 intervals, with denser responding in the first wo-thirds of the condition and shorter periods of responding in the last third. The second panels show that during the Session 2 5-minute control, 10 responses were emitted across five of the 30 intervals, near the beginning and end of the condition. During the 60-minute prose, 410 responses were emitted across 132 of the 360 intervals, with slow responding toward the beginning of the condition and denser responding in the last three-quarters. The third panels show that during the Session 3 5-minute control, 43 responses were emitted across 17 of the 30 intervals, with a pronounced burst near the middle. During the 60-minute prose, 408 responses were emitted across 123 of the 360 intervals, with two bursts near the middle and toward the end of the condition. The fourth panels show that during the Session 4

5-minute control, 34 responses were emitted across 10 of the 30 intervals, with three bursts interspersed through the condition. During the 60-minute prose, 516 responses were emitted across 145 of the 360 intervals, with five pronounced periods of denser responding. The fifth panels show that during the Session 5 5-minute control, three responses were emitted across two of the 30 intervals, near the end. During the 60-minute prose, 407 responses were emitted across 163 of the 360 intervals, with denser responding near the middle and end of the condition. The sixth panels show that during the Session 6 5-minute control, 95 responses were emitted across 19 of the 30 intervals, with most responding concentrated toward the beginning and near the middle of the condition. During the 60-minute mindfulness, 334 responses were emitted across 104 of the 360 intervals, with two periods of denser responding and shorter periods in between. The seventh panels show that during the Session 7 5-minute control, 26 responses were emitted across nine of the 30 intervals, with interspersed responding through the first half of the condition and a burst near the end. During the 60-minute mindfulness, 324 responses were emitted across 124 of the 360 intervals, with responding evenly dispersed throughout the condition, but denser in the first half. The eighth panels show that during the Session 8 5-minute control, 31 responses were emitted across 12 of the 30 intervals, with two bursts near the middle and end of the condition. During the 60-minute prose, 343 responses were emitted across 102 of the 360 intervals, with responding fairly evenly dispersed across the observation. Figure N90 shows the same data as Figure N89, but with the pen reset every 5 minutes to better demonstrate response patterns across time. This figure shows that there are no visually significant differences in responding between conditions.

Figure N91 displays the average frequency (responses per minute) of discrete displacement behaviors (top panel) as well as percent of session engaged in continuous

displacement behaviors (bottom panel) per condition for each session for Participant 7. The top panel shows that during the Session 1 control, she emitted an average of 2.0 responses per minute and during the 60-minute prose she emitted an average of 6.4 responses per minute. During the Session 2 control, she emitted an average of 2.0 responses per minute and during the 60-minute prose she emitted an average of 6.8 responses per minute. During the Session 3 control, she emitted an average of 8.6 responses per minute and during the 60-minute prose she emitted an average of 6.8 responses per minute. During the Session 4 control, she emitted an average of 6.8 responses per minute and during the 60-minute prose she emitted an average of 8.6 responses per minute. During the Session 5 control, she emitted an average of 0.6 responses per minute and during the 60-minute prose she emitted an average of 6.8 responses per minute. During the Session 6 control, she emitted an average of 19.0 responses per minute and during the 60-minute mindfulness she emitted an average of 5.6 behaviors per minute. During the Session 7 control, she emitted an average of 5.2 responses per minute and during the 60-minute mindfulness she emitted an average of 5.4 responses per minute. During the Session 8 control, she emitted an average of 6.2 behaviors per minute and during the 60-minute prose she emitted an average of 5.7 behaviors per minute. Overall, the level for the prose condition is consistently higher than the mindfulness condition, although the difference is not visually significant. The mindfulness condition has low variability, with frequencies ranging from 5.4 to 5.6 responses per minute and a maintaining trend. The prose conditions also have low variability with frequencies ranging from 5.7 to 8.6 responses per minute and a maintaining trend. The control conditions have the highest variability with frequencies ranging from 0.6 to 19.0 responses per minute, with an increasing trend.

The bottom panel of Figure N91 shows that during the Session 1 5-minute control, Participant 7 supported her head 26.3% of the time, and during the 60-minute prose she engaged with items 5.6% of the time, supported her head 7.3%, and crossed her arms 8.1%, for a total of 21%. During the Session 2 5-minute control, she did not engage in continuous displacement behaviors; during the 60-minute prose she engaged in work 70.4% of the time, engaged with her phone 12.8%, and engaged with a book 1.7%, for a total of 84.9%. She also supported her head 8.3%. During the Session 3 control, she supported her head 7.7% of the time, and during the 60-minute prose she engaged in work 97.4% of the time, engaged with her phone 1.4% of the time, and stood up for a negligible amount of time (10 seconds out of 3,600 seconds), for a total of 98.8%. She also supported her head 12.3%. During the Session 4 5-minute control, she did not engage in continuous displacement behaviors, and during the 60-minute prose she engaged in work 69.7% of the time, engaged with her phone 11.0%, and crossed her arms 4.7%, for a total of 85.4%. She also consumed food 13.3% of the time and supported her head 11.6%. During the Session 5 control, she supported her head 13.7% of the time, and during the 60-minute prose she engaged in work 65.9% of the time and engaged with her phone 21.9%, for a total of 87.9%. She also consumed food 5.2% of the time and supported her head 8.0%. During the Session 6 control, she supported her head 2.0% of the time, and during the 60-minute mindfulness she engaged in work 89.6% of the time, and supported her head 10.9%. During the Session 7 control, she did not engage in continuous displacement behaviors, and during the 60-minute mindfulness she engaged in work 95.4% of the time and stood up 2.2%, for a total of 97.6%. She also consumed food 1.2% of the time and supported her head 6.2%. During the Session 8 control, she did not engage in continuous displacement behaviors, and during the 60-minute prose she engaged in work 88.5% of the time and engaged with her phone 2.4% of the time, for a total of 90.9%. She

also consumed food 7.4% of the time and supported her head 1.1%. The mindfulness condition has the lowest variability, ranging from 89.6% to 97.6%. The control condition has moderate variability, ranging from 0 to 26.3%, and the prose conditions have high variability, ranging from 22.7% to 98.8%. The level of the control conditions is lower than prose and mindfulness, both of which overlap. The control and mindfulness conditions show maintaining trends, and the prose condition has a maintaining trend after the initial data point.

Statistical Analysis of Heart Rate and Questionnaire Responses

After data collection was completed, the heart rate averages for Participants 2-8 were entered into SPSS for each condition in each session, and analyzed individually, which was suggested by an experienced statistician during consultation with the principal investigator's dissertation chair. Where there was not a value for a cell (e.g., no value for prose when a session consisted of 60 minutes of mindfulness), the average of the participant's existing values for that condition was entered. The data were then subjected to a repeated measures analysis of variance (ANOVA) to compare the average heart rate in each condition: Control, Prose, and Mindfulness. Participant 2's data showed a significant main effect for condition type [$F(2,6)=23.547$, $p=.001$]. As a result, a pairwise comparison post hoc analysis was conducted, and a paired samples t-test showed a significant difference between the control condition and the prose condition ($p=.001$) and the prose condition and the mindfulness condition ($p=.002$). Thus, for Participant 2, heart rate was significantly lower in the prose condition as compared to the control condition, and significantly higher in the mindfulness condition as compared to the prose condition. Participant 3's data did not show a significant main effect for condition type [$F(2,5)=3.132$, $p=.131$].

Participant 4's data showed a significant main effect for condition type [$F(2,5)=11.022$, $p=.015$]. As a result, a pairwise comparison post hoc analysis was conducted, and a paired

samples t-test showed a significant difference between the control condition and the prose condition (p=.012) as well as the control condition and the mindfulness condition (p=.008). Thus, for Participant 4, heart rate was significantly higher in the prose condition as compared to the control condition, and significantly higher in the mindfulness condition as compared to the control condition.

Participant 5's data showed a significant main effect for condition type [F(2,6)=13.401, p=.006]. As a result, a pairwise comparison post hoc analysis was conducted, and a paired samples t-test showed a significant difference between the prose condition and the mindfulness condition (p=.003). Thus, for Participant 5, heart rate was significantly lower in the mindfulness condition as compared to the prose condition. Participant 6's data did not show a significant main effect for condition type [F(2,6)=.691, p=.537].

Participant 7's data showed a significant main effect for condition type [F(2,6)=15.229, p=.004]. As a result, a pairwise comparison post hoc analysis was conducted, and a paired samples t-test showed a significant difference between the control condition and the prose condition (p=.002). Thus, for Participant 7, heart rate was significantly lower in the control condition as compared to the prose condition.

Pearson correlations were also calculated to determine the relationship, if any, between MAAS scores and PSS scores for Participants 2-7. Each pair of scores was entered into an Excel spreadsheet and there was an overall negative correlation between these variables, r=-0.57, n=112, p<.00001. The correlation for individual participants was significant for Participants 2-5. The strongest correlation was shown for Participant 3, r=-0.90, n=20, p<.00001; the correlation for Participant 4 was r=-0.86, n=20, p<.00001; for Participant 2 was r=-0.74, n=20, p=0.00019; and for Participant 5 was r=-0.52, n=20, p=0.019. These results show that for these participants,

and especially for Participants 2-4, MAAS scores and PSS scores were significantly inversely related, in that as self-reported levels of mindfulness increased, self-reported levels of stress decreased.

Chapter 5: Discussion and Conclusions

Introduction

The purpose of the current study was to explore the immediate effects of guided mindfulness practice, and to determine whether longer durations of practice would have proportionally greater effects than shorter practices on heart rate, mindfulness scores, stress scores, and displacement behaviors. There were significant differences in heart rate for four of the participants between at least two of the conditions. Specifically, average heart rate was lower in the prose condition for Participant 2, higher in the control condition for Participant 4, lower in the mindfulness condition for Participant 5, and higher in the prose condition for Participant 7. The results demonstrated an effect on MAAS and PSS scores for some participants in some sessions, although they were not consistent across conditions. There was a notable effect on displacement behaviors for the majority of the participants, where rate and duration were lowest in the mindfulness condition for the majority of participants as compared to the prose condition. Overall, the majority of participants reported that the mindfulness practices were beneficial and the time commitment involved in the study was reasonable.

Although mindfulness has been shown to be an effective tool for many, it is still not used widely. One of the reasons for this may be the time commitment that some programs require. The standard 8-week curriculum developed by Kabat-Zinn (2003) often requires a minimum of 5 hours per week (one 1.5-hour weekly session plus 45 minutes of independent practice at least five times per week), and some programs require several hours per day. Individuals who are employed full-time, attend school, and/or have families, among other commitments, may not be able to devote that amount of time to a mindfulness practice regimen. Empirical evidence that shorter practices can have favorable results may increase the likelihood that more people will, at minimum, attempt mindfulness. Results of the current study showed that some individuals may

reap benefits, such as higher levels of self-reported mindfulness and lower levels of self-reported stress, from practices as short as 5 minutes, and that, interestingly, longer practices (for these participants) did not produce significantly greater effects. Whether or not these benefits maintain across long periods of time was not assessed here, but future research may assess long-term effects of shorter durations of practice.

The current research builds on previous studies that demonstrate mindfulness practice can have numerous beneficial effects. Several researchers have found that mindfulness was associated with a number of positive outcomes, such as increased well being (Lykins & Baer, 2009), self esteem (Rasmussen & Pidgeon, 2011), and quality of life (Fernros et al., 2008) and also decreased depression (Aggs & Bambling, 2010), PTSD symptoms (Kimbrough et al., 2010), and insomnia (Cincotta et al., 2011). The majority of the participants in the current study indicated that the mindfulness practice was at least somewhat helpful, specifically in regards to their jobs or schooling and in dealing with challenges. Although these participants were not asked about well-being or health topics, this is something future researchers should consider incorporating in the scope of their studies.

The procedures for Participants 6 and 7 were modified to include extended baseline sessions and eliminate the 5- and 20-minute mindfulness conditions to determine whether those baseline sessions would lead to effects on the dependent variables, essentially whether dependent variables would change over time in the absence of mindfulness. As the results show, however, there were no meaningful differences in dependent variables for Participants 6 and 7 across the extended baseline sessions, and the implementation of mindfulness practice led to some differences.

Interpretation of Findings

The first dependent variable of interest in the current study was heart rate. The revised heart rate averages have distinct patterns for some of the participants, where there was a visually significant difference between the conditions. For example, Participant 2's average heart rate was highest during the control condition for each session and was lowest during the prose conditions, with averages during the mindfulness conditions falling in between. The repeated-measures ANOVA also revealed a statistically significant difference between the prose and control conditions and the prose and mindfulness conditions, where the average in the prose conditions was lower for both comparisons. The repeated-measures ANOVA did not reveal any significant differences in average heart rate for Participant 3, and visual analysis showed that the average was lowest for the prose conditions for the majority of sessions, but the data paths for all three conditions overlap several times. Participant 4's average heart rate was highest during the control conditions for each session except session 8, and was lowest during the mindfulness conditions for sessions 2, 4, 6, and 7. The repeated-measures ANOVA revealed a statistically significant difference between the control and prose conditions and the control and mindfulness conditions, where the average in the control conditions was lower for both comparisons. The repeated-measures ANOVA revealed a statistically significant difference between the prose and mindfulness conditions for Participant 5, where the mindfulness condition was lower, although a visual analysis of the data did not suggest a meaningful difference. The repeated-measures ANOVA did not reveal a statistically significant difference in heart rate between any conditions for Participant 6; however, visual analysis of the data indicate that the average heart rate was lower during both prose and mindfulness conditions, compared to the control conditions, for each session. Participant 7's average heart rate was consistently lower during both the prose and

mindfulness conditions, compared to the control conditions, with the exception of Session 6 in which the average during mindfulness was higher than the average during control. The repeated-measures ANOVA revealed that there was a statistically significant difference between the control and prose conditions in that heart rate was lower in the control condition.

It is possible that simply sitting for an extended period of time, regardless of the audio playing, led to a lower average heart rate, relative to the control condition, as the lowest average was observed during the final condition of the session for the majority of sessions for four of the participants. This may have been compounded by sessions being conducted in a novel environment for some of the participants, where their heart rate may have habituated throughout the session, resulting in a lower average near the end of the session compared to the beginning of the session. Heart rate could also have been affected by the point in time when the participants put on the device. The principal investigator asked participants to put it on after completing the pre-session questionnaires, directly prior to the 5-minute control. Asking them to connect the device earlier in the session, before completing the questionnaires, may have provided more time for their heart rate to habituate and reach stability.

The omission of some heart rate values also altered the overall average for Participants 2, 3, and 4 by more than 5 bpm, and up to 31 bpm. Although it was the author's evaluation that the very extreme values (i.e., 0 bpm or 250 bpm) were likely due to a malfunction in the device, some of the other omitted values (i.e., 101 bpm or 107 bpm) may have been accurate data. The standard range of resting heart rate for adult humans is 60-100 bpm ("Target Heart Rates," n.d.) but because it can be as low as 40-60 bpm for some individuals (i.e., athletes), the minimum cutoff was lowered to 50 bpm. In future research using heart rate as a dependent variable, a more individualized method may be a more accurate measure, such as obtaining a typical heart rate

range for each participant from their doctor or medical professional or conducting a longer control condition.

Other variables may have also had an effect on participants' heart rate that were not accounted for in this study. For example, the principal investigator requested that participants not engage in activities that could increase heart rate for the 3 hours prior to the start time of sessions, such as consuming caffeinated beverages or exercising. Although it was not possible to prevent them from doing so, most participants reported that they did abstain. One participant reported that two cups of coffee each morning was her baseline, and one participant reported that one cup of coffee and approximately 1 hour of exercise each morning was her baseline; as such, the principal investigator requested that these participants remain consistent throughout the study and they reported that they did. Another possibility could have been private events or specific language in the audio recordings that increased heart rate, such as thinking about stressful tasks or events (i.e., an upcoming exam or project, family difficulties, etc.) during sessions. Overall, heart rate did not produce meaningful results in the current study as a reliable measure of stress impacted by mindfulness practice.

Another dependent variable of interest in this study was participants' self-reported level of mindfulness. Participant 1's MAAS scores did not change reliably as a function of the mindfulness audio. The largest increase of 0.4 followed 20 minutes of mindfulness, and the only decrease relative to the control condition occurred after 40 minutes of prose during the same session. The increase following 60 minutes of mindfulness was only 0.1. Because Participant 1 completed only three of the eight sessions, it is difficult to interpret these results. Participant 2's MAAS scores changed during most sessions, but not necessarily reliably as a function of the mindfulness audio. The two largest increases did follow mindfulness conditions, increasing by

0.4 after 60 minutes and by 0.6 after 5 minutes. Other increases occurred after the other mindfulness conditions, but also after prose conditions. An interesting point to note is that the only decrease in MAAS score following a mindfulness condition occurred during Session 7, after Participant 2 requested to the end the session early due to self-reported frustration about the noise interference from the hallway (e.g., students and faculty entering and exiting other classrooms and talking). This decrease in mindfulness level might be expected subsequent to a frustrating experience, and is befittingly demonstrated here. Participant 3's MAAS scores changed substantially and reliably with the audio. The only decreases occurred after prose audio at the end of three sessions (e.g., after mindfulness and prose) and ranged from 0.1 to 1.1. The score increased after each mindfulness condition, with increases ranging from 0.6 after 20 and 5 minutes of mindfulness, to 2.3 after both sessions with 60 minutes of mindfulness. Participant 4's MAAS scores did not change reliably as a function of the mindfulness audio. There were three decreases, one after 55 minutes of prose at the beginning of the session, and two after 20 minutes of mindfulness at the end of the session. The score increased after both 60-minute mindfulness conditions, once by 0.7 and the other by 0.1. Participant 5's MAAS scores did not decrease during any session, and increased during two sessions following mindfulness. Other than Session 2, the increases following prose were negligible (ranging from 0 to 0.2). The next largest increases followed 60 and 20 minutes of mindfulness, increasing by 0.4 each time. Participant 6's MAAS scores did not change reliably as a function of the mindfulness audio. Although the score changed after each prose and mindfulness condition, the changes were not consistent with condition. Seven of the eight changes were increases, ranging from 0.1 to 0.7 after prose, and 0.4 to 0.5 after the two mindfulness conditions, and the only decrease occurred after prose in Session 6. The second and third largest increases were following mindfulness, but

the largest was following prose. Participant 7's MAAS scores did not change reliably as a function of the mindfulness audio. The only changes followed 60 minutes of prose, one being a decrease of 0.2 and the other being an increase of 0.1.

Overall, it does not appear that the self-reporting of mindfulness levels was a sensitive and functionally relevant measure, as the score changed reliably as a function of the mindfulness practice for only one participant. This may be because the assessment was not functionally related to the guided mindfulness practice, or because the assessment itself is not a reliable measure. It is possible that the repeated completion of the MAAS (two or three times per session) affected the scores by participants answering similarly each time; the principal investigator attempted to avoid this by stating, "Please answer according to how you feel right now, in this moment." The MAAS was chosen for inclusion as a dependent variable in this study due to its validity and efficiency; it has been shown to be a valid and reliable assessment tool that can be completed in five minutes or less (Brown & Ryan, 2003). It has also been shown to be useful when measuring moment-to moment changes, as it focuses "on the presence or absence of attention to and awareness of what is occurring in the present" and that "[t]his present-centered attention-awareness is…foundational to mindfulness" (Brown & Ryan, 2003, p. 824). However, the independent variable utilized here or individual differences could have had unintended effects on the results of the measure.

Other extraneous variables may have also impacted their scores, including noise interference, the content of the audio, or engaging with the puzzle books for Participants 2 and 4. One example of noise interference occurred with Participant 6 in Session 7. After the mindfulness audio portion of the session, the principal investigator returned to the room to administer the post-session MAAS and PSS. The participant mentioned the noise from the

hallway and said that it was loud and had caused some frustration. Examination of the heart rate data shows there was a notable increase in heart rate around the 37th minute (identified by an arrow in Figures N66 and N67), and upon viewing the video recording of the session, noise can be heard around this same time.

A third dependent variable of interest was participants' self-reported levels of stress. Participant 1's PSS score decreased during each of the three sessions, most notably in Session 2, with a decrease of 4 after 60 minutes of mindfulness. Participant 2's PSS score increased during three of the sessions, following both baselines of 60 minutes of prose, and then in Session 7 following approximately 37 minutes of mindfulness before asking to end early. The largest decrease of 3 followed 60 minutes of mindfulness. Participant 3's PSS scores changed significantly and reliably with the mindfulness audio. The largest decrease of 14 followed 60 minutes of mindfulness, the second largest decrease of 10 followed 5 minutes of mindfulness, and the third largest decrease of 7 followed 60 minutes of mindfulness, 20 minutes of mindfulness, and 60 minutes of prose. The largest increase of 6 followed 40 minutes of prose at the end of Session 6, and the other increase of 1 followed 20 minutes of mindfulness in Session 2. Participant 3 spent a significant amount of time in Session 2's mindfulness condition engaged with her phone, which she did not do in the other mindfulness conditions, which may have contributed to the increase. Participant 4's PSS scores decreased during most sessions, with the only increases following mindfulness conditions at the end of three sessions. Two of the largest decreases occurred following 60 minutes of mindfulness. Participant 5's PSS score decreased during each of the eight sessions, with the largest decrease following 55 minutes of prose, and the second largest decrease following 60 minutes of mindfulness. Participant 6's PSS score decreased during six of the eight sessions, most notably by 10 following 60 minutes of

mindfulness. The next largest decrease of 4 occurred during three sessions, the second mindfulness condition and two prose conditions. The only two increases occurred during prose conditions, increasing by 3 during Session 1 and by 1 in Session 6. Participant 7's PSS score did not change reliably as a function of the mindfulness audio. There were two increases of 1 following 60 minutes of prose, and two decreases of 1 following prose and mindfulness. As with the MAAS scores, there was not an apparent relation between the mindfulness conditions and changes to the PSS scores. For two of the participants, the overall scores over time did show a decreasing trend, indicating a decrease in stress, with the decrease being gradual for Participant 2 and more pronounced for Participant 4 starting with Session 4.

The final dependent variable of interest was the rate and duration of displacement behaviors. For five of the seven participants, there was a clear pattern in which discrete displacement behaviors were emitted at a visually significantly lower average rate during the mindfulness conditions as compared especially to the prose conditions; however, this pattern was not shown for Participants 6 and 7. One reason for this may be their experience with extended baseline sessions with prose audio, where engagement in displacement behaviors generalized to the experimental environment and carried over to the mindfulness sessions. The relation between the mindfulness and control conditions was less evident; the reason for this is unclear, as Participants 1-3 experienced the mindfulness condition before the prose condition, and the opposite was true for Participants 4 and 5. In addition, for five of the seven participants, there was a clear pattern in which the duration of time spent engaging in displacement behaviors was visually significantly higher during the prose conditions as compared specifically to the mindfulness conditions; this pattern was not shown for Participants 2 and 7. These differences may indicate that participants were more focused during the mindfulness conditions, as opposed

to the prose conditions. One reason for this may be that the mindfulness audio contained some instructions such as how to sit and what to do when the mind wanders, which is typical of guided mindfulness practices, whereas the prose audio did not include any type of instructions on how participants should behave. This lack of instruction in the prose conditions may have contributed to more off-task behaviors such as reading, engaging with a mobile phone or computer, or eating. A comparison condition that is more similar to mindfulness than the prose audio utilized in this study may provide a more stringent evaluation of the differences in effects.

Participant 1 emitted discrete displacement behaviors and engaged in continuous displacement behaviors at a significantly higher rate during prose conditions than control or mindfulness conditions, with no overlap in the data paths. Participant 2 emitted discrete displacement behaviors at the highest rate during prose conditions, and the lowest rate during mindfulness conditions, although there was overlap in the data paths for mindfulness, prose, and control conditions. Continuous displacement behaviors had low levels during all three conditions, but are highest during prose and lowest during mindfulness. Participant 3 emitted discrete displacement behaviors at the lowest rates during mindfulness conditions, although there was some overlap with control and prose conditions. Duration of displacement behaviors had a consistently higher level during the prose conditions, with the exception of Session 2. Participant 4 emitted discrete displacement behaviors at a higher rate during the control and prose conditions, compared to the mindfulness conditions, although there was slight overlap within some sessions. Continuous displacement behaviors had the highest level during the prose conditions, with control and mindfulness conditions both low and overlapping. Participant 5 emitted discrete displacement behaviors at a higher rate during the prose conditions, compared to the control and mindfulness conditions, with no overlap with the mindfulness conditions.

Continuous displacement behaviors were significantly higher during the prose conditions, with control and mindfulness conditions at zero or near-zero levels. Participant 6 emitted discrete displacement behaviors at a lower rate during mindfulness conditions compared to prose conditions, although the difference was visually very similar, and at approximately the same rate during control conditions. Continuous displacement behaviors were high for both prose and mindfulness conditions. Participant 7 emitted discrete displacement behaviors at a lower rate during mindfulness conditions compared to prose conditions, although there was some overlap and the differences were visually similar; the average rate during control conditions had high variability. Continuous displacement behaviors had a high level for both prose and mindfulness conditions, with no clear difference between the two conditions.

There are differences in levels of displacement behavior between the conditions for all participants, with discrete displacement behaviors at a lower rate during the mindfulness conditions than the control or prose conditions; however, some of the differences are not visually significant. Engagement in continuous displacement behaviors was also consistently highest for most of the prose conditions across the majority of participants, with a few exceptions. The principal investigator did inform participants that data would be collected on displacement behaviors, but did not offer any details about what specific behaviors were included. Therefore, the differences in displacement behaviors might be a more meaningful measure than self-reported stress. It is also possible that these responses could be indicative of boredom rather than stress, or following instruction (mindfulness) versus not having any instructions to follow (control and prose), and these are topics that future researchers might parse out.

Overall, results from the current investigation show that mindfulness was not functionally related to heart rate, MAAS scores, or PSS scores, based on visual analysis of the data.

Mindfulness and displacement behaviors, however, do seem to be functionally related based on these data and this may be the most meaningful of the dependent variables. Participants were informed of the purpose of the MAAS and the PSS, namely, to determine their level of mindfulness and level of stress at each administration. Even if participants did not have a learning history with each of these instruments, their titles (Mindful Attention Awareness Scale and Perceived Stress Scale) provided the information necessary to deduce their purpose, and they were completed two to three times during every session. On the other hand, participants were informed of data collection on displacement behaviors during the first baseline session only, during informed consent, and no details were offered (participants did not ask questions about this specific topic). Therefore, it is likely that participants were unaware of which overt behaviors were being measured during data collection and coding, and the information provided or reactivity was unlikely to exert control over this dependent variable, whereas it is possible that participants responded on the MAAS and PSS in a manner that they believed would be favorable.

Measures of the above-mentioned dependent variables indicated that there were no significant proportional differences between the effects of the different mindfulness conditions. In other words, any effects of the mindfulness practice were not three-fold for the 60-minute audio compared to the 20-minute audio, twelve-fold for the 60-minute audio compared to the 5-minute audio, or four-fold for the 20-minute audio compared to the 5-minute audio. In fact, there were no consistent discernible differences between any of the mindfulness conditions among the participants. For example, the largest decreases in PSS score for Participant 3 followed 5 minutes and 60 minutes of mindfulness, where it may be expected that 5 minutes of mindfulness would result in a small decrease and that 60 minutes would produce a larger increase. One conclusion

that could be drawn from these results is that engaging in some mindfulness, even in short durations, can have a positive effect on self-reported levels of stress and mindfulness, but also one's everyday experiences as indicated by participants' responses to the social validity questionnaire. Another conclusion may be that engaging in mindfulness, regardless of duration, had minimal effects on dependent variables for these participants. Further research is needed to determine the extent of the effects of guided mindfulness practice.

Limitations

There were several limitations in the current study. First, the six participants who completed all eight sessions were each placed in at least two different rooms over the course of the study due to availability at the school. The investigator requested the same room as much as possible, but it was not always available. The different environments may have had an unintended effect on the participants' responding; for example, Session 1 for Participant 7 was held in a small conference room with a magnetic white marker board and extraneous materials (i.e., markers and magnets) that she engaged with during the session. Also, the presence of the puzzle books for some participants and not others may have contributed to the differences in displacement behaviors. Participants 5-7 did not have the opportunity to engage with these materials during the audio portions of sessions, as the principal investigator removed them after the control condition was over. Had the books been available during the audio, it is possible that they would have used them.

Second, the content of the audio recordings was different for each session. Because the conditions were of different lengths session-to-session, it was not possible for all recording to have the same content. In addition, because the purpose was to maximize participants' attending to the audio, listening to the same recording during every session would have likely countered

that objective. The principal investigator selected recordings that were as similar as possible (regular cadence and tone, etc.), but the content may have contributed to, or inhibited, some effects. Some participants, for example, disclosed to the principal investigator that the prose recordings were boring and that they preferred the mindfulness recordings. As a result, this "boredom" may have influenced participants' off-task behavior. Furthermore, the compensation provided to participants was low ($5 per each 65-minute session), and the principal investigator therefore attempted to keep obligations minimal. If higher compensation is provided, participants may be more willing to tolerate a "boring" situation.

Third, there were a few occurrences of error on the part of the principal investigator: the iPad stopped recording during one session for Participant 1 due to lack of storage space, the heart rate monitor was not present for one of the sessions for Participant 3, and one of the control conditions was not video recorded for Participant 3. Fourth, the current sample of participants was small and lacking in diversity: six of the participants were female, five were white, four were graduate students (and a fifth was recently graduated), and six were 24-31 years old. As such, the results may not have generality to a larger population of people who perhaps are less practiced in following directions, are in a different age range, or are of different races or ethnicities.

Fifth, low IOA for some dependent variables can make interpretation of the results more difficult. Although retraining of the second observer occurred on four separate occasions due to IOA below 90%, some types of IOA, particularly scored-interval IOA, did not reach 90%. This may be due to the complexity of the recording system or very low rates of the target behaviors. With several responses included in the response class of "Displacement Behaviors," it was difficult to record only these specific responses for a few reasons. Firstly, remembering which

specific responses were to be counted was difficult, and required referring to the list of operational definitions on several occasions. Secondly, after coding data from a few videos, it became easier to record a tally every time a participant moved at all, whether or not the response met the requirements of the operational definition. As a result, the principal investigator revised the list of operational definitions that included examples and non-examples. It is recommended that future researchers develop a less complicated data collection system, should they choose to include displacement behaviors as a dependent variable.

Sixth, participants had varying backgrounds and experience with mindfulness. One participant reported that she engaged in informal mindfulness practices, including thinking about her day and responsibilities, taking a moment to breathe when frustrated or overwhelmed, and practicing yoga. Two participants had learned some basic information about mindfulness but not practiced, and the remaining participants reported they had no information about mindfulness. The participant with the most experience with mindfulness, Participant 7, had the smallest difference in displacement behaviors, both in rate and duration, between mindfulness and prose conditions, and responded least favorably on the social validity questionnaire. She also reported to the principal investigator that she did not particularly enjoy the sessions and used them to catch up on work. It may be possible that Participant 7 had certain expectations regarding the current study because of her experience on the topic that were not met, leading her to engage in off-task behaviors and not attend to the audio in a fully practicing manner.

Seventh, there was not a guaranteed method to assess whether or not participants actually engaged in practicing mindfulness in those conditions. It is possible that participants were engaging in other covert behaviors, such as daydreaming, while listening to the audio. This study included questions about the audio content in an attempt to assess procedural adherence and the

results indicated that the majority of participants were attending to the audio during the majority of sessions, with a total of 75% (37 of 50) of questionnaires scoring 100% (with 100% treatment integrity IOA). Nonetheless, it is not possible to definitively state whether or not participants were actually engaging in mindfulness even if they were listening to the audio. Future researchers might address this matter by asking more detailed questions about the audio content or giving more explicit instructions for participants to listen closely to the audio, or even to fully engage in the mindfulness practice. Individual differences and different environmental contexts (e.g., mental health concerns) may also play a part in how closely participants attended to the audio, and researchers should consider those variations among participants.

Eighth, the inclusion of the puzzle books and magazines in the 5-minute control presented a few limitations. The purpose of the books was to provide consistency across sessions and participants while recording heart rate during the control conditions. It was determined that providing this activity would provide more reliability than having participants choose activities to engage in, such as looking at mobile phones (in the case bad news was received and increased heart rate). In reality, the presence of the books created a confound that was not anticipated, both by being in the control conditions and also being left during the audio portion of sessions for some participants. Future investigators might consider asking participants to simply sit for the 5 minutes without engaging in an activity.

Finally, the inclusion of prose audio as a comparison for the mindfulness audio conditions presented limitations of its own, but also had its usefulness. In order to determine the effects of guided mindfulness practices, a comparison condition was needed. One possibility would be to have participants simply sit in a quiet room; however, there would be no process to ascertain if any effects were the result of the audio or merely sitting for a period of time. Playing

a different kind of audio would be the most effectual way to determine if effects are due to the content of the audio. The prose tracks included in this study were selected for their comparability to the mindfulness tracks (similar tone, cadence, etc.), but the fact remains that the various content of the audio tracks is a potential confound.

Recommendations

There are several implications for future research. Future investigations might compare different types of mindfulness practices to determine if some are more effective than others. Potential comparisons could include listening to guided practices focusing on imagery, body scans, breathing, awareness, etc.; mindfulness-centered coloring books; listening to music; silent meditation; partner meditation; and group meditation. Other comparisons might be made between times of day and correlate findings to self-reports of being a "morning person" or a "night owl," or compare effects of participant-selected interventions to researcher-selected interventions. Future research may also include an analysis of the cumulative effects of mindfulness practice over time, which was only indirectly assessed in the current study, or the differences between practicing mindfulness with an audio recording and practicing with an in-person instructor, which was not assessed in the current study. Many mindfulness-based programs include a weekly session in which participants meet with a trained mindfulness instructor, and provide audio for independent practice several times per week. Variances between these two formats, which may be experientially different, are yet to be evaluated.

Another area for future research may be studying the effects of longer durations of mindfulness practice (e.g., 2 hours or more), which would likely require participants who have extensive experience with practicing mindfulness. More experienced individuals would probably

be better suited to longer practices and be better able to attend to this type of task for longer amounts of time than naïve participants.

Future investigators should carefully consider the behavioral measure(s) they decide to include in their research. Event recording in 10-second intervals of displacement behaviors was a challenging task that required up to 4 hours of data collection for one 1-hour video and retraining of second observers on a few separate occasions, due to the complexity of the recording system. Although such a program was not available for this study, an automated system of data collection would have been incredibly useful. Displacement behaviors, when several different responses are included, may lend themselves better to a partial-interval recording structure, rather than event recording. The definitions of displacement behaviors from Triosi (2008) were helpful as a starting point, but other investigators may consider creating their own operational definitions, individualized to their participants, which was done to an extent in the current study. Responses were added to the list when the principal investigator observed a response that appeared to serve the same function as the other responses already included. In addition, future investigators may want to consider utilizing an altogether different behavioral measure. Although displacement behaviors correlated with the interventions presented in this study, other measures may be more accurate representations. Options might include duration of breath-holding (Hayes & Smith, 2005) or of placing one's hand in an ice bath (Kingston, Chadwick, Meron, & Skinner, 2007), with longer durations potentially indicating higher levels of mindfulness or higher levels of willingness to have unpleasant experiences in the present moment.

Future researchers who intend to include heart rate as a dependent variable should consider asking participants to connect the heart rate monitor at the very beginning of the session, prior to measuring any dependent variables. This extra time would allow heart rate to

stabilize and collect more accurate data. In the current study, the heart rate monitor was connected directly prior to the 5-minute control, which may have resulted in some erroneous data.

Conclusion

Results of the current study add to the growing body of evidence that mindfulness can be an effective tool for many individuals and can help in a variety of aspects, including stress, anxiety, mental and psychological ailments, or depression. In addition, these results suggest that intensive, lengthy mindfulness practices may not be necessary in order to see positive effects, given that 5 minutes of guided mindfulness practice resulted in outcomes not much different than those of 60 minutes of practice in the present study. On the other hand, frequent, brief practices may lead to some of the benefits that individuals may be looking for, especially those new to mindfulness or those with demanding schedules.

The current study was an original contribution to the body of research on mindfulness as it directly assessed the immediate effects of varying durations of guided mindfulness practice on several stress-related dependent variables, including displacement behaviors. Previous researchers have not conducted this kind of a systematic manipulation of mindfulness parameters to assess whether or not there would be proportionally different effects. These results demonstrated that various durations of mindfulness practice can have positive effects, especially on a behavioral measure such as displacement behaviors. This may encourage individuals who have considered mindfulness, but presumed it would require too much of a time commitment. Future research can continue to add to the literature, and extend these results, by studying the effects of different forms of mindfulness.

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Appendix A: Screening Email

Dear (Insert Name),

Hello and thank you for your interest in my research study! I truly appreciate your time in reaching out to me. Please take a few minutes to read the two questions and the questionnaire below. If you feel comfortable answering these questions and would still like to participate in this study, please use the space provided to answer the questions and questionnaire, and email your answers back to me. Please answer the questions honestly and about how you feel *right now*, in *this moment*. If you have any questions or concerns, please feel free to ask me. If you would prefer to answer these questions via telephone, please email me back with a contact number and day/time that is best to call you.

Let me know if you have any questions.

Thank you and I look forward to hearing from you!
Cassandra Dikes, MA, BCBA
Primary Investigator

Please read these questions and circle (highlight, etc.) either YES or NO to indicate your answer:
QUESTION 1: Do you currently have a therapeutic relationship with a counselor who specializes in Acceptance and Commitment Therapy?

YES or NO

QUESTION 2: Do you currently practice mindfulness at least once per week?

YES or NO

Please read the statements below about everyday experiences. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience by writing the corresponding number in the space to the left of each statement. Please answer according to what really reflects your experience rather than what you think your experience should be. Please treat each item separately from every other item.

1	2	3	4	5	6
Almost Always	Very Frequently	Somewhat Frequently	Somewhat Infrequently	Very Infrequently	Almost Never

Read each statement FIRST:	Write your answer (1-6) here SECOND:
1. I could be experiencing some emotion and not be conscious of it until sometime later.	
2. I break or spill things because of carelessness, not paying attention, or thinking of something else.	
3. I find it difficult to stay focused on what's happening in the present.	
4. I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.	
5. I tend not to notice feelings of physical tension or discomfort until they really grab my attention.	
6. I forget a person's name almost as soon as I've been told it for the first time.	
7. It seems I am "running on automatic," without much awareness of what I'm doing.	
8. I rush through activities without really being attentive to them.	
9. I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.	
10. I do jobs or tasks automatically, without being aware of what I'm doing.	
11. I find myself listening to someone with one ear, doing something else at the same time.	
12. I drive places on 'automatic pilot' and then wonder why I went there.	
13. I find myself preoccupied with the future or the past.	
14. I find myself doing things without paying attention.	
15. I snack without being aware that I'm eating.	

Appendix B: Informed Consent

TheChicagoSchool of Professional Psychology

Title: The Effects of a Systematic Manipulation of Mindfulness Practice on Self-Reported Levels of Mindfulness and Stress, Displacement Behaviors, and Heart Rate

Investigator: Cassandra Dikes, M.A., BCBA

I am asking you to participate in a research study. Please take your time to read the information below and feel free to ask any questions before signing this document.

Purpose: The purpose of the study is to see if longer durations of mindfulness practice lead to greater effects than shorter durations.

Procedures: Up to 40 participants will be recruited for this study from a graduate school and the communities in the Chicago area.

This study will take place at The Chicago School of Professional Psychology, located at 325 N. Wells St. in downtown Chicago. There will be 2 sessions per week for 4-6 weeks, for a total of 8-11 sessions. Each session is expected to last 1-3 hours. All sessions will be video recorded for the purposes of data collection. You will receive $5 compensation for each session; there is no penalty for ending a session early (i.e., you will still receive $5 if you choose to end a session early).

During sessions, you will be asked to fill out short questionnaires, put on a heart rate sensor on a chest strap, listen to audio recordings, and fill out more short questionnaires. Some of the recordings may include prose and/or music, ask you to think about certain things, or ask you to just sit quietly. The questionnaires will be pen and paper format and will ask you about your experiences with how you handle stress.

At the end of the study, there will be a debriefing in which you will be asked to fill out a questionnaire, or vocally answer questions about your experience during the study with a member of the research team. Upon completing the study, you will be entered into a drawing with all other participants for $50. The winner of the $50 will be contacted after all participants have completed all of the sessions.

Risks to Participation: The first risk of participation is a potential breach of confidentiality. The steps to minimize this risk are listed in the confidentiality section below. The second risk of participation is potential emotional or physical discomfort from being asked to complete a new task or asked to sit for an hour's time. The researcher will minimize this risk by providing a break before and after the audio portion of sessions, and during sessions if necessary. If you decide you no longer want to participate in the study on a given day, the researcher will stop the session right away.

Benefits to Participants: No direct benefits are guaranteed for participation in this study. Participants may show increases in mindfulness and decreases in stress. In addition, the results of the study may contribute to a body of research on mindfulness and stress.

Alternatives to Participation: Participation in this study is voluntary. You may withdraw from study participation at any time without any penalty.

Confidentiality: Your identity will be kept confidential, known only to the researcher and research assistants. Each participant will be assigned a code and all videos, data sheets, and other study-related documents will be labeled with this code rather than the participant's name. The informed consent form and screening questionnaire will be the only documents containing identifying information.
All electronic data (e.g., video recordings of sessions) will be stored on a laptop computer that will be passcode protected, and/or a flash drive that will also be passcode protected. All physical data (e.g., hard copies of data sheets) will be kept in a secure, locked cabinet in Dr. Fawna Stockwell's office at The Chicago School of Professional Psychology. Ms. Dikes, Dr. Stockwell, and research assistants will be the only persons with access to electronic and physical data.
All data, including video recordings, will be destroyed after 5 years, per the American Psychological Association's guidelines. This includes shredding papers, deleting electronic files, and destroying video recordings.

Questions/Concerns: If you have questions about the specifics of this study, you can contact the following individuals: Cassandra Dikes at xxxxxxx@ego.thechicagoschool.edu or Fawna Stockwell at xxxxxxxxxx@thechicagoschool.edu. If you have questions concerning your rights in this research study you may contact the Institutional Review Board (IRB), which is concerned with the protection of subjects in research projects. You may reach the IRB office Monday through Friday at this number 312.467.2343 or by writing them at this address:

Institutional Review Board, The Chicago School of Professional Psychology, 325 N. Wells, Chicago, Illinois, 60654.

Consent

Subject

The research project and the procedures have been explained to me. I agree to participate in this study. My participation is voluntary and I do not have to sign this form if I do not want to be part of this research project. I will receive a copy of this consent form for my records.

Signature of Subject: _____ Date: _____

Signature of the Person Obtaining Consent: _____ Date: _____

Appendix C: Treatment Integrity Checklist for Baseline (Session 1)

Participant: _____ Date: _____

Each of the following tasks should be completed during the first meeting with all participants. Check off each task as it is completed. If a task is NOT completed, DO NOT check it off.

1. Begin video recording.
2. Introduce yourself to the participant and thank him or her for his or her time.
3. Give informed consent form to participant.
4. Read the informed consent form to the participant and ask that he or she follow along on his or her own copy.
5. Ask the participant if he or she has any questions about the informed consent and answer accordingly.
6. Ask the participant if he or she is willing to participate.
7. If he or she says no, thank him or her for his or her time, give $5, and end here.
8. If he or she says yes, ask him or her to sign the informed consent form and proceed with the remaining steps.
9. Ask the participant for his or her contact information and reiterate that all personal identifying information will be kept confidential, and used only for purposes of the study.
10. Ask the participant to complete the pre-session questionnaires.
11. Ask the participant if he or she has engaged in any activities in the last 3 hours that may elevate his or her heart rate (exercise, drinking caffeinated beverages, smoking).
12. Ask the participant to connect the heart rate monitor and ensure the equipment is working correctly.
13. Ask the participant to engage in a regular, low-stress activity for 5 minutes.
14. Begin the 60-min non-mindfulness audio.
15. Ask the participant to remove the heart rate monitor.
16. Ask the participant to complete post-session questionnaires.
17. Set up the next session.
18. Thank the participant for his or her time and participation and give them $5.
19. End video recording.

Appendix D: Treatment Integrity Checklist for Experimental Sessions (Sessions 2-7)

Participant: _____ Date: _____

Session: _____ Condition: _____

Each of the following tasks should be completed during experimental sessions with all participants. Check off each task as it is completed. If a task is NOT completed, DO NOT check it off.

1. Begin video recording.
2. Greet the participant and thank him or her for his or her time.
3. Ask the participant if he or she has engaged in any activities in the last 3 hours that may elevate his or her heart rate (exercise, drinking caffeinated beverages, smoking).
4. Ask the participant to complete the pre-session questionnaires.
5. Ask the participant to connect the heart rate monitor and ensure the equipment is working correctly.
6. Ask the participant to engage in a regular, low-stress activity for 5 minutes.
7. Begin the 60-minute audio, according to schedule. Note above (Condition) which audio is being used.
8. If using the 5 or 20 min of mindfulness audio, pause the recording and ask the participant to complete the questionnaires before resuming non-mindfulness portion of the audio. (If using the 60 min mindfulness audio, wait until the end only.)
9. Resume the remainder of the audio.
10. Ask the participant to remove the heart rate monitor.
11. Ask the participant to complete post-session questionnaires.
12. Set up the next session.
13. Thank the participant for his or her time and participation, and give them $5.
14. End video recording.

Appendix E: Treatment Integrity Checklist for Return to Baseline (Session 8)

Participant: _____ Date: _____

Each of the following tasks should be completed during the last session with all participants. Check off each task as it is completed. If a task is NOT completed, DO NOT check it off.

1. Begin video recording.
2. Greet the participant and thank him or her for his or her time.
3. Ask the participant if he or she has engaged in any activities in the last 3 hours that may elevate his or her heart rate (exercise, drinking caffeinated beverages, smoking).
4. Ask the participant to complete the pre-session questionnaires.
5. Ask the participant to connect the heart rate monitor and ensure the equipment is working correctly.
6. Ask the participant to engage in a regular, low-stress activity for 5 minutes.
7. Begin the 60-minute non-mindfulness audio.
8. Ask the participant to remove the heart rate monitor.
9. Ask the participant to complete post-session questionnaires.
10. Give the participant a copy of the debriefing summary.
11. Read the debriefing summary and ask the participant to follow along on his or her copy.
12. Ask the participant if he or she has any questions and answer accordingly.
13. Give the participant a copy of the social validity questionnaire.
14. Read the instructions for the social validity questionnaire and ask the participant to follow along on his or her copy.
15. Ask the participant if he or she has any questions and answer accordingly.
16. Ask the participant to complete the social validity questionnaire.
17. Thank the participant for his or her time and participation, and give them $5.
18. End video recording.

Appendix F: Mindful Attention Awareness Scale (MAAS)

Participant: Circle one: PRE / MID / POST Date:

Mindful Attention Awareness Scale: Day-to-Day Experiences

Instructions: Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be. Please treat each item separately from every other item.

1	2	3	4	5	6
Almost Always	Very Frequently	Somewhat Frequently	Somewhat Infrequently	Very Infrequently	Almost Never

	CIRCLE ONE:					
1. I could be experiencing some emotion and not be conscious of it until some time later.	**1**	**2**	**3**	**4**	**5**	**6**
2. I break or spill things because of carelessness, not paying attention, or thinking of something else.	**1**	**2**	**3**	**4**	**5**	**6**
3. I find it difficult to stay focused on what's happening in the present.	**1**	**2**	**3**	**4**	**5**	**6**
4. I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.	**1**	**2**	**3**	**4**	**5**	**6**
5. I tend not to notice feelings of physical tension or discomfort until they really grab my attention.	**1**	**2**	**3**	**4**	**5**	**6**
6. I forget a person's name almost as soon as I've been told it for the first time.	**1**	**2**	**3**	**4**	**5**	**6**
7. It seems I am "running on automatic," without much awareness of what I'm doing.	**1**	**2**	**3**	**4**	**5**	**6**
8. I rush through activities without being really attentive to them.	**1**	**2**	**3**	**4**	**5**	**6**
9. I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.	**1**	**2**	**3**	**4**	**5**	**6**
10. I do jobs or tasks automatically, without being aware of what I'm doing.	**1**	**2**	**3**	**4**	**5**	**6**
11. I find myself listening to someone with one ear, doing something else at the same time.	**1**	**2**	**3**	**4**	**5**	**6**
12. I drive places on 'automatic pilot' and then wonder why I went there.	**1**	**2**	**3**	**4**	**5**	**6**
13. I find myself preoccupied with the future or the past.	**1**	**2**	**3**	**4**	**5**	**6**
14. I find myself doing things without paying attention.	**1**	**2**	**3**	**4**	**5**	**6**
15. I snack without being aware that I'm eating.	**1**	**2**	**3**	**4**	**5**	**6**

Appendix G: Modified Perceived Stress Scale (PSS)

Participant: Circle One: PRE/MID/POST Date:

PERCEIVED STRESS SCALE - Modified

INSTRUCTIONS: The questions in this scale ask you about your feelings and thoughts RIGHT NOW. In each case, please indicate your response by placing an "X" over the circle representing HOW OFTEN you feel or think a certain way.

	Never	Almost Never	Some-times	Fairly Often	Very Often
1. How often do you feel upset because of something that happened unexpectedly?	○	○	○	○	○
2. How often do you feel that you are unable to control the important things in your life?	○	○	○	○	○
3. How often do you feel nervous and "stressed"?	○	○	○	○	○
4. How often do you feel confident about your ability to handle your personal problems?	○	○	○	○	○
5. How often do you feel that things are going your way?	○	○	○	○	○
6. How often do you find that you cannot cope with all the things that you have to do?	○	○	○	○	○
7. How often are you able to control irritations in your life?	○	○	○	○	○
8. How often do you feel that you are on top of things?	○	○	○	○	○
9. How often are you angered because of things that are outside your control?	○	○	○	○	○
10. How often do you feel difficulties are piling up so high that you cannot overcome them?	○	○	○	○	○

Appendix H: Frequency Data Sheet

DATA RECORDING SHEET FOR DISPLACEMENT BEHAVIORS

Instructions: During the 65 minute video, record displacement behaviors as defined below by making a tally mark in the corresponding interval. If none occur, **mark an X in that interval**. Data for the first five minutes are on this page, and the remaining 60 are on separate pages.

Displacement Behavior Operational Definitions

Grooming: fingers are passed through the hair in a combing movement; fingers touch the hair

Touching hand to face: hand/handsor finger(s) in contact with the face

Touching hand to mouth: hand/hands or finger(s) in contact with the mouth/lips

Scratching: fingernails are used to scratch a part of the body, frequently the head/face

Yawning: mouth opens widely, roundly, and slowly, and closes more swiftly; mouth movement is accompanied by a deep breath and often closing of the eyes and lowering of the brows

Touching hand to hand: contact made between both hands; crossing the hands; interlacing the fingers

Twisting mouth: lips are closed, pushed forward, and twisted to one side

Licking lips: tongue is passed over the lips; tongue passes the plane of the lips

Biting lips: one lip, usually the lower one, or both lips, drawn into the mouth

0:00 - 1:40 (0:10 s intervals)		**1:41 - 3:20 (0:10 s intervals)**		**3:21 - 5:00 (0:10 s intervals)**	
0:00 - 0:10		1:41 - 1:50		3:21 - 3:30	
0:11 - 0:20		1:51 - 2:00		3:31 - 3:40	
0:21 - 0:30		2:01 - 2:10		3:41 - 3:50	
0:31 - 0:40		2:11 - 2:20		3:51 - 4:00	
0:41 - 0:50		2:21 - 2:30		4:01 - 4:10	
0:51 - 1:00		2:31 - 2:40		4:11 - 4:20	
1:01 - 1:10		2:41 - 2:50		4:21 - 4:30	
1:11 - 1:20		2:51 - 3:00		4:31 - 4:40	
1:21 - 1:30		3:01 - 3:10		4:41 - 4:50	
1:31 - 1:40		3:11 - 3:20		4:51 - 5:00	

Participant: Video: Date:

5:01 - 10:00 (0:10 s intervals)		10:01 - 15:00 (0:10 s intervals)		15:01 - 20:00 (0:10 s intervals)	
5:01 - 5:10		10:01 - 10:10		15:01 - 15:10	
5:11 - 5:20		10:11 - 10:20		15:11 - 15:20	
5:21 - 5:30		10:21 - 10:30		15:21 - 15:30	
5:31 - 5:40		10:31 - 10:40		15:31 - 15:40	
5:41 - 5:50		10:41 - 10:50		15:41 - 15:50	
5:51 - 6:00		10:51 - 11:00		15:51 - 16:00	
6:01 - 6:10		11:01 - 11:10		16:01 - 16:10	
6:11 - 6:20		11:11 - 11:20		16:11 - 16:20	
6:21 - 6:30		11:21 - 11:30		16:21 - 16:30	
6:31 - 6:40		11:31 - 11:40		16:31 - 16:40	
6:41 - 6:50		11:41 - 11:50		16:41 - 16:50	
6:51 - 7:00		11:51 - 12:00		16:51 - 17:00	
7:01 - 7:10		12:01 - 12:10		17:01 - 17:10	
7:11 - 7:20		12:11 - 12:20		17:11 - 17:20	
7:21 - 7:30		12:21 - 12:30		17:21 - 17:30	
7:31 - 7:40		12:31 - 12:40		17:31 - 17:40	
7:41 - 7:50		12:41 - 12:50		17:41 - 17:50	
7:51 - 8:00		12:51 - 13:00		17:51 - 18:00	
8:01 - 8:10		13:01 - 13:10		18:01 - 18:10	
8:11 - 8:20		13:11 - 13:20		18:11 - 18:20	
8:21 - 8:30		13:21 - 13:30		18:21 - 18:30	
8:31 - 8:40		13:31 - 13:40		18:31 - 18:40	
8:41 - 8:50		13:41 - 13:50		18:41 - 18:50	
8:51 - 9:00		13:51 - 14:00		18:51 - 19:00	
9:01 - 9:10		14:01 - 14:10		19:01 - 19:10	
9:11 - 9:20		14:11 - 14:20		19:11 - 19:20	
9:21 - 9:30		14:21 - 14:30		19:21 - 19:30	
9:31 - 9:40		14:31 - 14:40		19:31 - 19:40	
9:41 - 9:50		14:41 - 14:50		19:41 - 19:50	
9:51 - 10:00		14:51 - 15:00		19:51 - 20:00	

Participant: Video: Date:

20:01 - 25:00 (0:10 s intervals)		25:01 - 30:00 (0:10 s intervals)		30:01 - 35:00 (0:10 s intervals)	
20:01 - 20:10		25:01 - 25:10		30:01 - 30:10	
20:11 - 20:20		25:11 - 25:20		30:11 - 30:20	
20:21 - 20:30		25:21 - 25:30		30:21 - 30:30	
20:31 - 20:40		25:31 - 25:40		30:31 - 30:40	
20:41 - 20:50		25:41 - 25:50		30:41 - 30:50	
20:51 - 21:00		25:51 - 26:00		30:51 - 31:00	
21:01 - 21:10		26:01 - 26:10		31:01 - 31:10	
21:11 - 21:20		26:11 - 26:20		31:11 - 31:20	
21:21 - 21:30		26:21 - 26:30		31:21 - 31:30	
21:31 - 21:40		26:31 - 26:40		31:31 - 31:40	
21:41 - 21:50		26:41 - 26:50		31:41 - 31:50	
21:51 - 22:00		26:51 - 27:00		31:51 - 32:00	
22:01 - 22:10		27:01 - 27:10		32:01 - 32:10	
22:11 - 22:20		27:11 - 27:20		32:11 - 32:20	
22:21 - 22:30		27:21 - 27:30		32:21 - 32:30	
22:31 - 22:40		27:31 - 27:40		32:31 - 32:40	
22:41 - 22:50		27:41 - 27:50		32:41 - 32:50	
22:51 - 23:00		27:51 - 28:00		32:51 - 33:00	
23:01 - 23:10		28:01 - 28:10		33:01 - 33:10	
23:11 - 23:20		28:11 - 28:20		33:11 - 33:20	
23:21 - 23:30		28:21 - 28:30		33:21 - 33:30	
23:31 - 23:40		28:31 - 28:40		33:31 - 33:40	
23:41 - 23:50		28:41 - 28:50		33:41 - 33:50	
23:51 - 24:00		28:51 - 29:00		33:51 - 34:00	
24:01 - 24:10		29:01 - 29:10		34:01 - 34:10	
24:11 - 24:20		29:11 - 29:20		34:11 - 34:20	
24:21 - 24:30		29:21 - 29:30		34:21 - 34:30	
24:31 - 24:40		29:31 - 29:40		34:31 - 34:40	
24:41 - 24:50		29:41 - 29:50		34:41 - 34:50	
24:51 - 25:00		29:51 - 30:00		34:51 - 35:00	

Participant: Video: Date:

35:01 - 40:00 (0:10 s intervals)		40:01 - 45:00 (0:10 s intervals)		45:01 - 50:00 (0:10 s intervals)	
35:01 - 35:10		40:01 - 40:10		45:01 - 45:10	
35:11 - 35:20		40:11 - 40:20		45:11 - 45:20	
35:21 - 35:30		40:21 - 40:30		45:21 - 45:30	
35:31 - 35:40		40:31 - 40:40		45:31 - 45:40	
35:41 - 35:50		40:41 - 40:50		45:41 - 45:50	
35:51 - 36:00		40:51 - 41:00		45:51 - 46:00	
36:01 - 36:10		41:01 - 41:10		46:01 - 46:10	
36:11 - 36:20		41:11 - 41:20		46:11 - 46:20	
36:21 - 36:30		41:21 - 41:30		46:21 - 46:30	
36:31 - 36:40		41:31 - 41:40		46:31 - 46:40	
36:41 - 36:50		41:41 - 41:50		46:41 - 46:50	
36:51 - 37:00		41:51 - 42:00		46:51 - 47:00	
37:01 - 37:10		42:01 - 42:10		47:01 - 47:10	
37:11 - 37:20		42:11 - 42:20		47:11 - 47:20	
37:21 - 37:30		42:21 - 42:30		47:21 - 47:30	
37:31 - 37:40		42:31 - 42:40		47:31 - 47:40	
37:41 - 37:50		42:41 - 42:50		47:41 - 47:50	
37:51 - 38:00		42:51 - 43:00		47:51 - 48:00	
38:01 - 38:10		43:01 - 43:10		48:01 - 48:10	
38:11 - 38:20		43:11 - 43:20		48:11 - 48:20	
38:21 - 38:30		43:21 - 43:30		48:21 - 48:30	
38:31 - 38:40		43:31 - 43:40		48:31 - 48:40	
38:41 - 38:50		43:41 - 43:50		48:41 - 48:50	
38:51 - 39:00		43:51 - 44:00		48:51 - 49:00	
39:01 - 39:10		44:01 - 44:10		49:01 - 49:10	
39:11 - 39:20		44:11 - 44:20		49:11 - 49:20	
39:21 - 39:30		44:21 - 44:30		49:21 - 49:30	
39:31 - 39:40		44:31 - 44:40		49:31 - 49:40	
39:41 - 39:50		44:41 - 44:50		49:41 - 49:50	
39:51 - 40:00		44:51 - 45:00		49:51 - 50:00	

Participant: Video: Date:

50:01 - 55:00 (0:10 s intervals)		55:01 - 60:00 (0:10 s intervals)		60:01 - 65:00 (0:10 s intervals)	
50:01 - 50:10		55:01 - 55:10		60:01 - 60:10	
50:11 - 50:20		55:11 - 55:20		60:11 - 60:20	
50:21 - 50:30		55:21 - 55:30		60:21 - 60:30	
50:31 - 50:40		55:31 - 55:40		60:31 - 60:40	
50:41 - 50:50		55:41 - 55:50		60:41 - 60:50	
50:51 - 51:00		55:51 - 56:00		60:51 - 61:00	
51:01 - 51:10		56:01 - 56:10		61:01 - 61:10	
51:11 - 51:20		56:11 - 56:20		61:11 - 61:20	
51:21 - 51:30		56:21 - 56:30		61:21 - 61:30	
51:31 - 51:40		56:31 - 56:40		61:31 - 61:40	
51:41 - 51:50		56:41 - 56:50		61:41 - 61:50	
51:51 - 52:00		56:51 - 57:00		61:51 - 62:00	
52:01 - 52:10		57:01 - 57:10		62:01 - 62:10	
52:11 - 52:20		57:11 - 57:20		62:11 - 62:20	
52:21 - 52:30		57:21 - 57:30		62:21 - 62:30	
52:31 - 52:40		57:31 - 57:40		62:31 - 62:40	
52:41 - 52:50		57:41 - 57:50		62:41 - 62:50	
52:51 - 53:00		57:51 - 58:00		62:51 - 63:00	
53:01 - 53:10		58:01 - 58:10		63:01 - 63:10	
53:11 - 53:20		58:11 - 58:20		63:11 - 63:20	
53:21 - 53:30		58:21 -5 8:30		63:21 - 63:30	
53:31 - 53:40		58:31 - 58:40		63:31 - 63:40	
53:41 - 53:50		58:41 - 58:50		63:41 - 63:50	
53:51 - 54:00		58:51 - 59:00		63:51 - 64:00	
54:01 - 54:10		59:01 - 59:10		64:01 - 64:10	
54:11 - 54:20		59:11 - 59:20		64:11 - 64:20	
54:21 - 54:30		59:21 - 59:30		64:21 - 64:30	
54:31 - 54:40		59:31 - 59:40		64:31 - 64:40	
54:41 - 54:50		59:41 - 59:50		64:41 - 64:50	
54:51 - 55:00		59:51 - 60:00		64:51 - 65:00	

Participant: Video: Date:

Appendix I: Duration Data Sheet

Participant: Session: Date:

Activities:

Phone: Participant engages with their cell phone
Stand up: Participant rises from the seat
Turn: Participant turns to the side at least 90 degrees (remains seated)
Head support: Participant places their head in their hand or on the table such that their head is supported
Cross arms: Participant crosses their arms such that one is over the other or they are intertwined
Work: Participant engages with a computer, papers, etc.
Eat: Participant consumes food items
Book: Participant engages with a book

Activity	Start	Stop	Duration

Appendix J: Debriefing Summary

Thank you again for your participation in this research study. Your time is very much appreciated. The purpose of this study was to determine the effects of mindfulness practice on stress levels and mindfulness scores. Specifically, we wanted to see if practicing mindfulness would decrease overall stress and increase mindfulness scores. We also wanted to see if there would be a difference in effects between the different conditions. For example, would longer practices result in greater differences.

Please let me know if you have any questions, and I will do my best to answer them.

If you would like to receive information about the results of this study, please indicate below. Please be aware that information will not be immediately available.

_____ Yes, I would like to receive information about the results of this study.

My name is _____

My email is _____

_____ No, I am not interested in receiving information about the results of this study.

All participants who complete this study will be entered into a drawing for a $50 gift card. If you win, how would you like to be contacted?

Name: _____

Contact: _____

If you win, which store would you like your gift card to be from?

_____

Appendix K: Social Validity Questionnaire

Social Validity Assessment of the Effects of Individual Mindfulness Practice on Stress and Anxiety

Participant: _____ Date: _____

Please indicate the extent to which you agree or disagree with each of the following statements regarding your experience with guided mindfulness practice during this research study by writing the number (1-5) that most closely reflects your experience on the blank next to each statement. Some questions have a follow-up question in italics depending on your answer. Please note that there are three pages to this questionnaire.

Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1	2	3	4	5

_____ Overall, I believe that mindfulness practice has been effective in reducing stress and anxiety in my everyday life.

_____ Overall, I believe that mindfulness practice has helped me to be more effective (in school) OR (at my job) OR (with my family) OR (none of the above). (Please CIRCLE one or more, to indicate if you are a student, have a job, live with family, or none of the above.)

_____ I believe that mindfulness practice has helped me to deal with challenges in my life.

_____ I believe that mindfulness practice has helped me to accept things I cannot change.

_____ The time commitment required for this research study was reasonable.

Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1	2	3	4	5

_____ I preferred one of the research conditions over the other two because it was easiest for me.

IF you answered 4 or 5 to the previous question, please circle the condition you preferred:

60 minutes of guided mindfulness practice

20 minutes of guided mindfulness practice

5 minutes of guided mindfulness practice

I could not distinguish a difference

_____ I preferred one of the research conditions over the other two because it was the most effective for me.

IF you answered 4 or 5 to the previous question, please circle the condition you preferred:

60 minutes of guided mindfulness practice

20 minutes of guided mindfulness practice

5 minutes of guided mindfulness practice

I could not distinguish a difference

Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1	2	3	4	5

_____ During the course of this research study, I spent some of my own time researching mindfulness and its effects.

IF you answered 4 or 5 to the previous question, please circle the best answer for the amount of TOTAL time you spent researching mindfulness:

One hour or less

One hour to three hours

More than three hours

_____ I plan to continue practicing mindfulness on my own now that this research study is over.

If you have any comments, please write them below. Thank you again for your time.

_____

_____

_____

Appendix L: Audio Reference Questions

AUDIO QUESTIONS

Participant: _____Date: _____ Track: 1

Please answer the following questions about the audio you just listened to today. Please circle either YES or NO for each question.

1. Did the audio have MORE than one voice?

   YES or NO

2. Did the audio include music?

   YES or NO

3. Did the audio talk about landscape?

   YES or NO

Appendix M: Tables

Table M1

Titles of Audio Recordings

Track No.	Mindfulness Audio	Prose Audio
1	N/A	A Day with Rosetti
2	Sitting meditation Forty-five minute body scan	N/A
3	Seated meditation	A Day with John Milton
4	Six minute breath awareness	A Day with William Morris
5	Twenty minute body scan	A Day with Walt Whitman
6	Guided meditation	N/A
7	Five minute breathing	Autobiography of John Stuart Mill
8	N/A	Autobiography of John Stuart Mill
9	N/A	Abraham Lincoln: A Commemoration
10	N/A	The Autobiography of Charles Darwin
11	N/A	Cleopatra and Caesar
12	N/A	Daniel Boone
13	Seated meditation	A Day with John Milton
14	Six minute breath awareness	A Day with William Morris
15	Five minute breathing	Autobiography of John Stuart Mill
16	Twenty minute body scan	A Day with Walt Whitman
17	N/A	The Reign of Paul I

Note: Mindfulness audio selections were downloaded from www.freemindfulness.org, which permits non-commercial use for all items, and prose audio selections were downloaded from www.librivox.org, which provides items that are in the public domain. Tracks 13-17 are identical to Tracks 3-5 and 7, with the order of presentation switched.

Table M2

Order of Experimental Sessions

	Session 1	Session 2	Session 3	Session 4	Session 5	Session 6	Session 7	Session 8
1	Baseline (60 min prose) TRACK 1 ____ / ____	60 min mind TRACK 2 ____ / ____	20 min mind + 40 min prose TRACK 3 ____ / ____	5 min mind + 55 min prose TRACK 4 ____ / ____	20 min mind + 40 min prose TRACK 5 ____ / ____	60 min mind TRACK 6 ____ / ____	5 min mind + 55 min prose TRACK 7 ____ / ____	Baseline (60 min prose) TRACK 8 ____ / ____
2	Baseline (60 min prose) TRACK 1 ____ / ____	60 min mind TRACK 2 ____ / ____	5 min mind + 55 min prose TRACK 4 ____ / ____	20 min mind + 40 min prose TRACK 3 ____ / ____	5 min mind + 55 min prose TRACK 7 ____ / ____	20 min mind + 40 min prose TRACK 5 ____ / ____	60 min mind TRACK 6 ____ / ____	Baseline (60 min prose) TRACK 8 ____ / ____
3	Baseline (60 min prose) TRACK 8 ____ / ____	20 min mind + 40 min prose TRACK 3 ____ / ____	60 min mind TRACK 2 ____ / ____	5 min mind + 55 min prose TRACK 4 ____ / ____	60 min mind TRACK 6 ____ / ____	20 min mind + 40 min prose TRACK 5 ____ / ____	5 min mind + 55 min prose TRACK 7 ____ / ____	Baseline (60 min prose) TRACK 9 ____ / ____
4	Baseline (60 min prose) TRACK 1 ____ / ____	40 min prose + 20 min mind TRACK 13 ____ / ____	55 min prose + 5 min mind TRACK 14 ____ / ____	60 min mind TRACK 2 ____ / ____	55 min prose + 5 min mind TRACK 15 ____ / ____	60 min mind TRACK 6 ____ / ____	40 min prose + 20 min mind TRACK 16 ____ / ____	Baseline (60 min prose) TRACK 8 ____ / ____
5	Baseline (60 min prose) TRACK 1 ____ / ____	55 min prose + 5 min mind TRACK 14 ____ / ____	40 min prose + 20 min mind TRACK 13 ____ / ____	60 min mind TRACK 2 ____ / ____	40 min prose + 20 min mind TRACK 16 ____ / ____	55 min prose + 5 min mind TRACK 15 ____ / ____	60 min mind TRACK 6 ____ / ____	Baseline (60 min prose) TRACK 8 ____ / ____
6	Baseline (60 min prose) TRACK 1 ____ / ____	Baseline (60 min prose) TRACK 8 ____ / ____	Baseline (60 min prose) TRACK 9 ____ / ____	Baseline (60 min prose) TRACK 10 ____ / ____	60 min mind TRACK 2 ____ / ____	Baseline (60 min prose) TRACK 11 ____ / ____	60 min mind TRACK 6 ____ / ____	Baseline (60 min prose) TRACK 12 ____ / ____
7	Baseline (60 min prose) TRACK 1 ____ / ____	Baseline (60 min prose) TRACK 8 ____ / ____	Baseline (60 min prose) TRACK 9 ____ / ____	Baseline (60 min prose) TRACK 10 ____ / ____	Baseline (60 min prose) TRACK 11 ____ / ____	60 min mind TRACK 2 ____ / ____	60 min mind TRACK 6 ____ / ____	Baseline (60 min prose) TRACK 12 ____ / ____

Note: Sessions 4-8 for Participant 1 are highlighted in grey due to her not completing these sessions. Blanks in each cell were used to write in the date of each session.

Table M3

Operational Definitions for Continuous Displacement Behaviors

Target Behavior	Operational Definition
Discrete displacement behaviors for frequency data collection and rate calculation	
Grooming	Fingers are passed through the hair in a combing movement
Touching hand to face	Hand or hands in contact with the face
Touching hand to mouth	Hand or hands in contact with the mouth
Scratching	Fingernails are used to scratch the body, frequently the head
Yawning	Mouth opens widely, roundly, and slowly, and closes more swiftly; mouth movement is accompanied by a deep breath and often closing of the eyes and lowering of the brows
Touching hand to hand	Twisting or fiddling finger movements with a ring, handkerchief, other hand; crossing the hands; interlacing the fingers; rubbing hands or fingers
Twisting mouth	Lips are closed, pushed forward, and twisted to one side
Licking lips	Tongue is passed over the lips
Biting lips	One lip, usually the lower one, is drawn into the mouth and held between the teeth
Continuous displacement behaviors for duration data collection	
Phone	Participant engages their cell phone
Stand up	Participant rises from the seat
Turn	Participant turns to the side at least 90 degrees (remains seated)
Head support	Participant places their head in their hand or on the table such that the head is supported
Cross arms	Participant crosses their arms such that one is over the other or they are intertwined
Work	Participant engages with a computer, papers, etc.
Eat	Participant consumes food items
Book	Participant engages with a book

Appendix N: Graphs and Figures

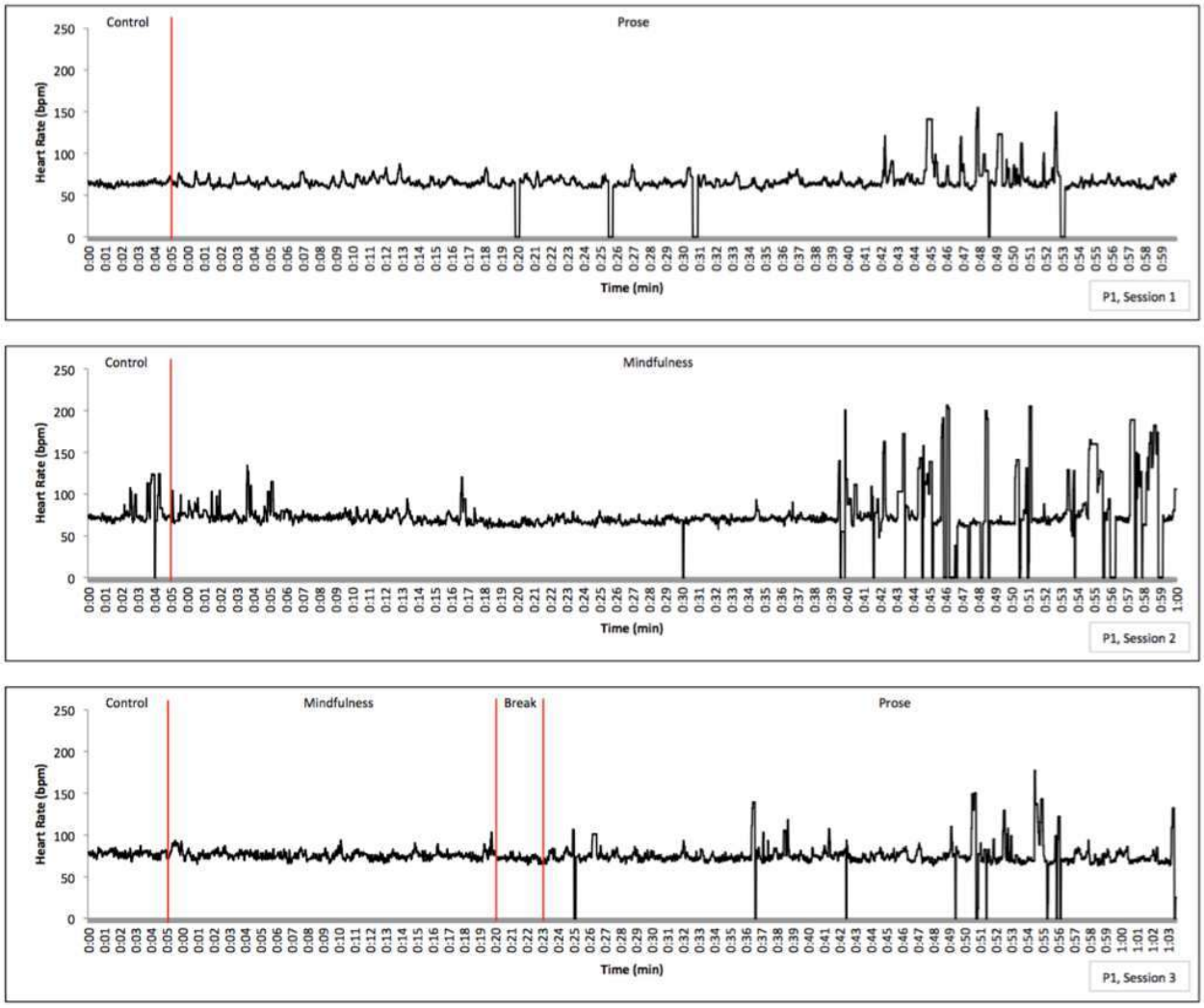


Figure N1. Heart rate for Sessions 1-3 for Participant 1.

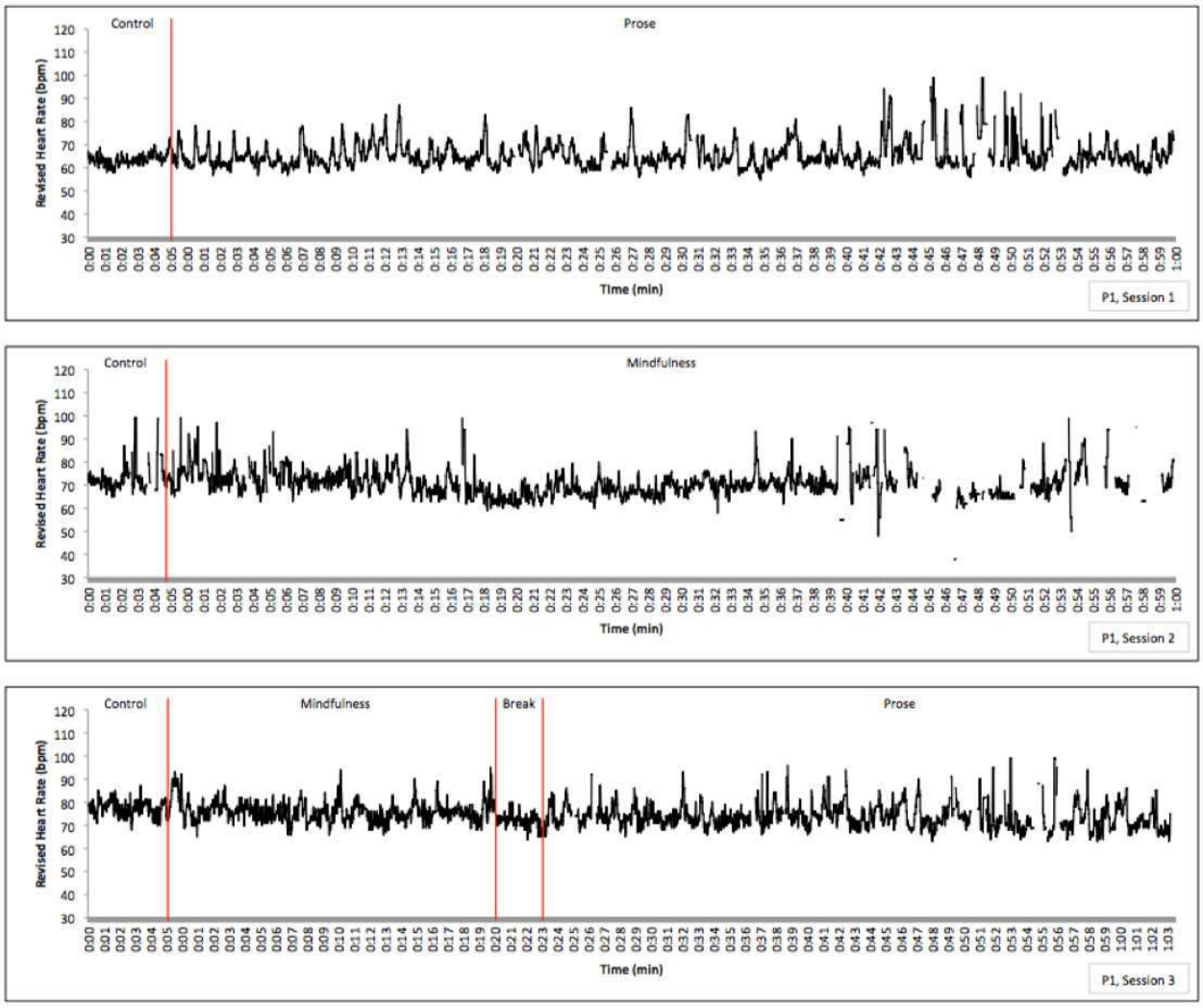


Figure N2. Revised heart rate for Sessions 1-3 for Participant 1.

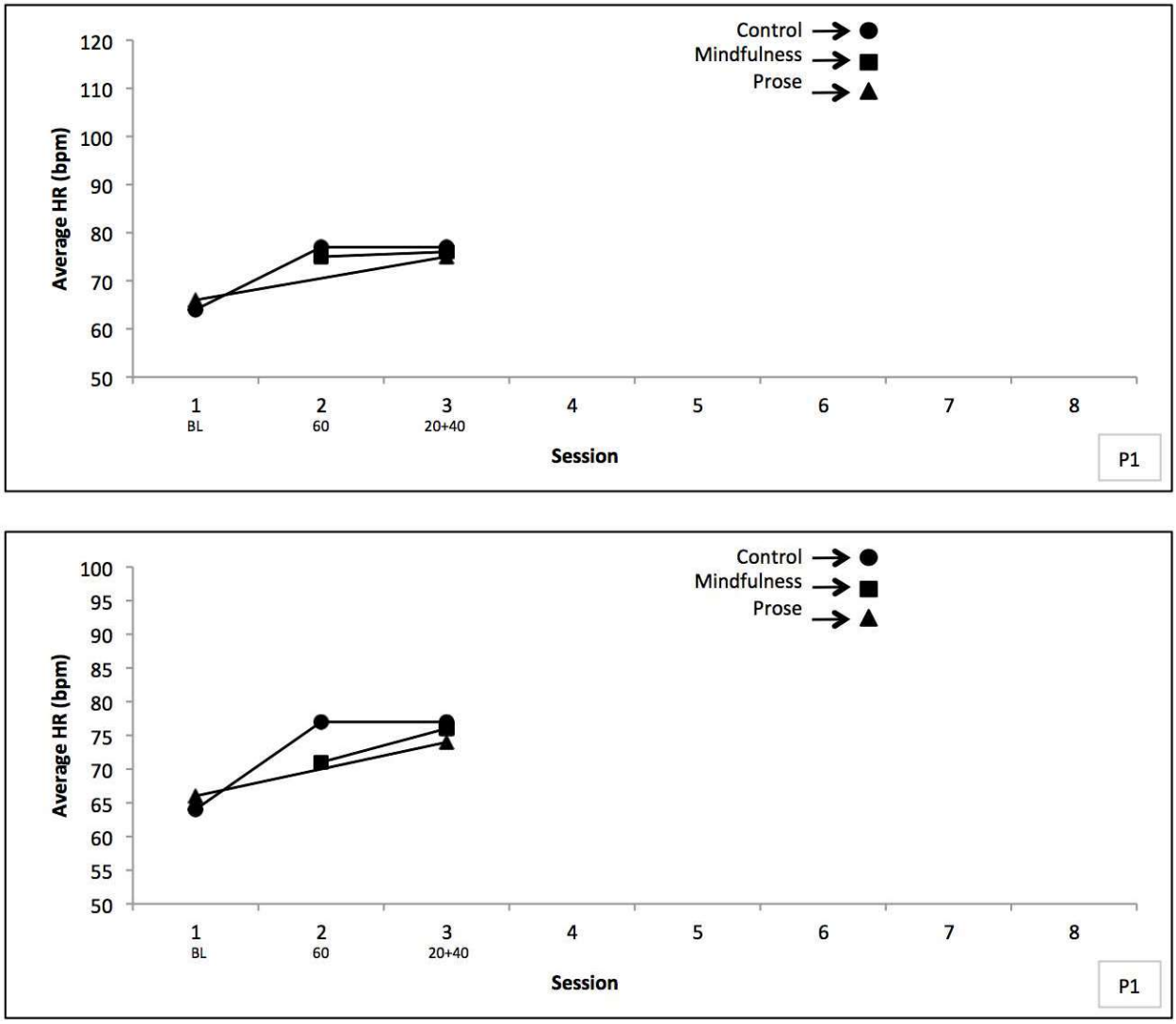


Figure N3. Average heart rate (top) and revised average heart rate (bottom) per condition for Sessions 1-3 for Participant 1.

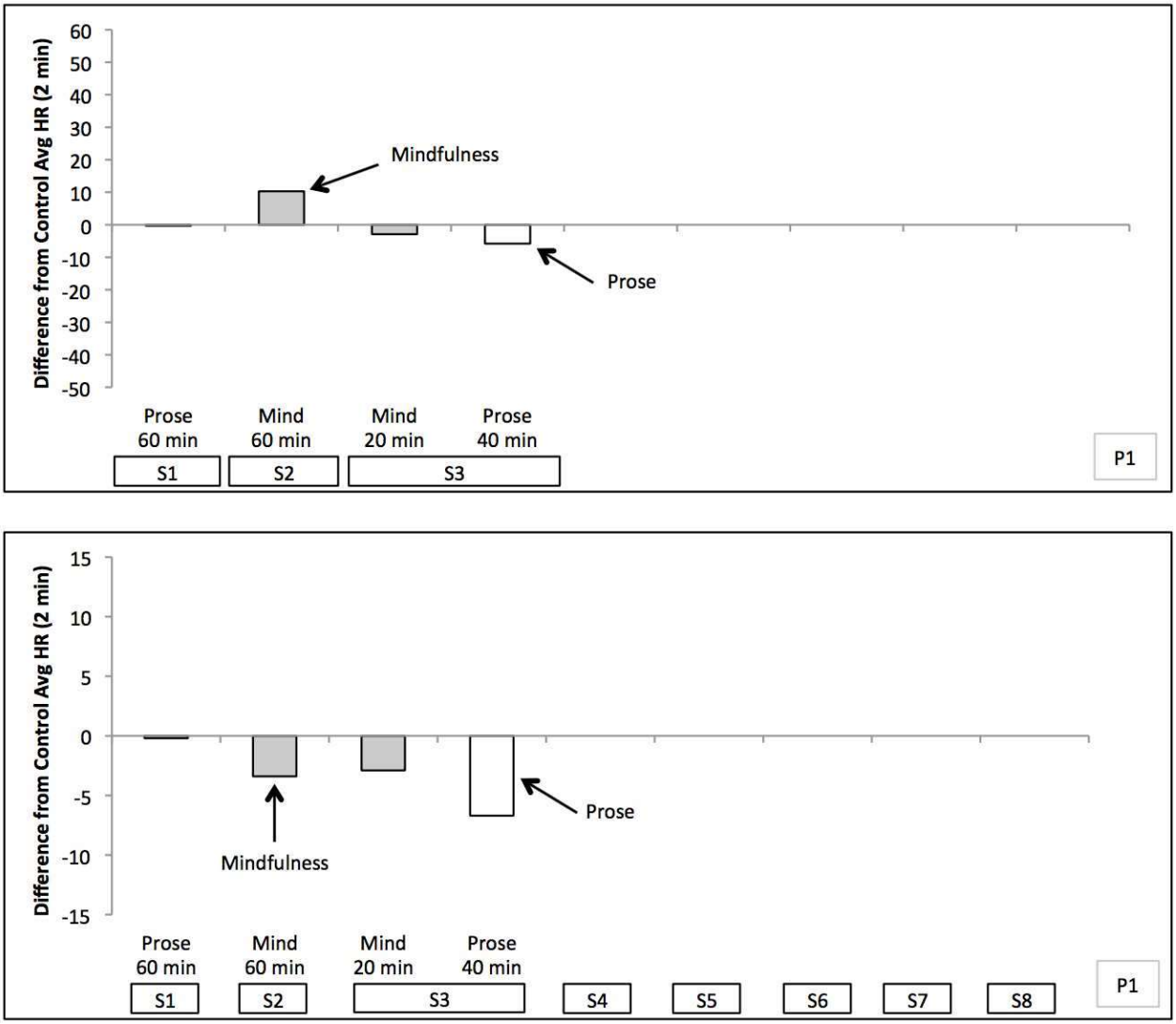


Figure N4. The difference (top) and revised difference (bottom) in average heart rate from the final 2 minutes of control to the final 2 minutes of each condition for Sessions 1-3 for Participant 1.

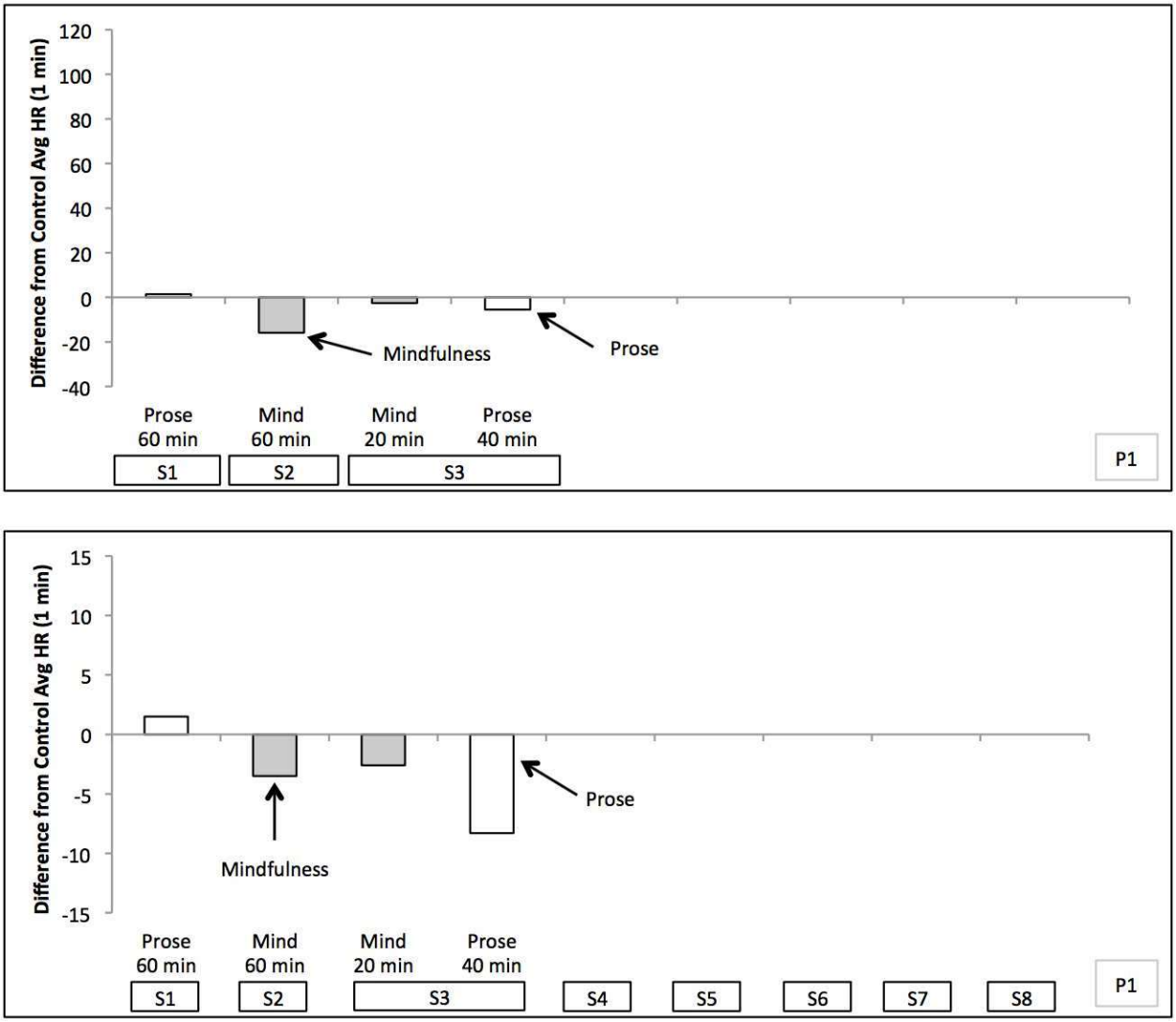


Figure N5. The difference (top) and revised difference (bottom) in average heart rate from the final 1 minute of control to the final 1 minute of each condition for Sessions 1-3 for Participant 1.

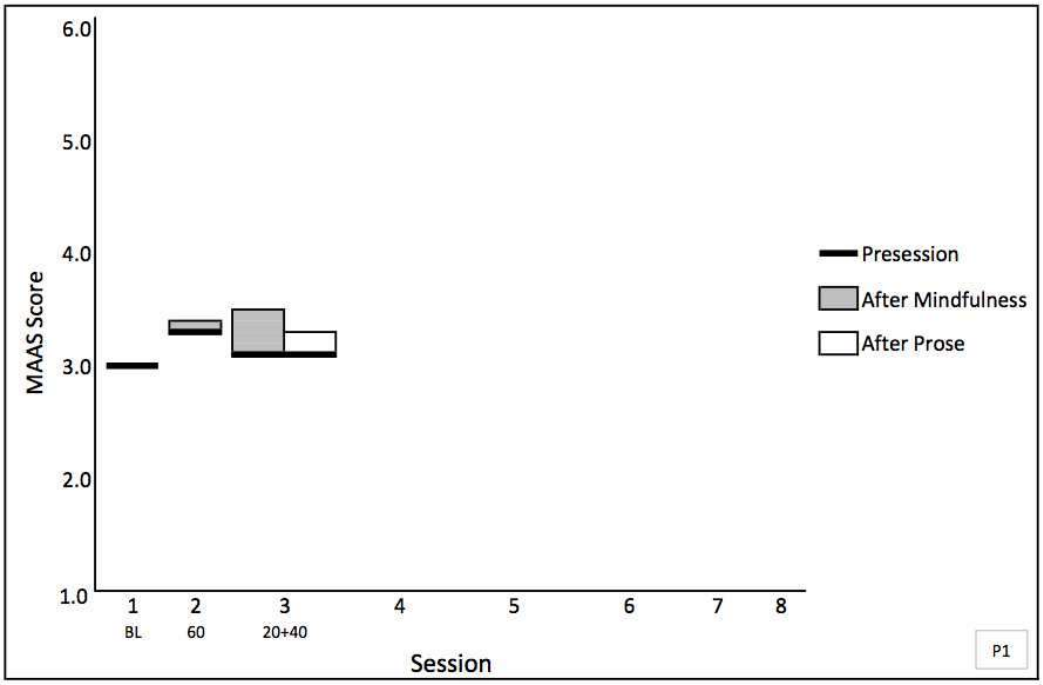


Figure N6. Pre-, mid- (when applicable), and post-session MAAS scores for Sessions 1-3 for Participant 1, where higher scores indicate a higher level of mindfulness.

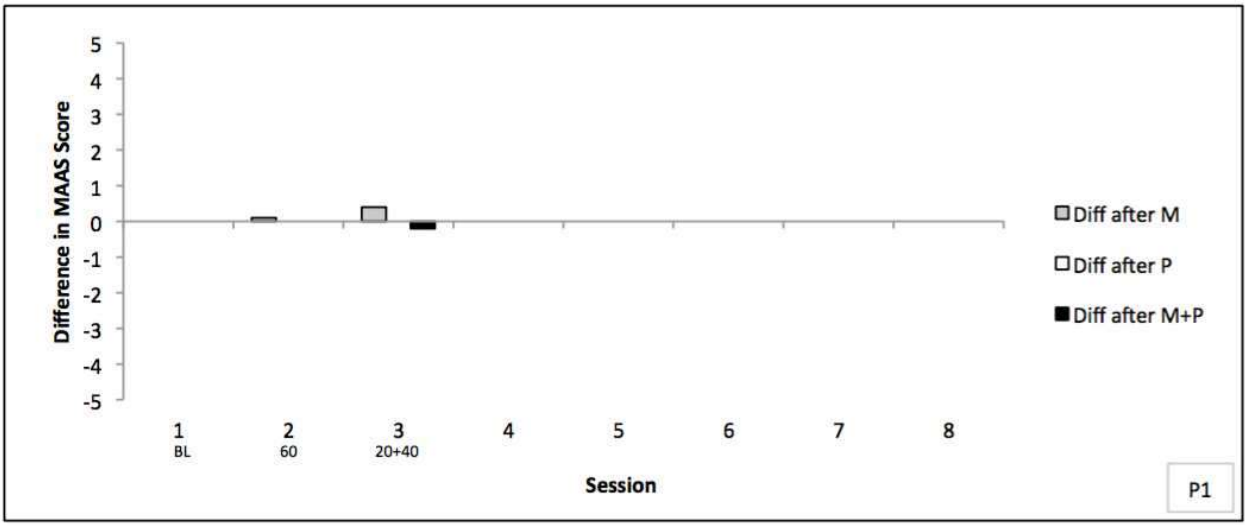


Figure N7. The difference in MAAS scores pre-session to post-mindfulness ("Diff after M" where M=mindfulness), pre-session to post-prose ("Diff after P" where P=prose"), and post-mindfulness to post-prose ("Diff after M+P") for Sessions 1-3 for Participant 1.

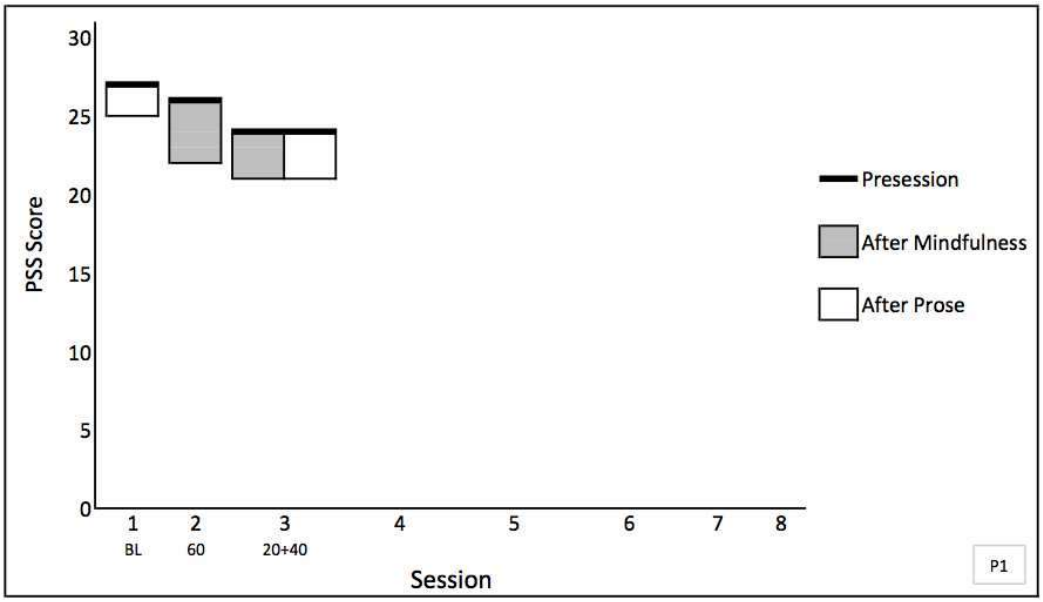


Figure N8. Pre-, mid- (when applicable), and post-session PSS scores for Sessions 1-3 for Participant 1, where higher scores indicate a higher level of stress.

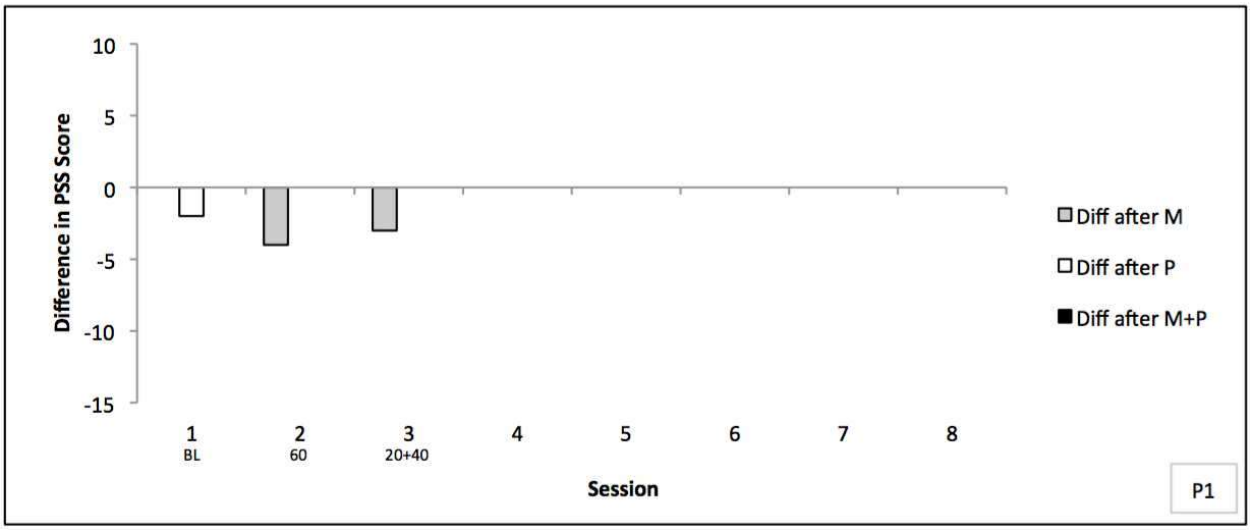


Figure N9. The difference in PSS scores pre-session to post-mindfulness ("Diff after M" where M=mindfulness), pre-session to post-prose ("Diff after P" where P=prose"), and post-mindfulness to post-prose ("Diff after M+P") for Sessions 1-3 for Participant 1.

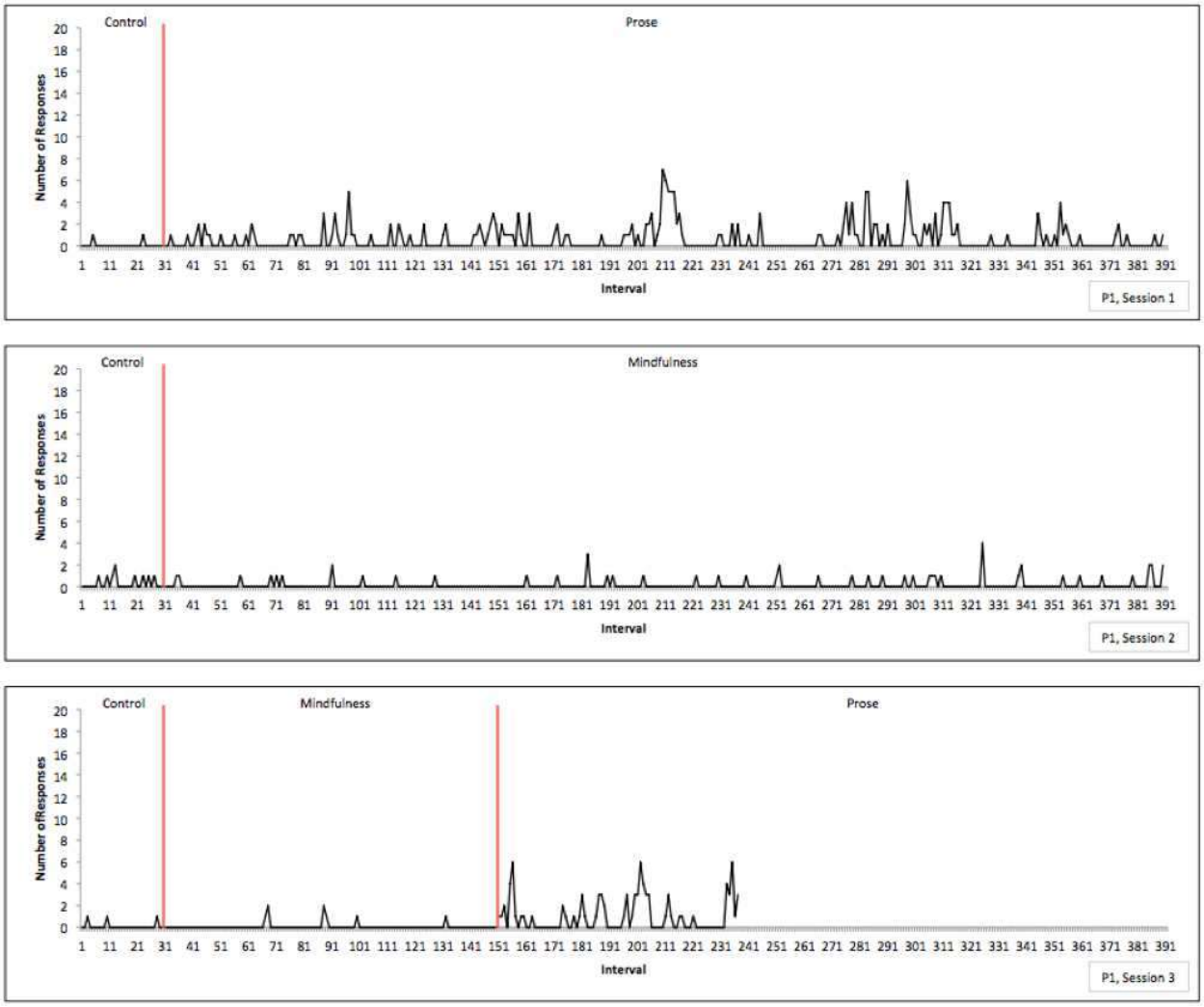


Figure N10. The number of displacement behaviors emitted per 10-second interval for Sessions 1-3 for Participant 1.

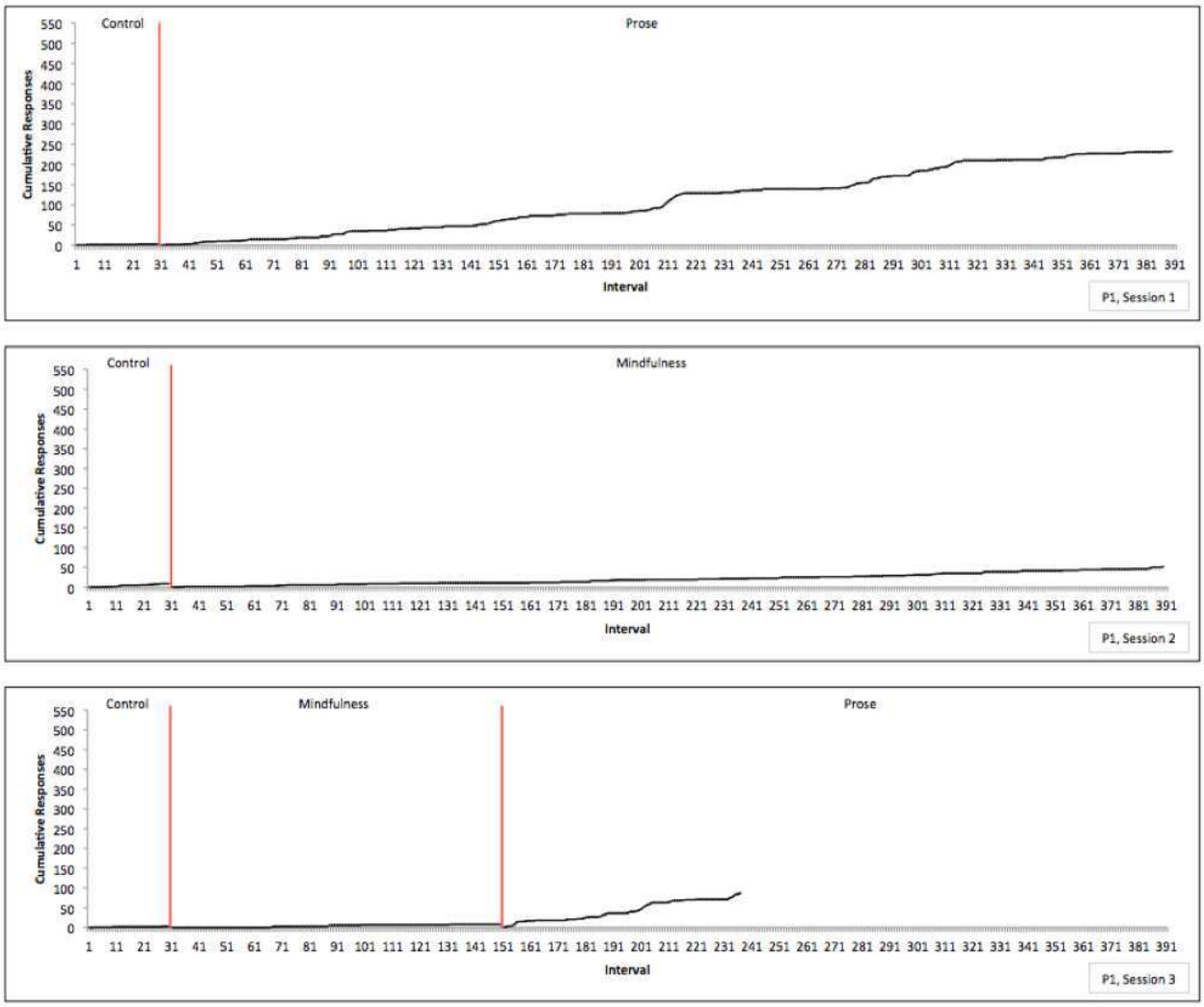


Figure N11. Cumulative displacement behaviors across 10-second intervals for Sessions 1-3 for Participant 1.

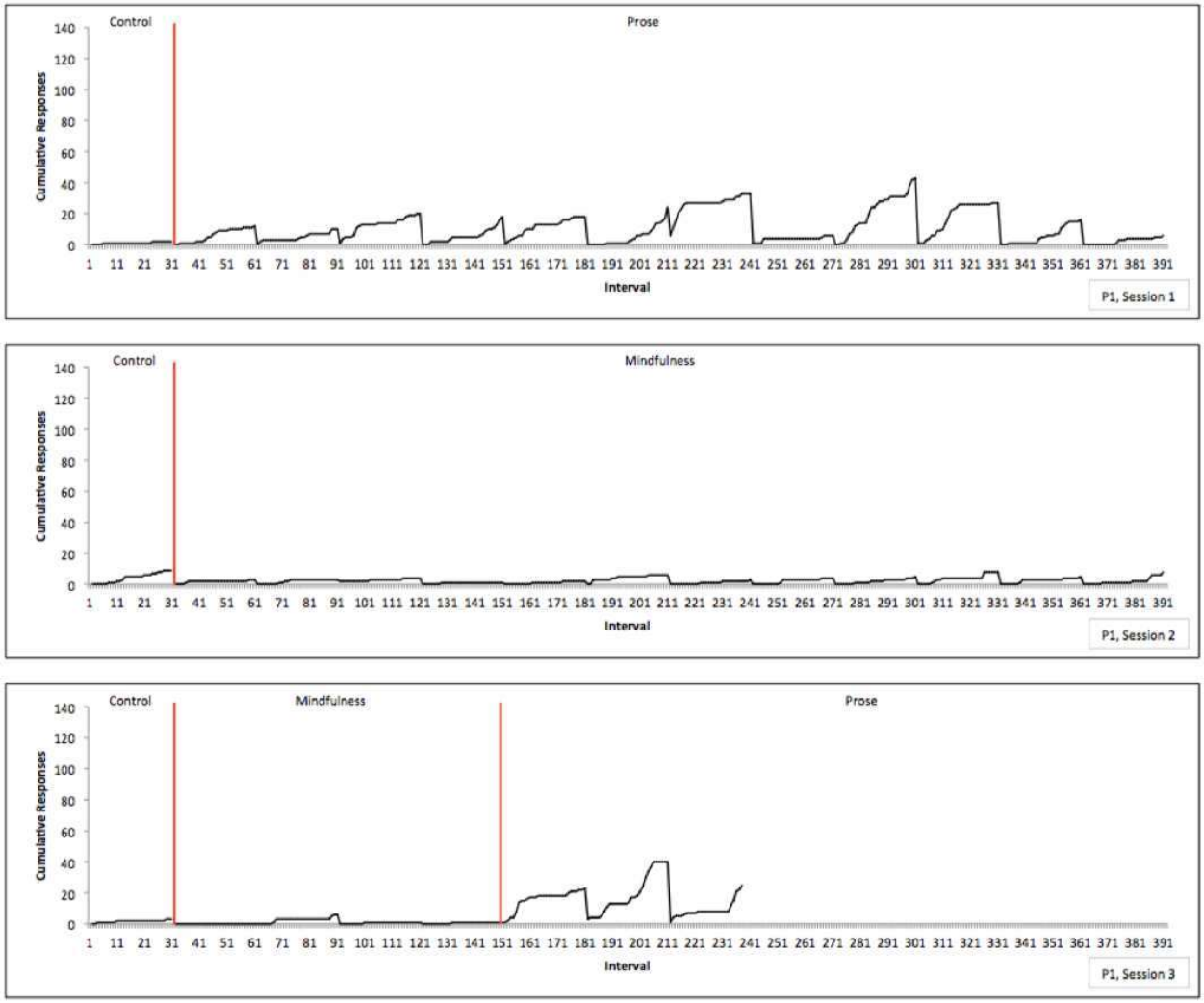


Figure N12. Cumulative displacement behaviors per 10-second interval with pen reset every 5 minutes for Sessions 1-3 for Participant 1.

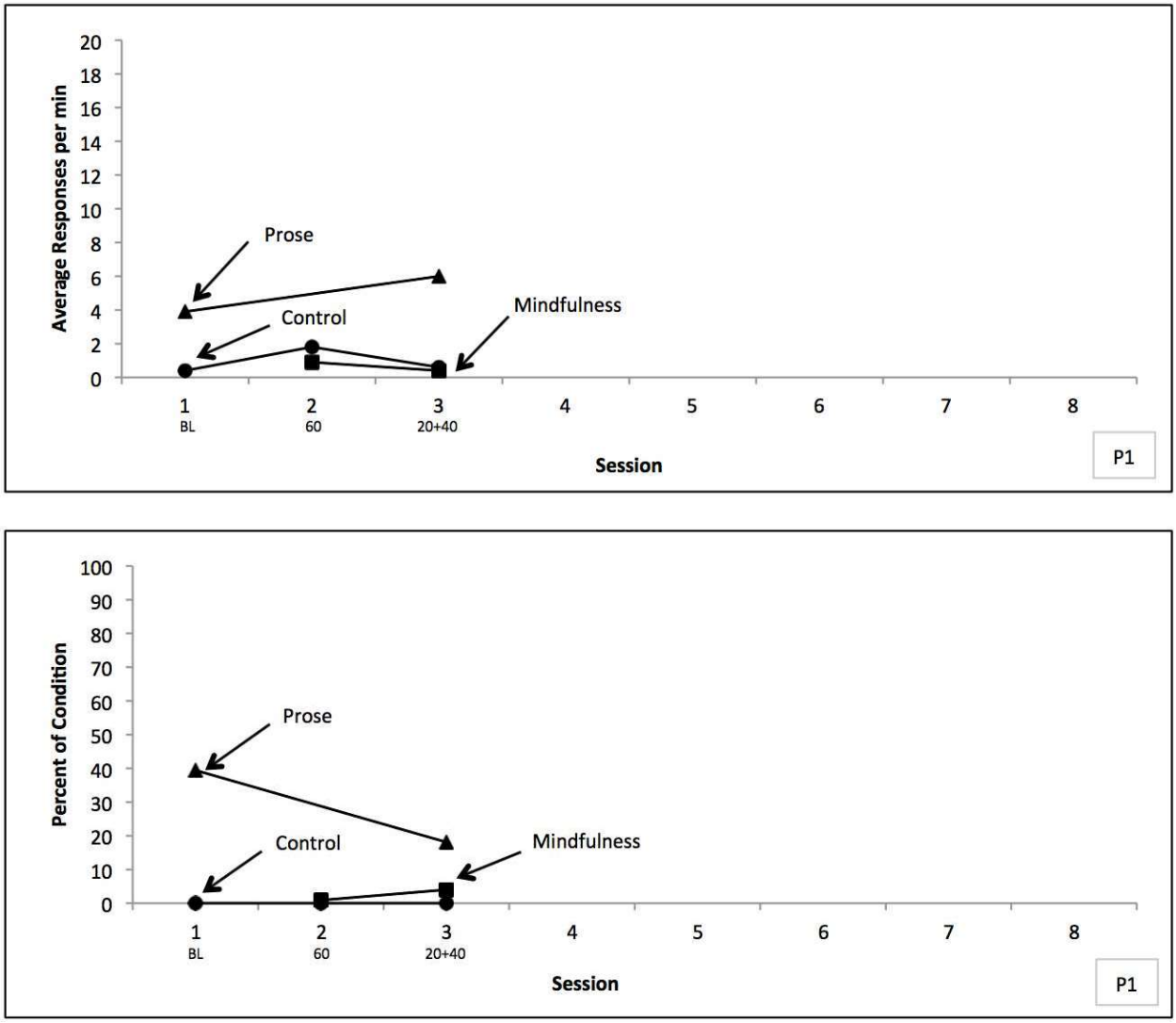
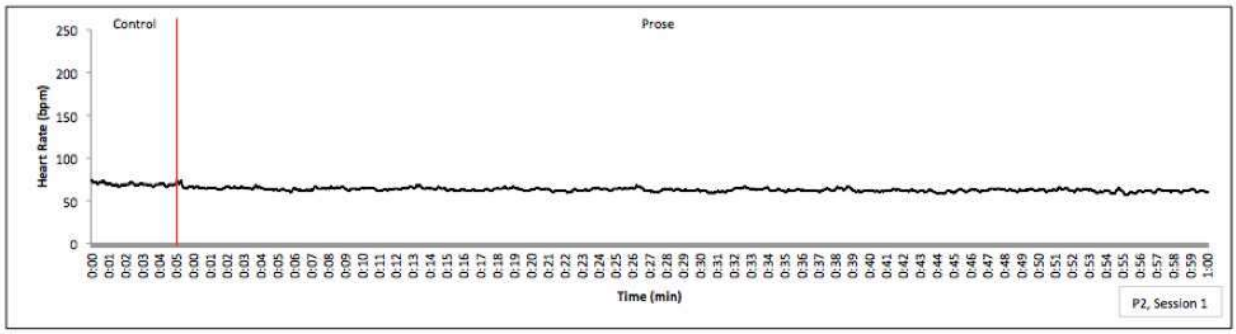
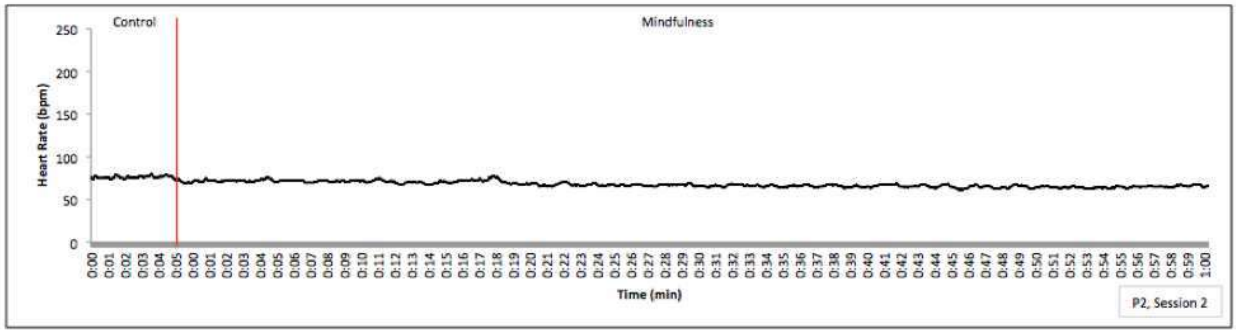
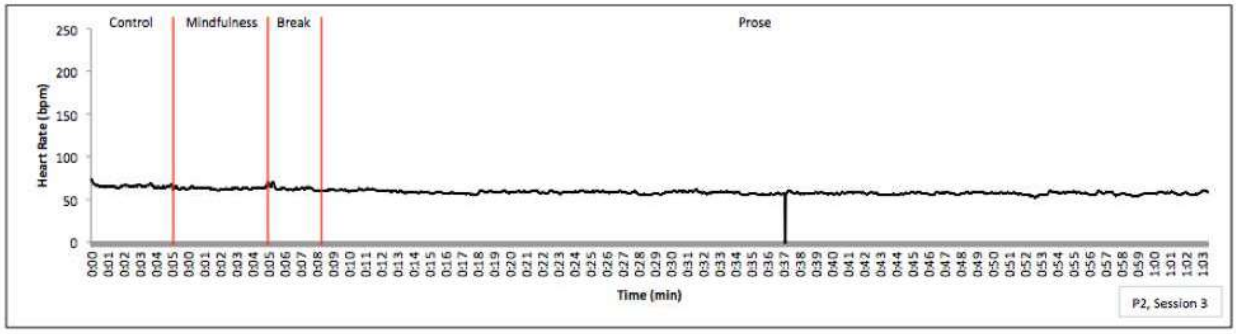
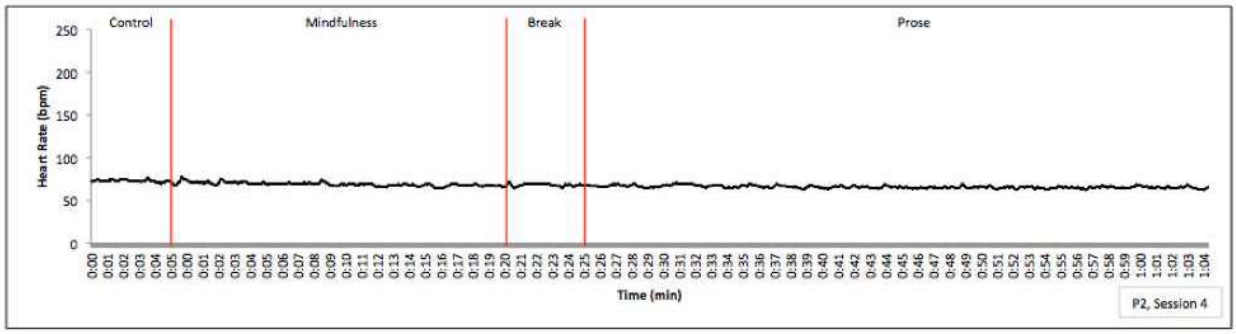


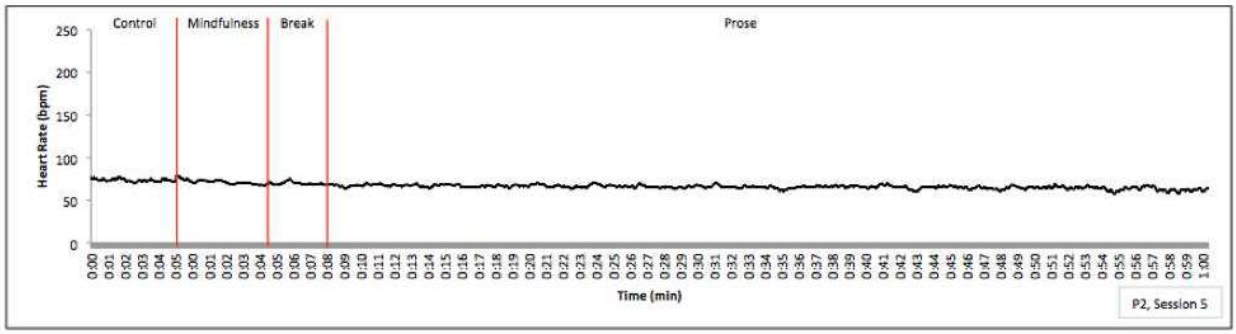
Figure N13. Average frequency (responses per minute) of discrete displacement behaviors (top) and percent of session time spent engaging in continuous displacement behaviors (bottom) per condition for Sessions 1-3 for Participant 1.


Control
Prose
Heart Rate (bpm)
Time (min)
P2, Session 1


Control
Mindfulness
Heart Rate (bpm)
Time (min)
P2, Session 2


Control
Mindfulness
Break
Prose
Heart Rate (bpm)
Time (min)
P2, Session 3


Control
Mindfulness
Break
Prose
Heart Rate (bpm)
Time (min)
P2, Session 4


Control
Mindfulness
Break
Prose
Heart Rate (bpm)
Time (min)
P2, Session 5

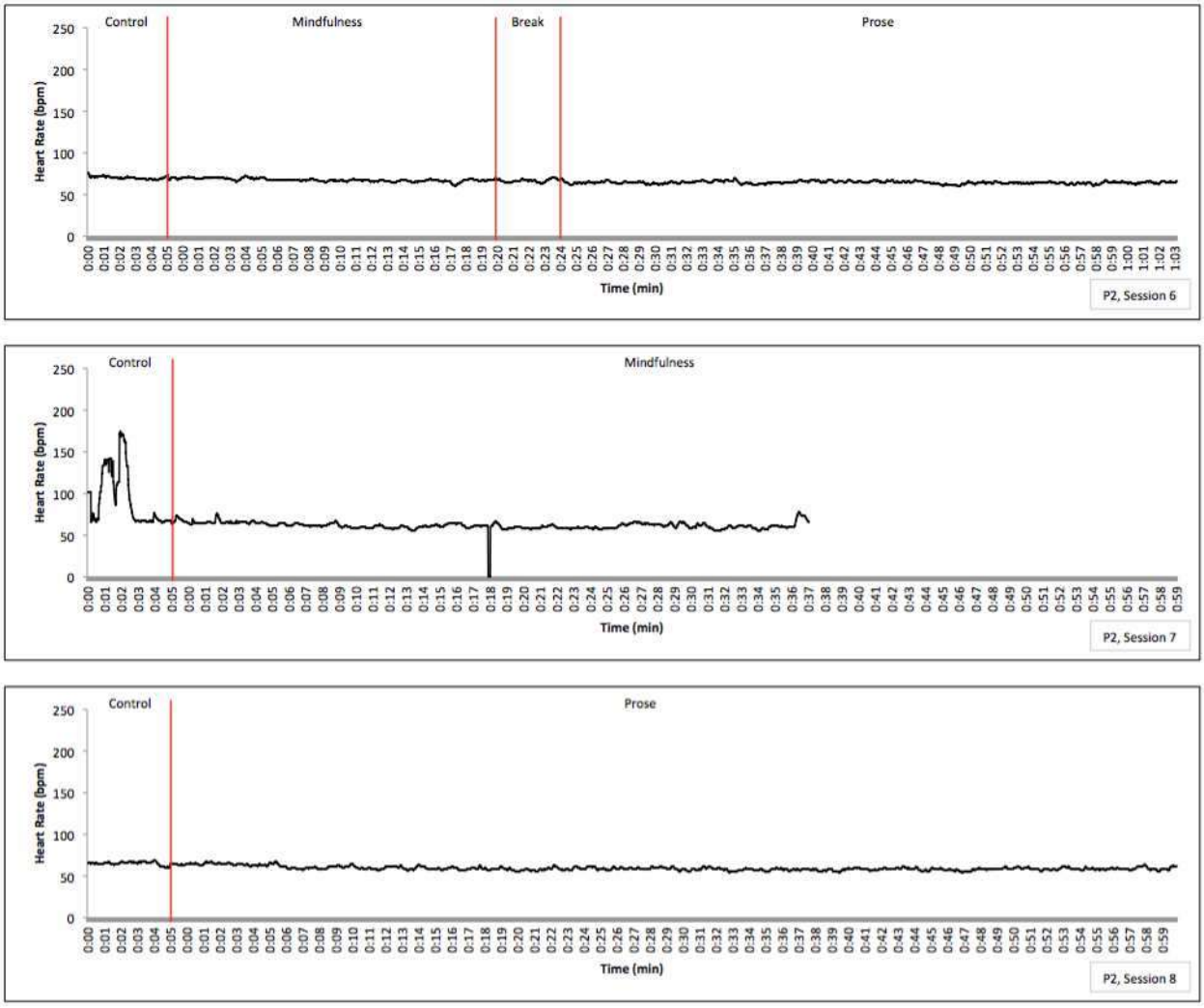
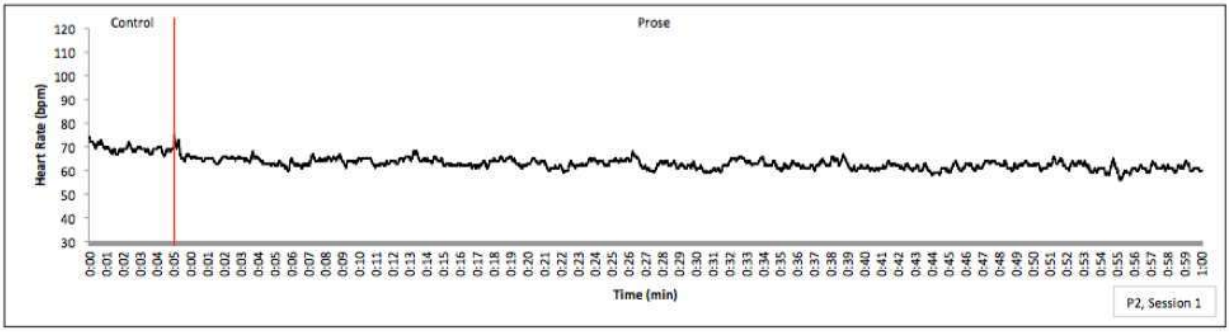
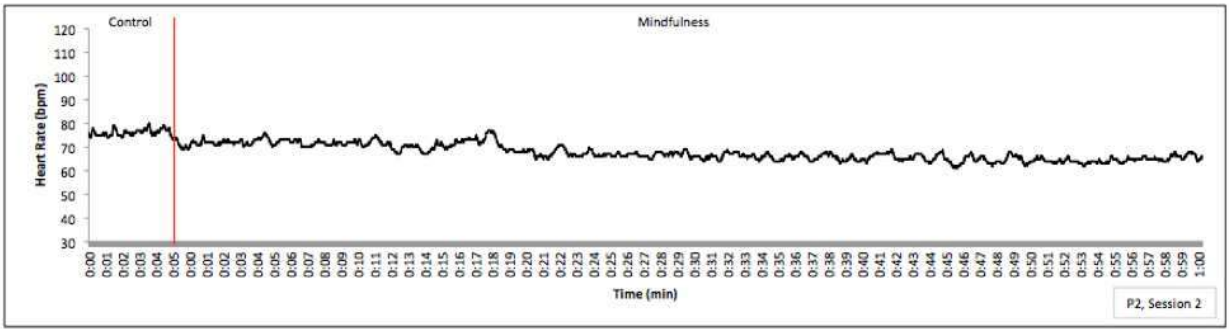
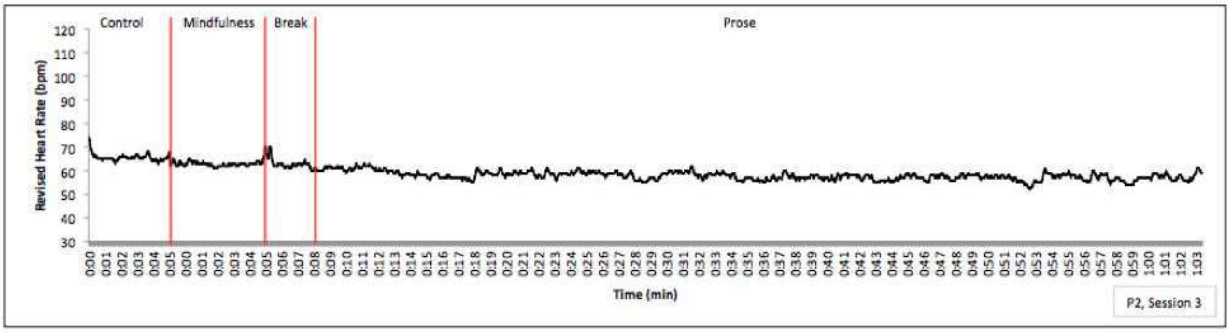
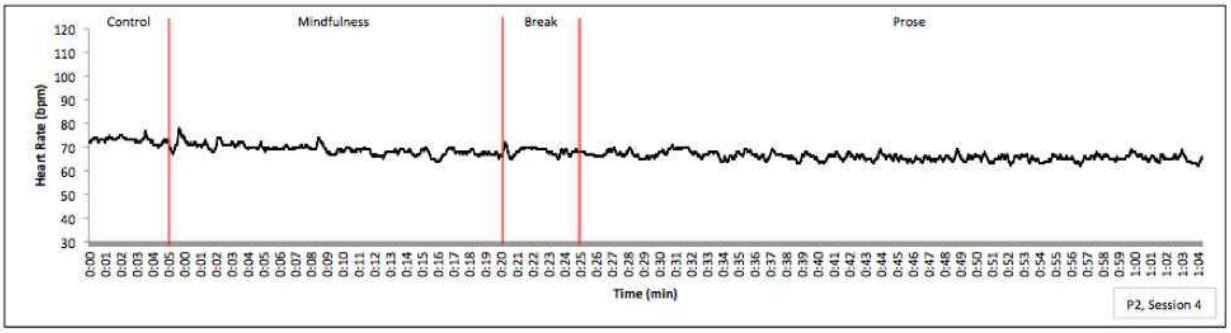


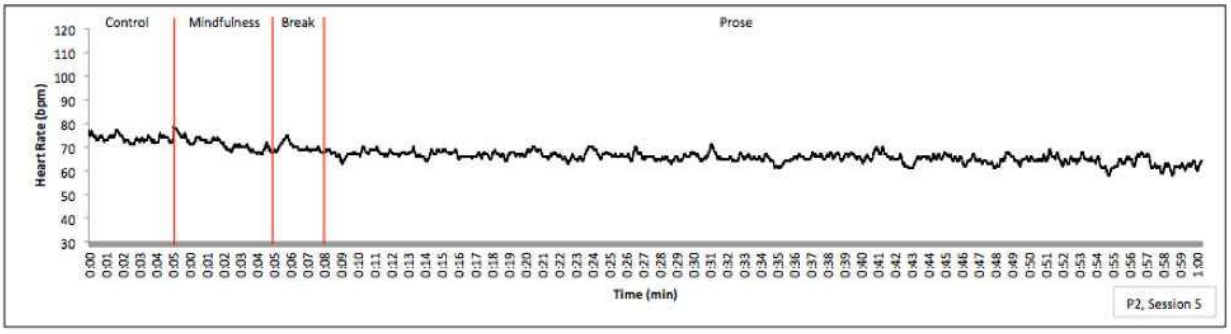
Figure N14. Heart rate for Sessions 1-8 for Participant 2.


Control
Prose
Heart Rate (bpm)
Time (min)
P2, Session 1


Control
Mindfulness
Heart Rate (bpm)
Time (min)
P2, Session 2


Control
Mindfulness
Break
Prose
Revised Heart Rate (bpm)
Time (min)
P2, Session 3


Control
Mindfulness
Break
Prose
Heart Rate (bpm)
Time (min)
P2, Session 4


Control
Mindfulness
Break
Prose
Heart Rate (bpm)
Time (min)
P2, Session 5

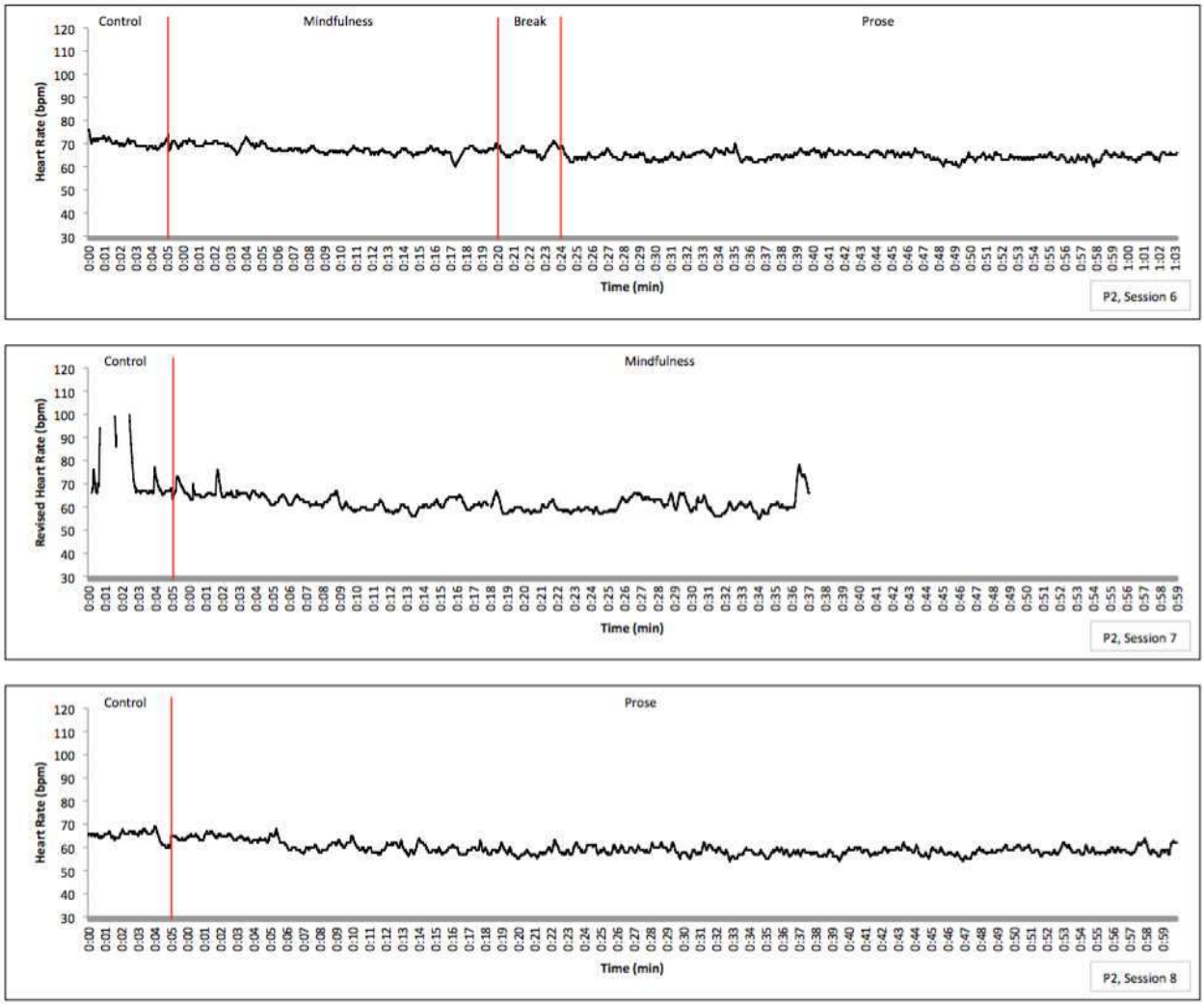


Figure N15. Revised heart rate for Sessions 1-8 for Participant 2.

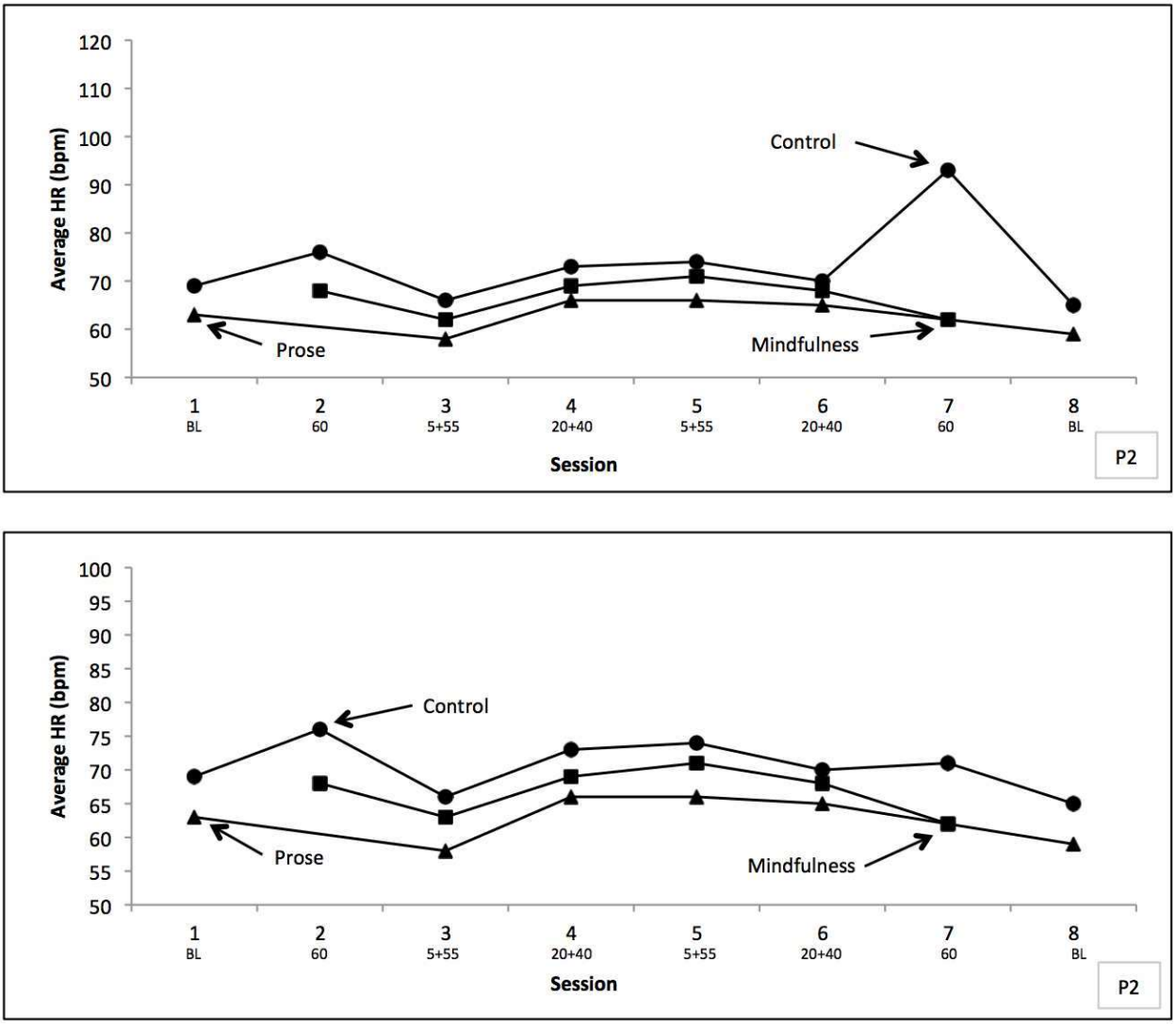


Figure N16. Average heart rate (top) and revised average heart rate (bottom) per condition for Sessions 1-8 for Participant 2.

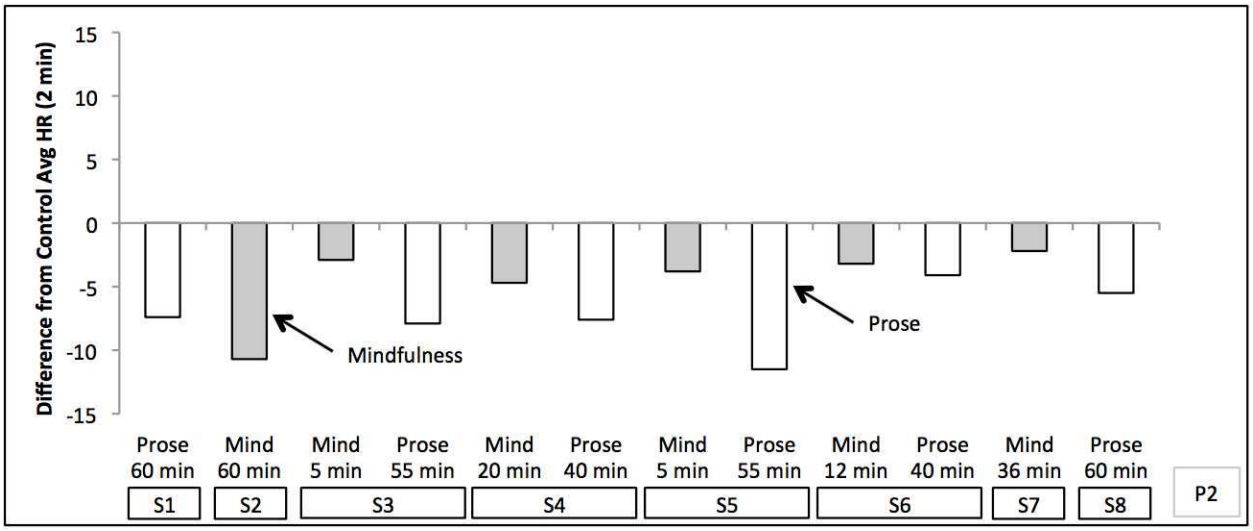


Figure N17. The difference in average heart rate from the final 2 minutes of control to the final 2 minutes of each condition for Sessions 1-8 for Participant 2.

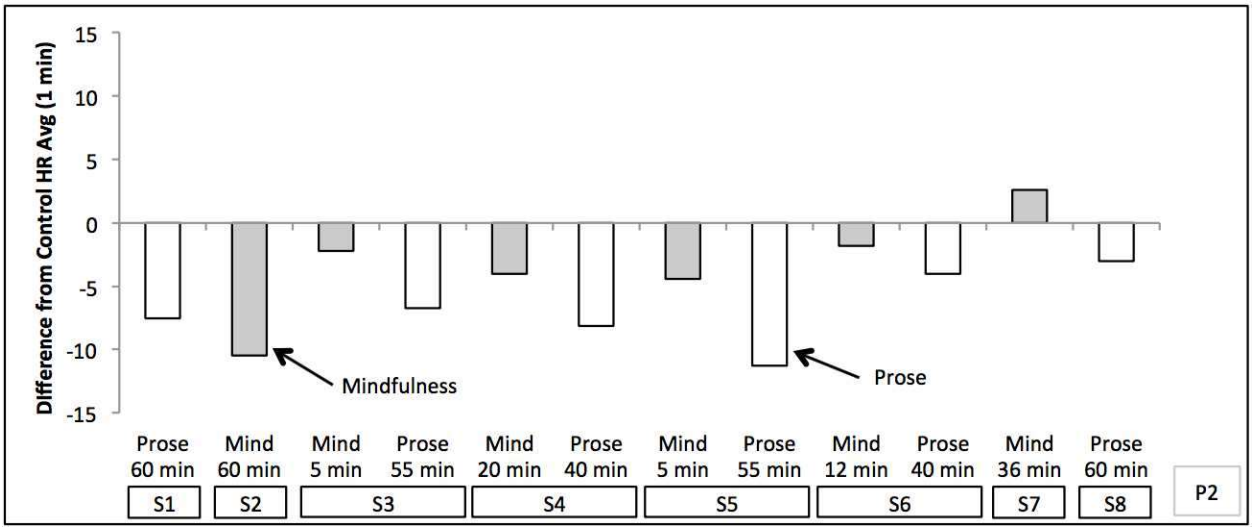


Figure N18. The difference in average heart rate from the final 1 minute of control to the final 1 minute of each condition for Sessions 1-8 for Participant 2.

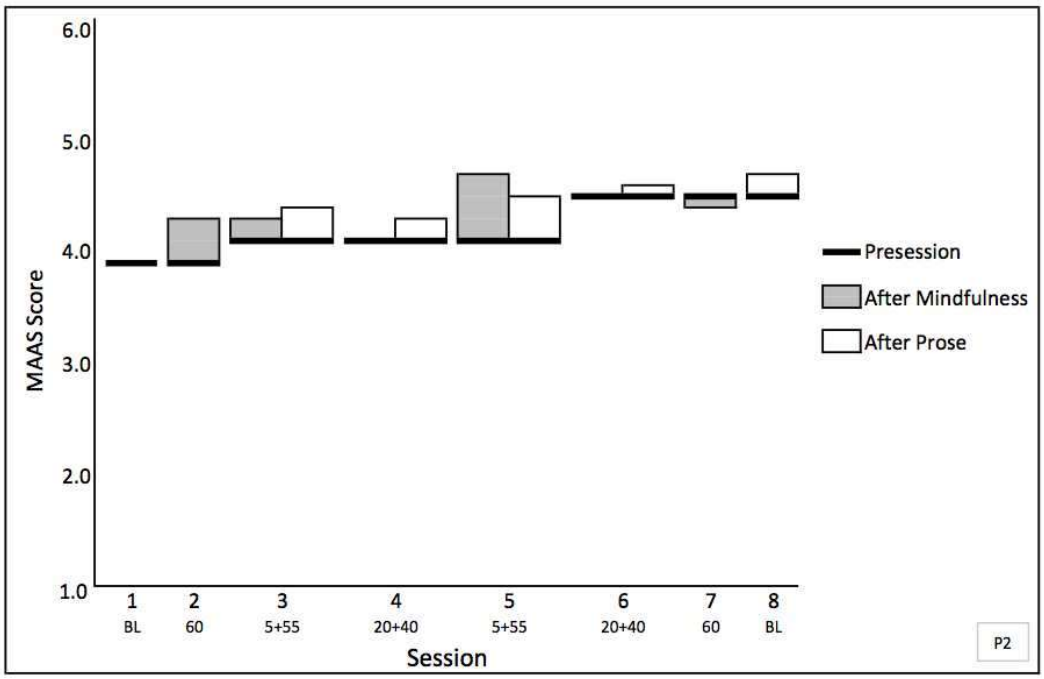


Figure N19. Pre-, mid- (when applicable), and post-session MAAS scores for Sessions 1-8 for Participant 2, where higher scores indicate a higher level of mindfulness.

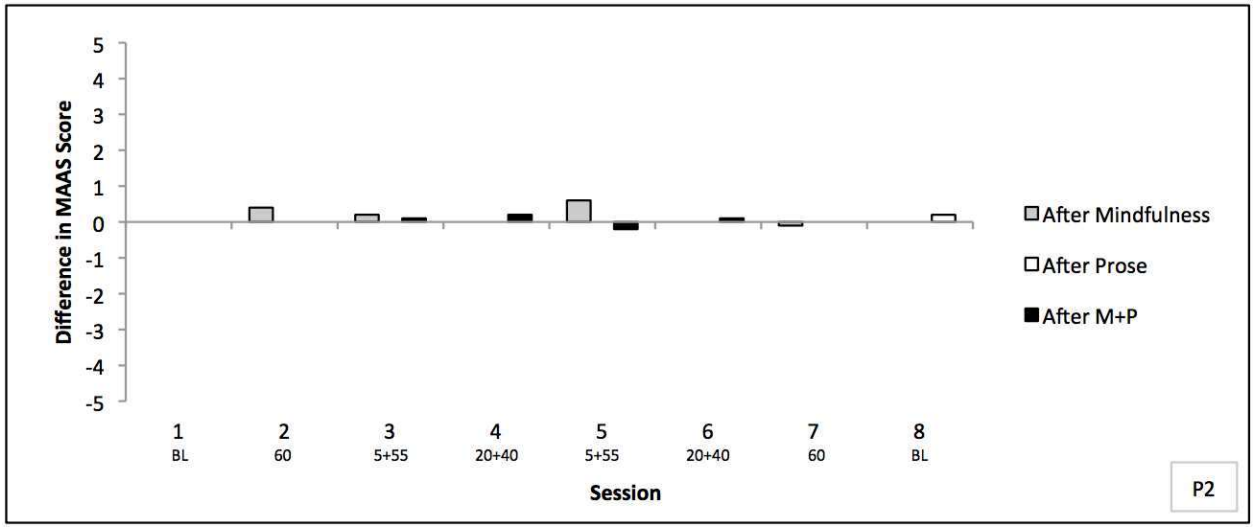


Figure N20. The difference in MAAS scores pre-session to post-mindfulness (After mindfulness), pre-session to post-prose (After prose), and post-mindfulness to post-prose (After M+P) for Sessions 1-8 for Participant 2.

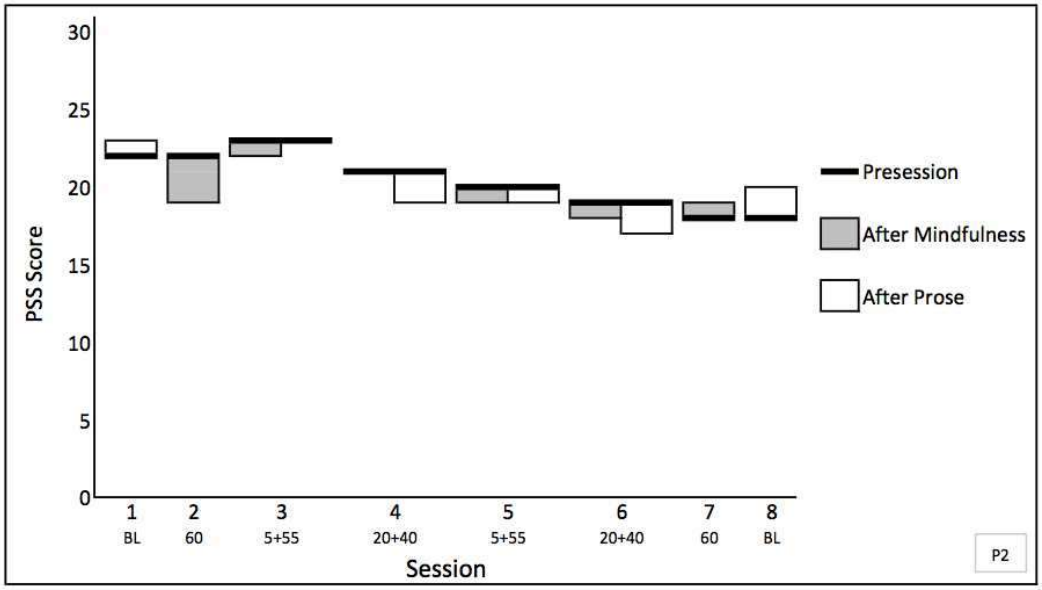


Figure N21. Pre-, mid- (when applicable), and post-session PSS scores for Sessions 1-8 for Participant 2, where higher scores indicate a higher level of stress.

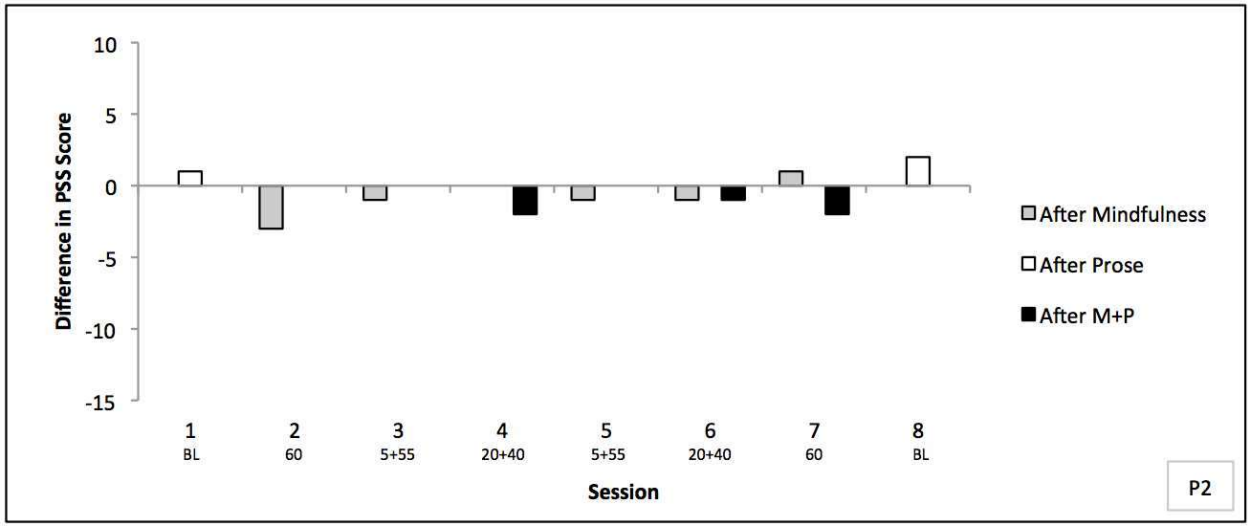
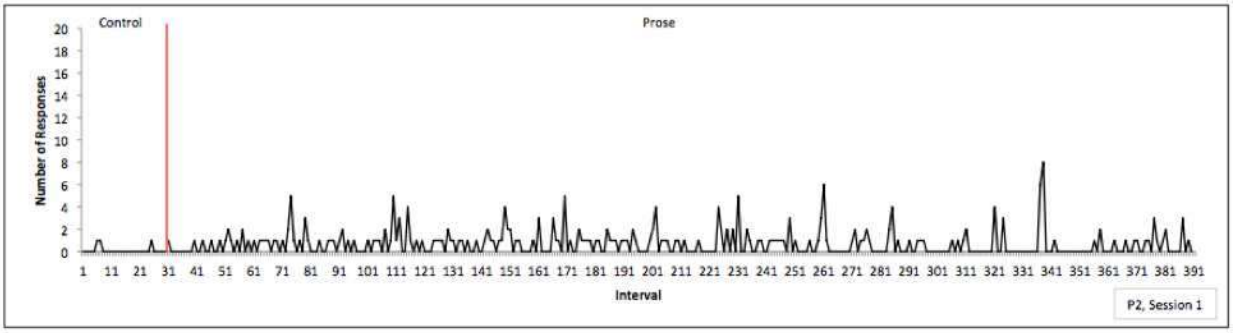
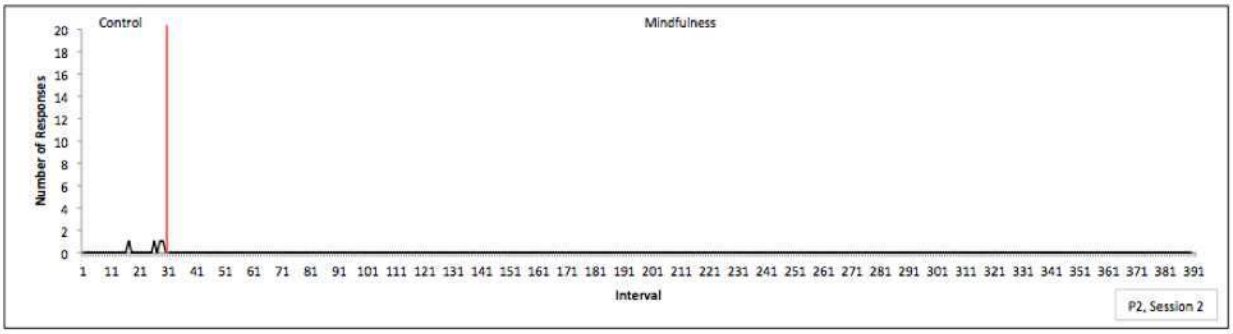
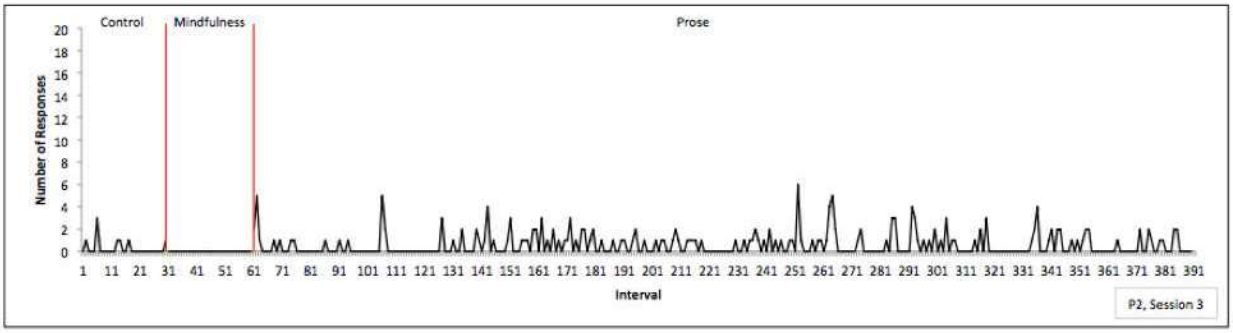
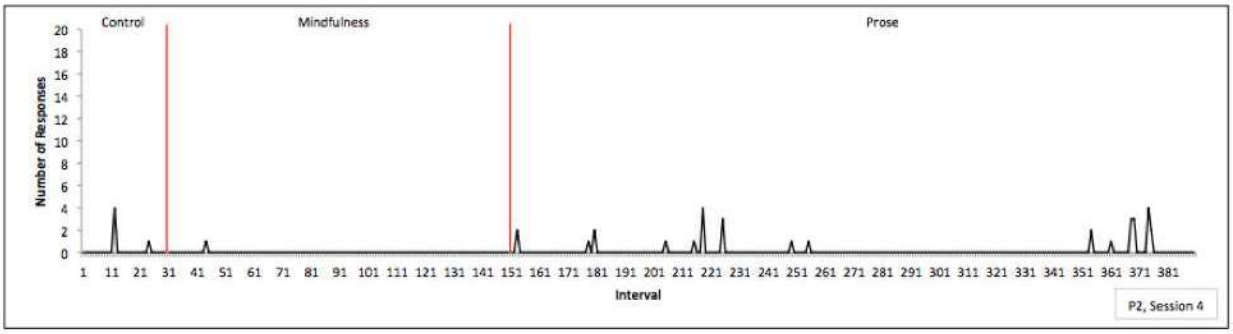


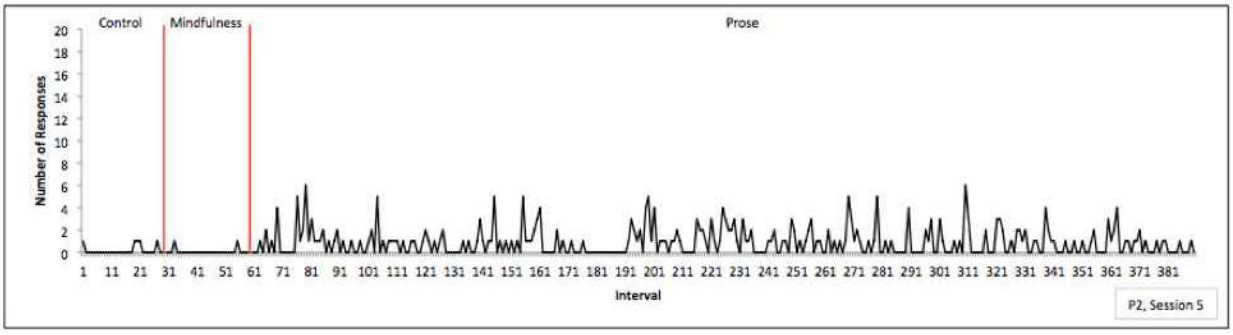
Figure N22. The difference in PSS scores pre-session to post-mindfulness (After mindfulness), pre-session to post-prose (After prose), and post-mindfulness to post-prose (After M+P) for Sessions 1-8 for Participant 2.


Control
Prose
Number of Responses
Interval
P2, Session 1


Control
Mindfulness
Number of Responses
Interval
P2, Session 2


Control
Mindfulness
Prose
Number of Responses
Interval
P2, Session 3


Control
Mindfulness
Prose
Number of Responses
Interval
P2, Session 4


Control
Mindfulness
Prose
Number of Responses
Interval
P2, Session 5

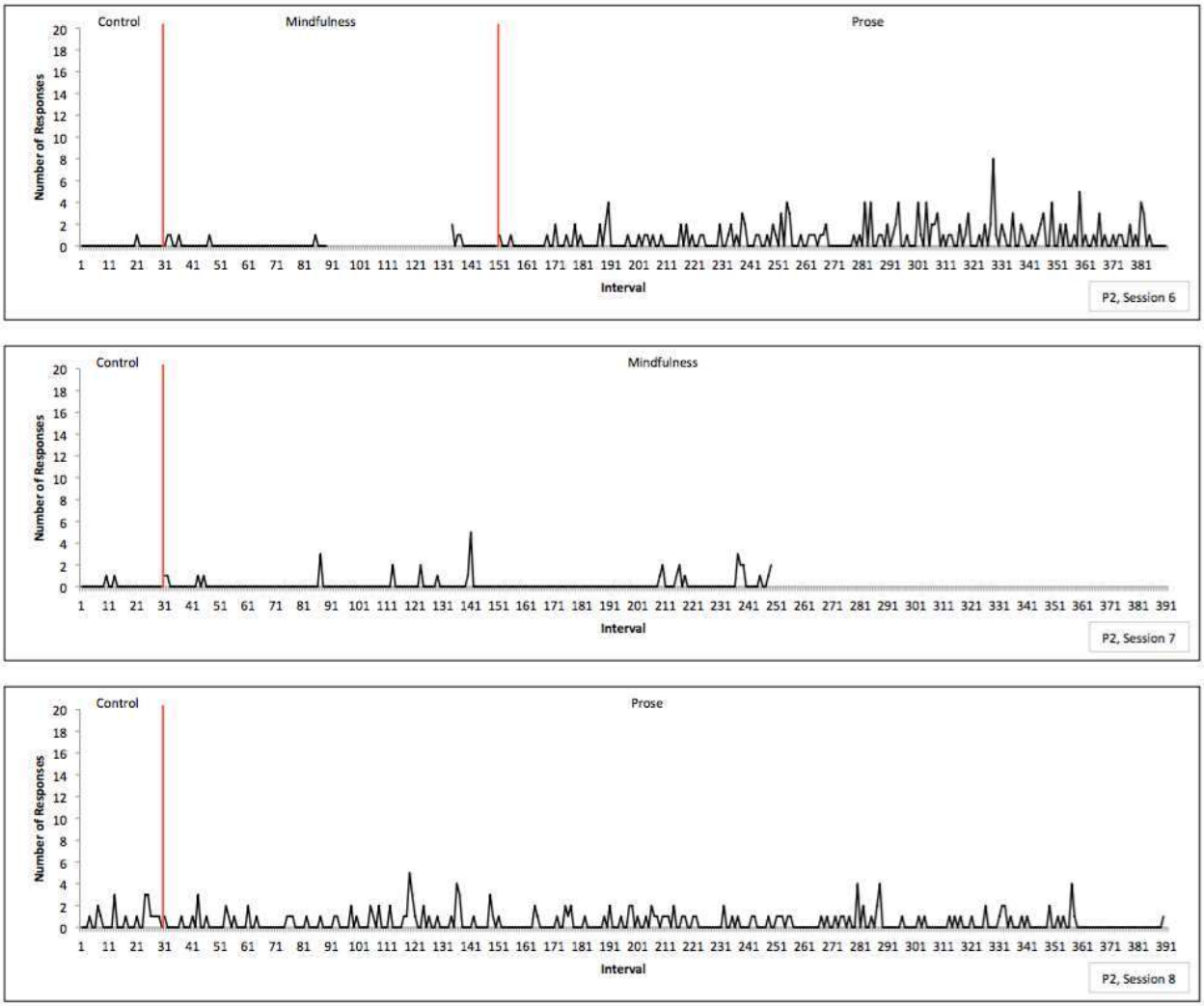
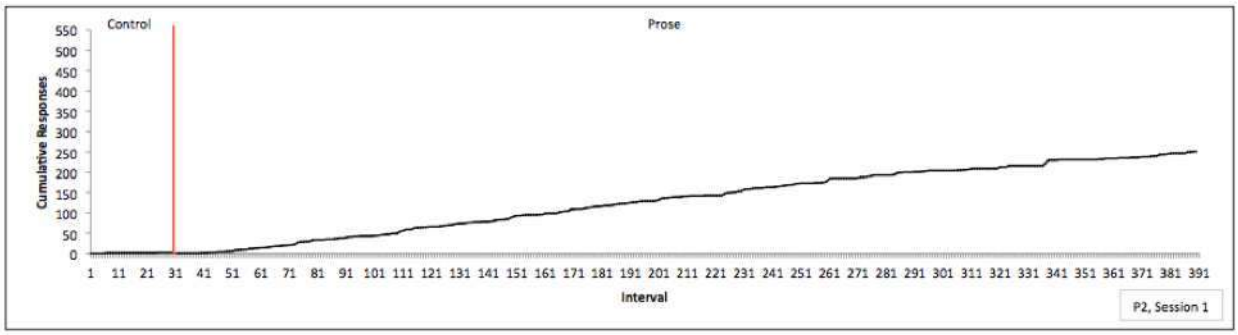
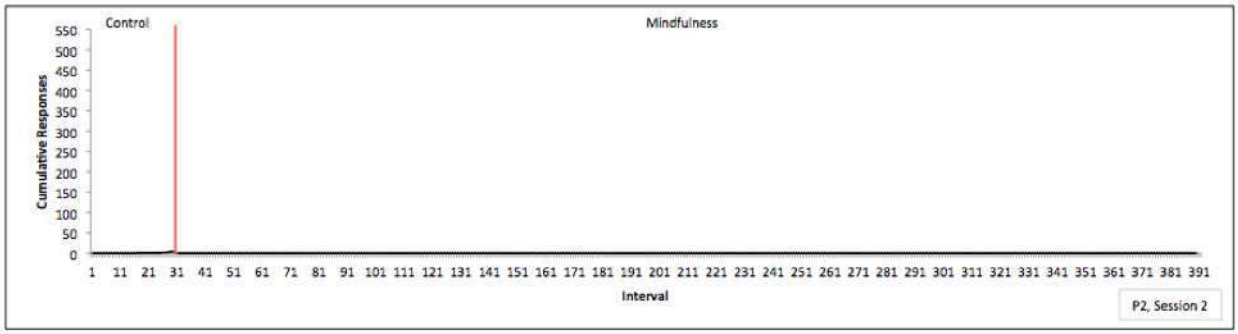
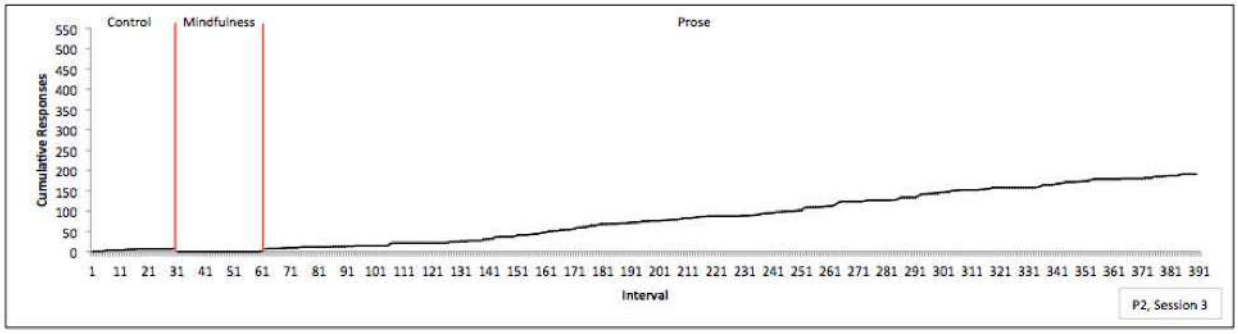
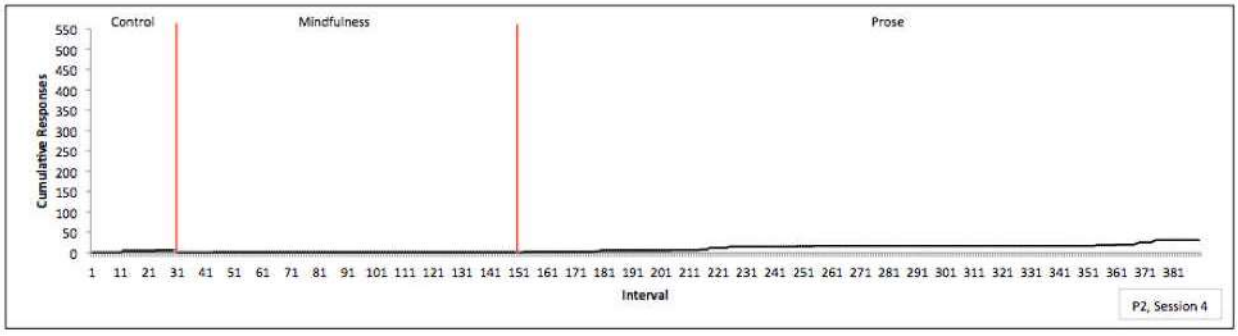


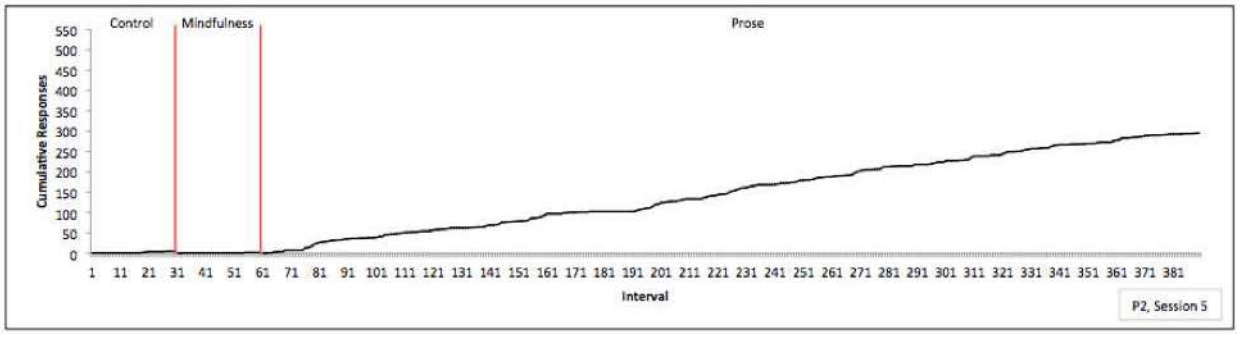
Figure N23. The number of displacement behaviors emitted per 10-second interval for Sessions 1-8 for Participant 2.


Control
Prose
Cumulative Responses
Interval
P2, Session 1


Control
Mindfulness
Cumulative Responses
Interval
P2, Session 2


Control
Mindfulness
Prose
Cumulative Responses
Interval
P2, Session 3


Control
Mindfulness
Prose
Cumulative Responses
Interval
P2, Session 4


Control
Mindfulness
Prose
Cumulative Responses
Interval
P2, Session 5

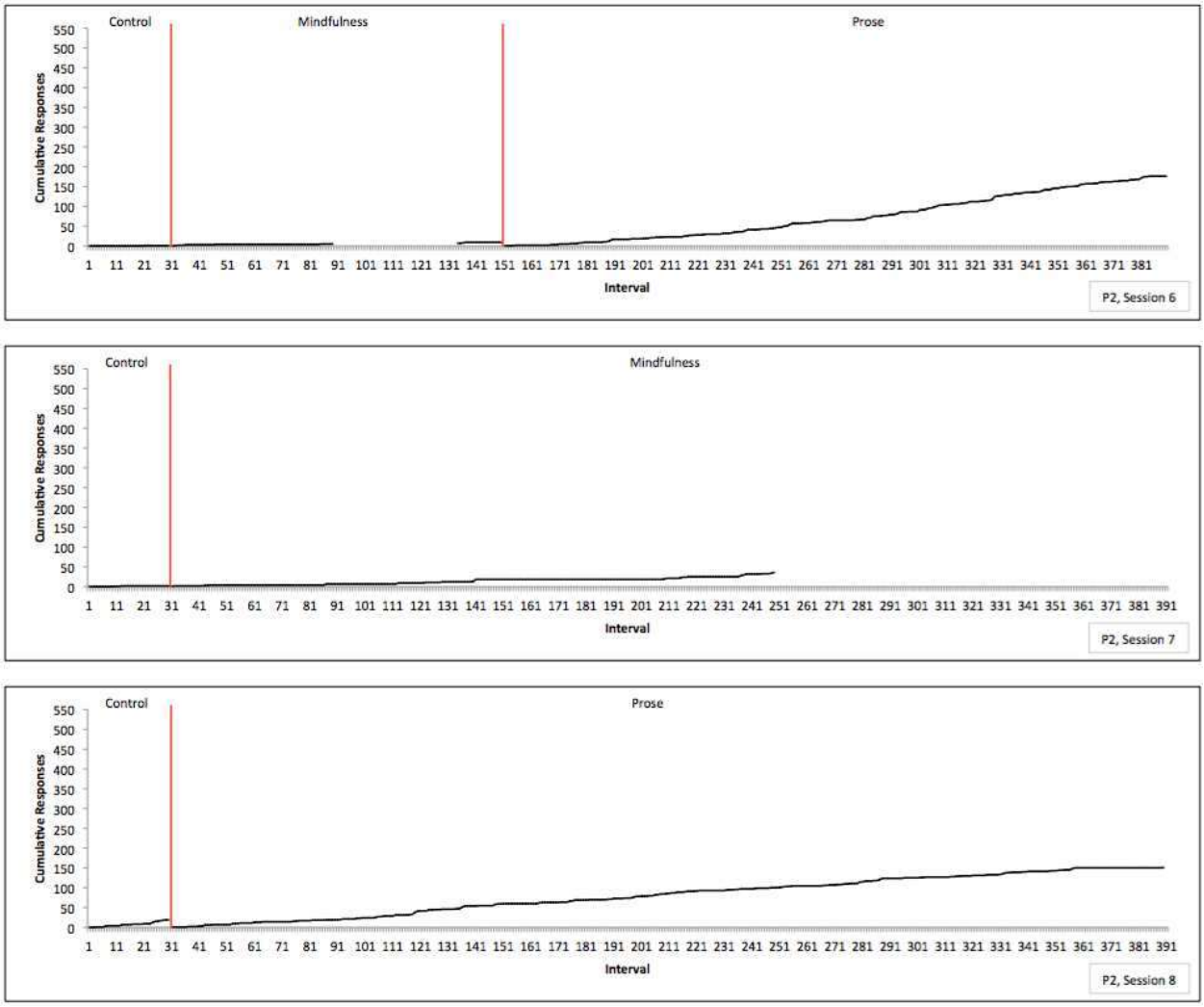
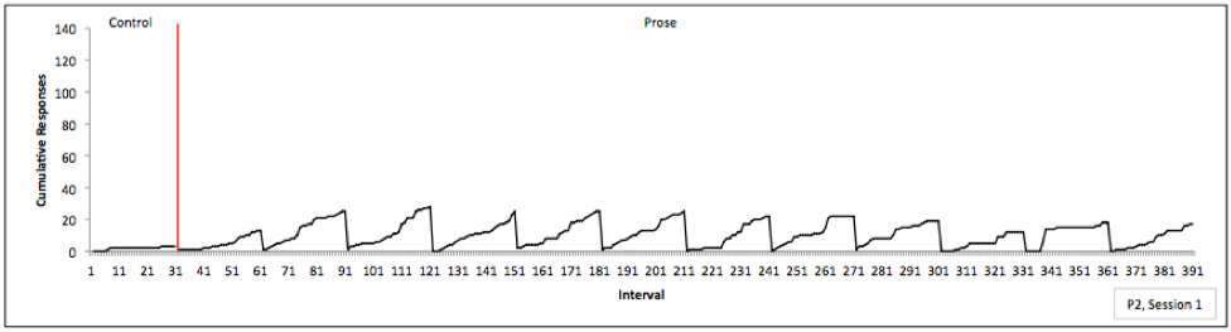
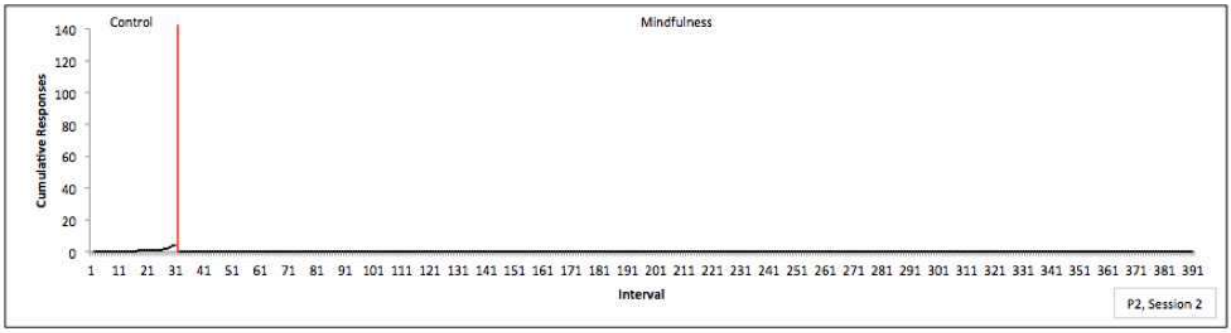
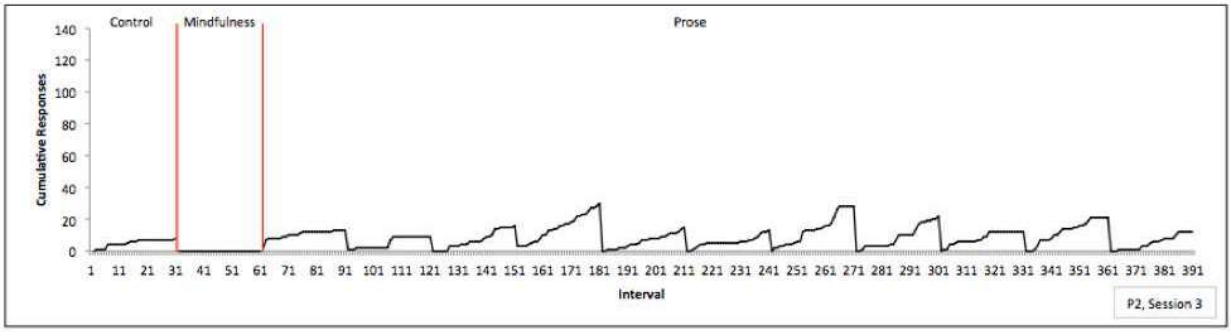
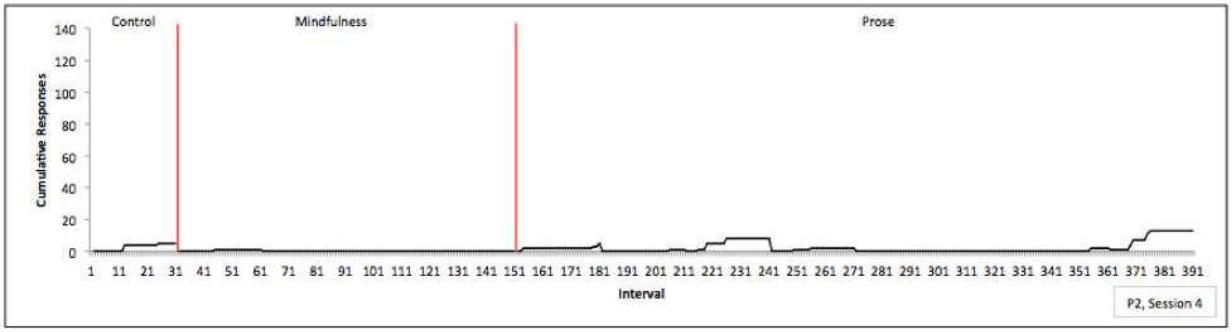


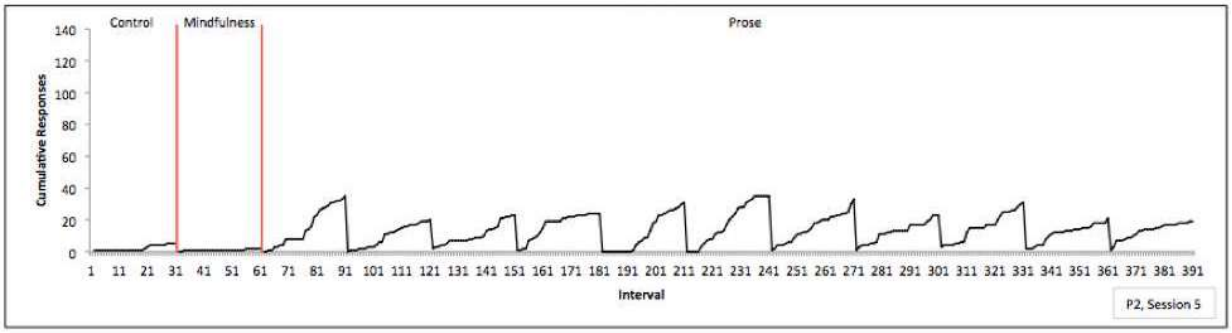
Figure N24. Cumulative displacement behaviors per 10-second interval for Sessions 1-8 for Participant 2.


Control
Prose
Cumulative Responses
Interval
P2, Session 1


Control
Mindfulness
Cumulative Responses
Interval
P2, Session 2


Control
Mindfulness
Prose
Cumulative Responses
Interval
P2, Session 3


Control
Mindfulness
Prose
Cumulative Responses
Interval
P2, Session 4


Control
Mindfulness
Prose
Cumulative Responses
Interval
P2, Session 5

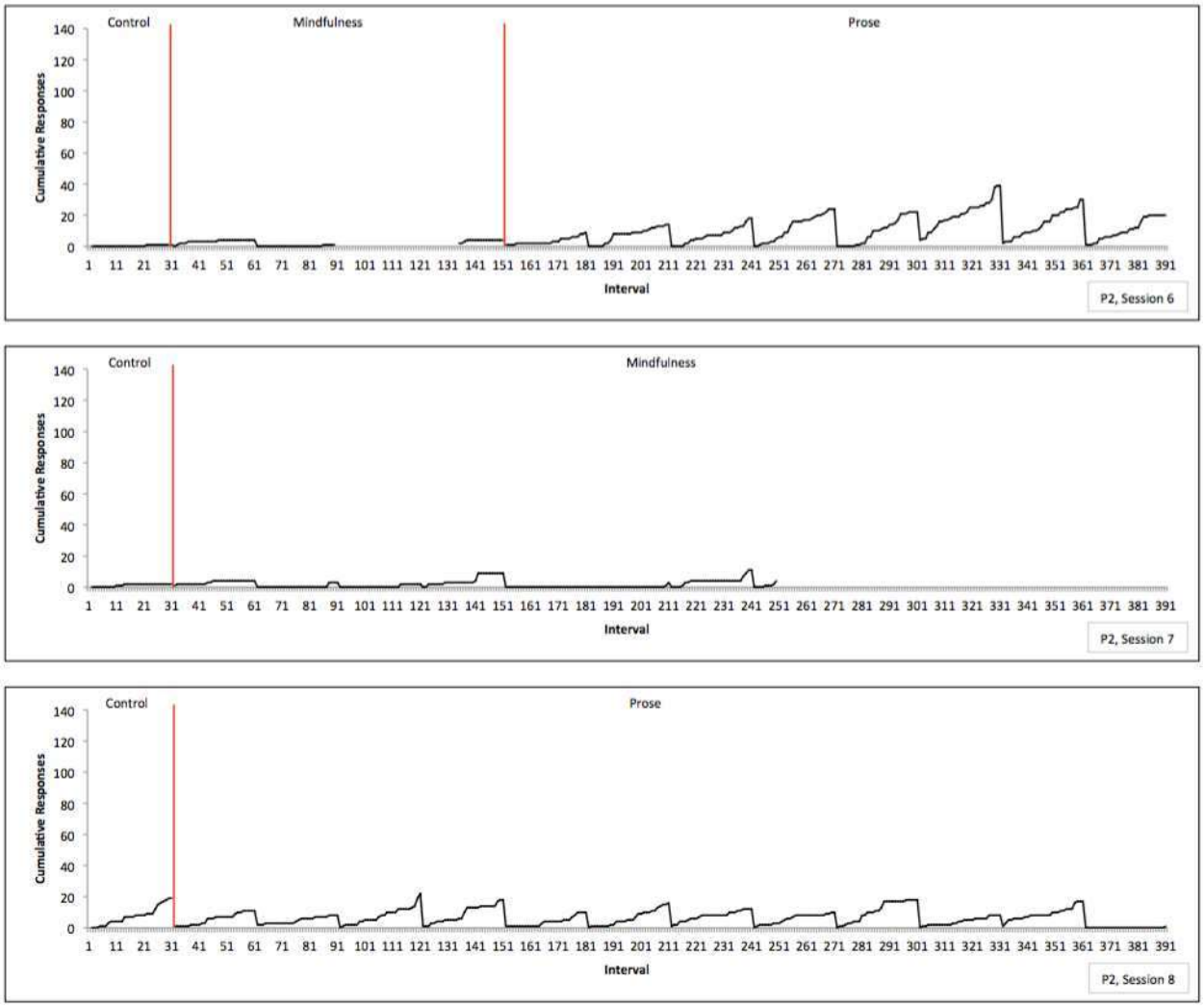


Figure N25. Cumulative displacement behaviors per 10-second interval with pen reset every 5 minutes for Sessions 1-8 for Participant 2.

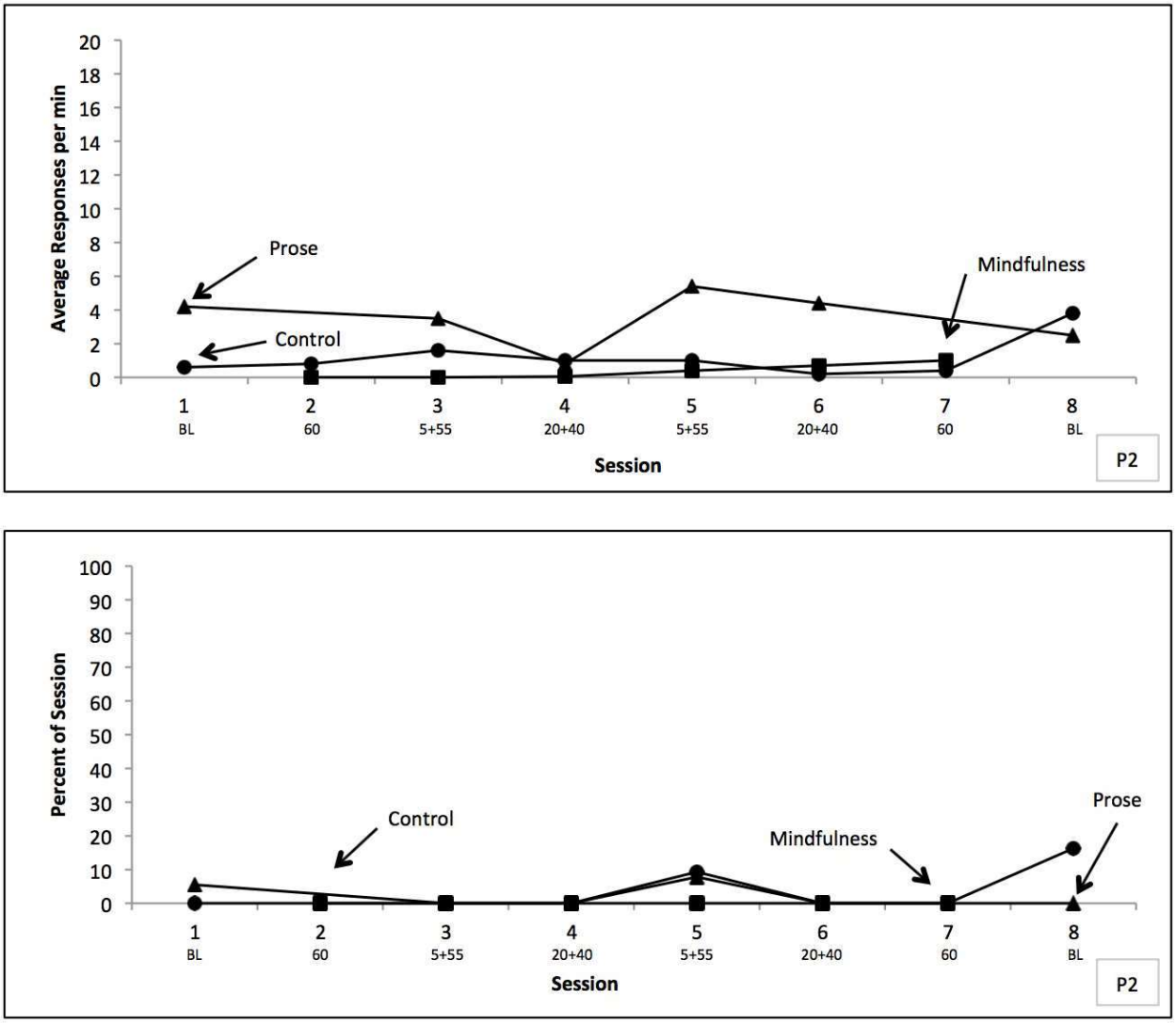
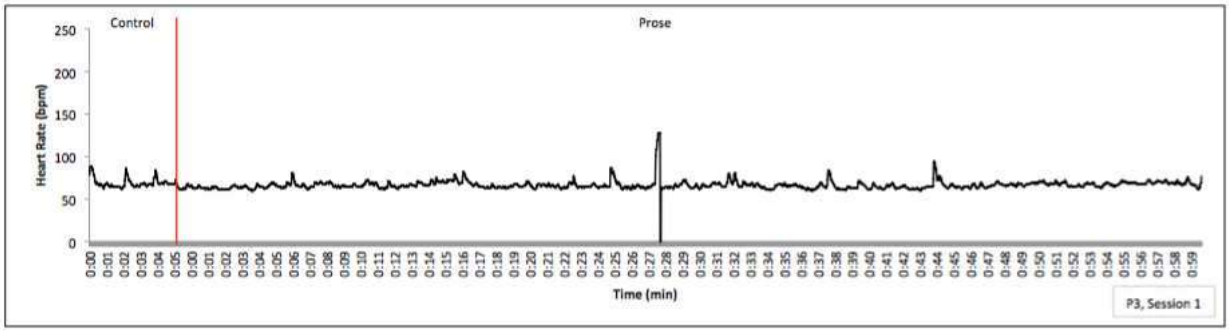
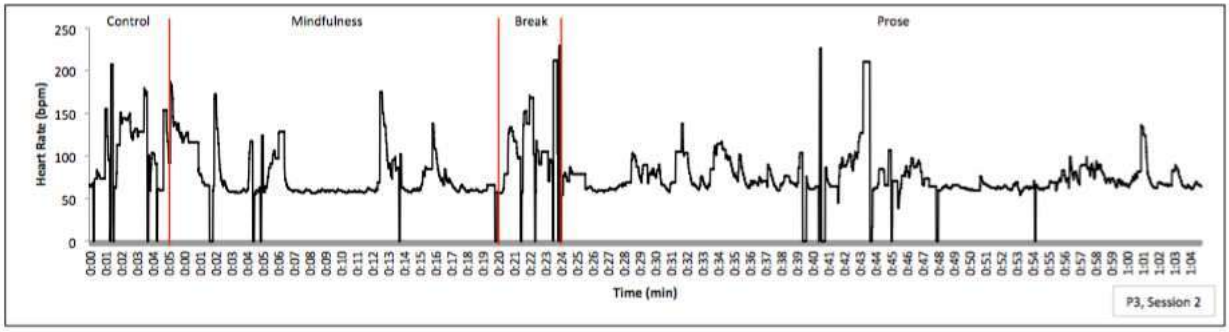
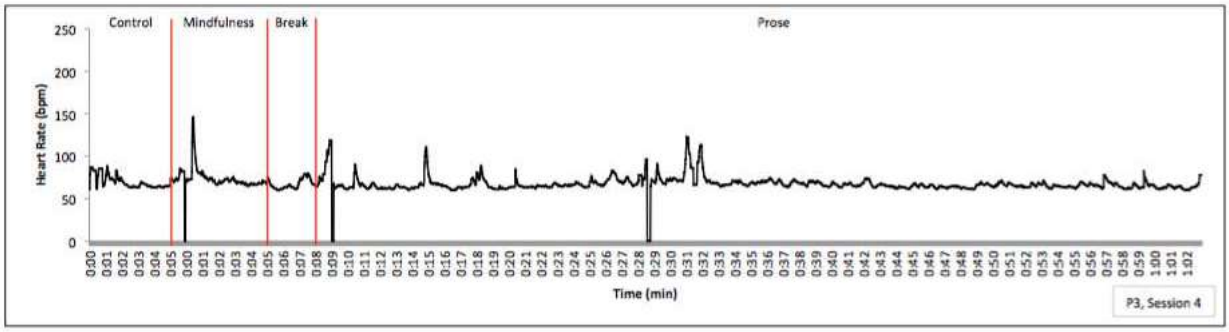
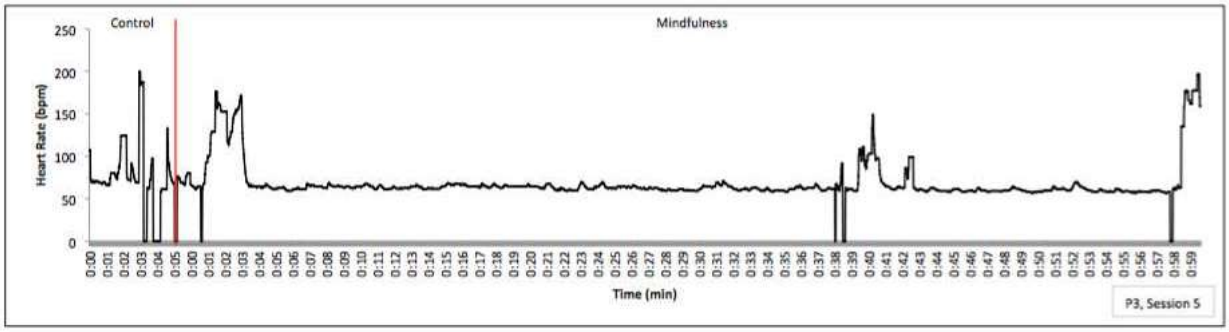


Figure N26. Average frequency of discrete displacement behaviors (top) and percent of engagement in continuous displacement behaviors (bottom) per condition for Sessions 1-8 for Participant 2.


Control
Prose
Heart Rate (bpm)
Time (min)
P3, Session 1


Control
Mindfulness
Break
Prose
Heart Rate (bpm)
Time (min)
P3, Session 2


Control
Mindfulness
Break
Prose
Heart Rate (bpm)
Time (min)
P3, Session 4


Control
Mindfulness
Heart Rate (bpm)
Time (min)
P3, Session 5

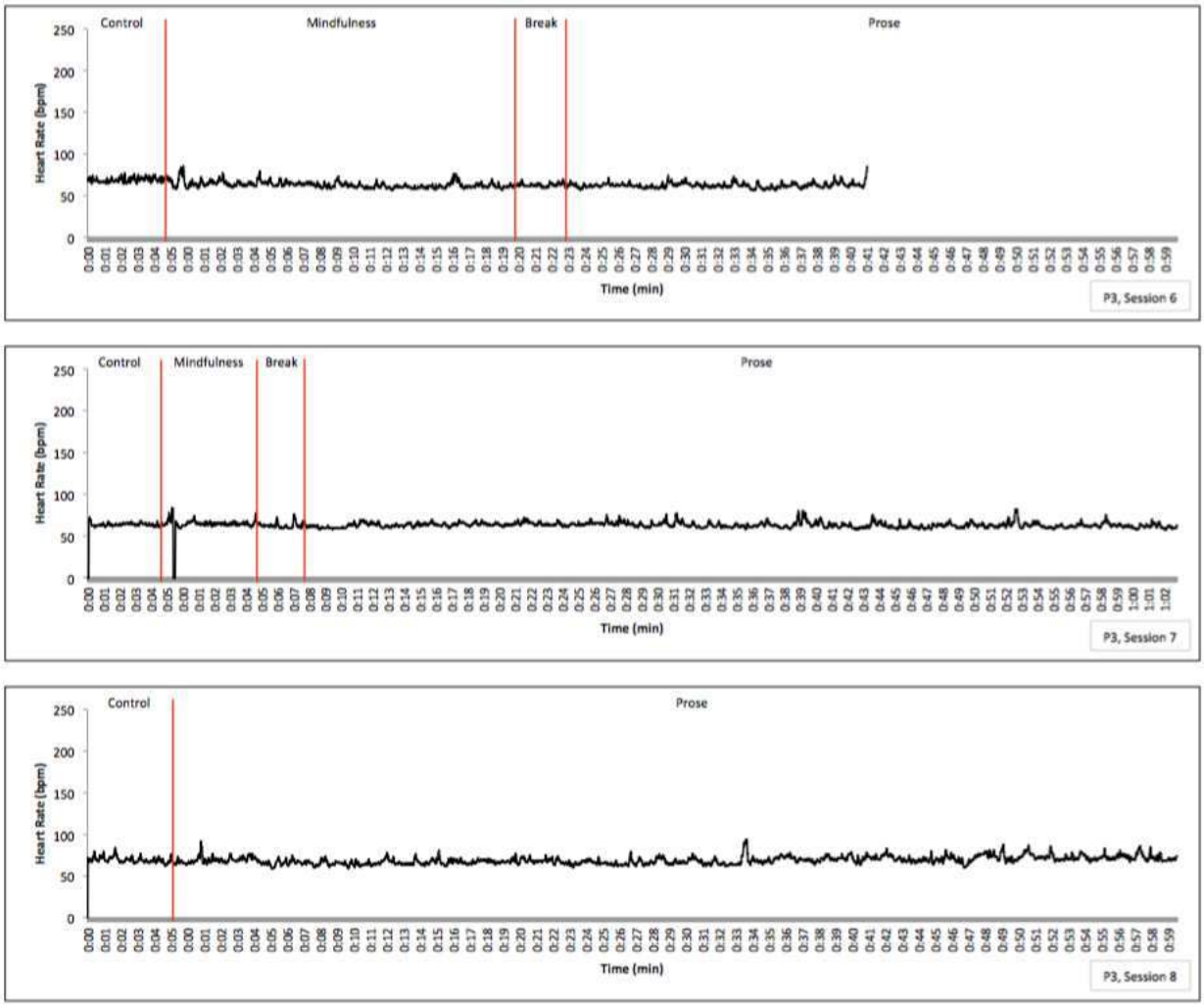
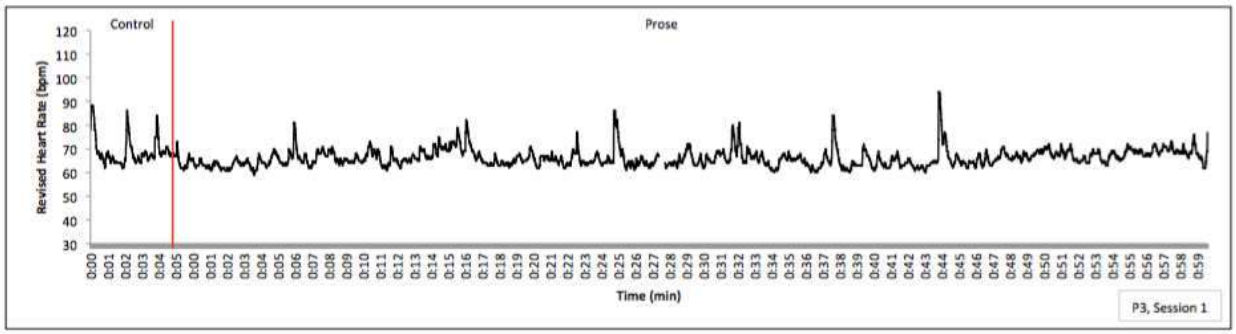
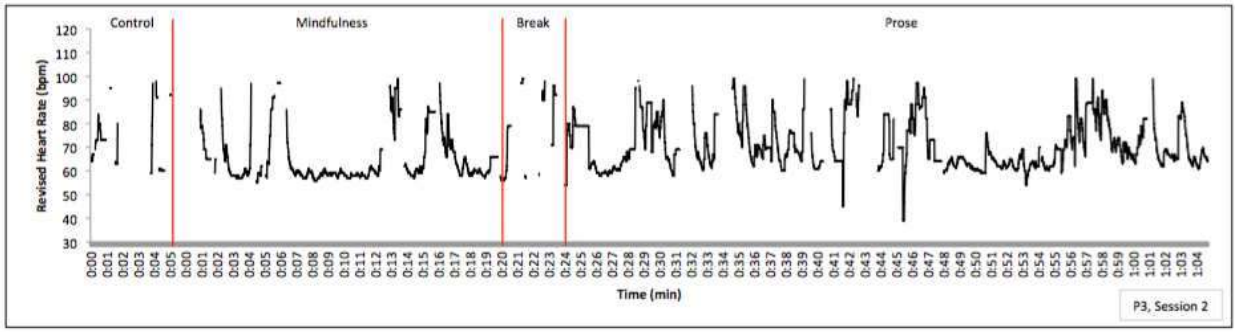
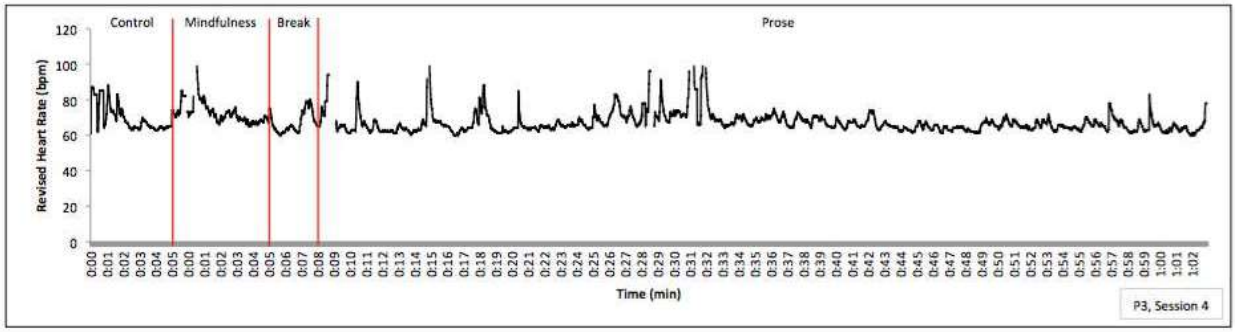
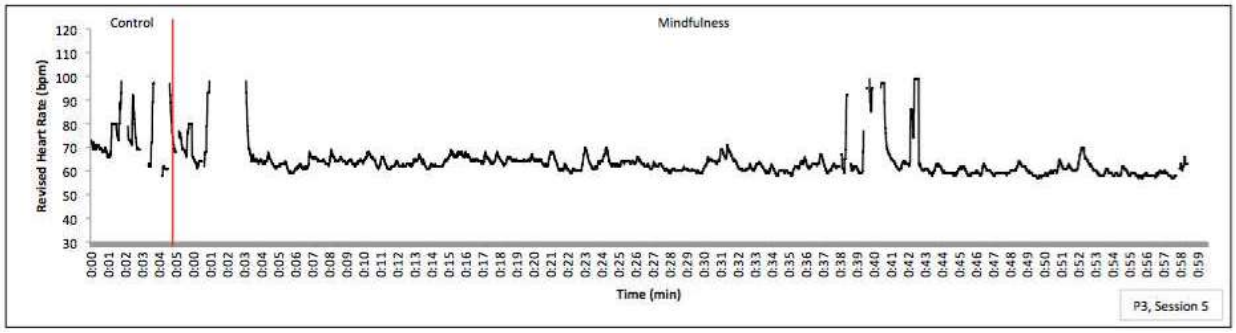


Figure N27. Heart rate for Sessions 1-8 for Participant 3.


Control
Prose
Revised Heart Rate (bpm)
Time (min)
P3, Session 1


Control
Mindfulness
Break
Prose
Revised Heart Rate (bpm)
Time (min)
P3, Session 2


Control
Mindfulness
Break
Prose
Revised Heart Rate (bpm)
Time (min)
P3, Session 4


Control
Mindfulness
Revised Heart Rate (bpm)
Time (min)
P3, Session 5

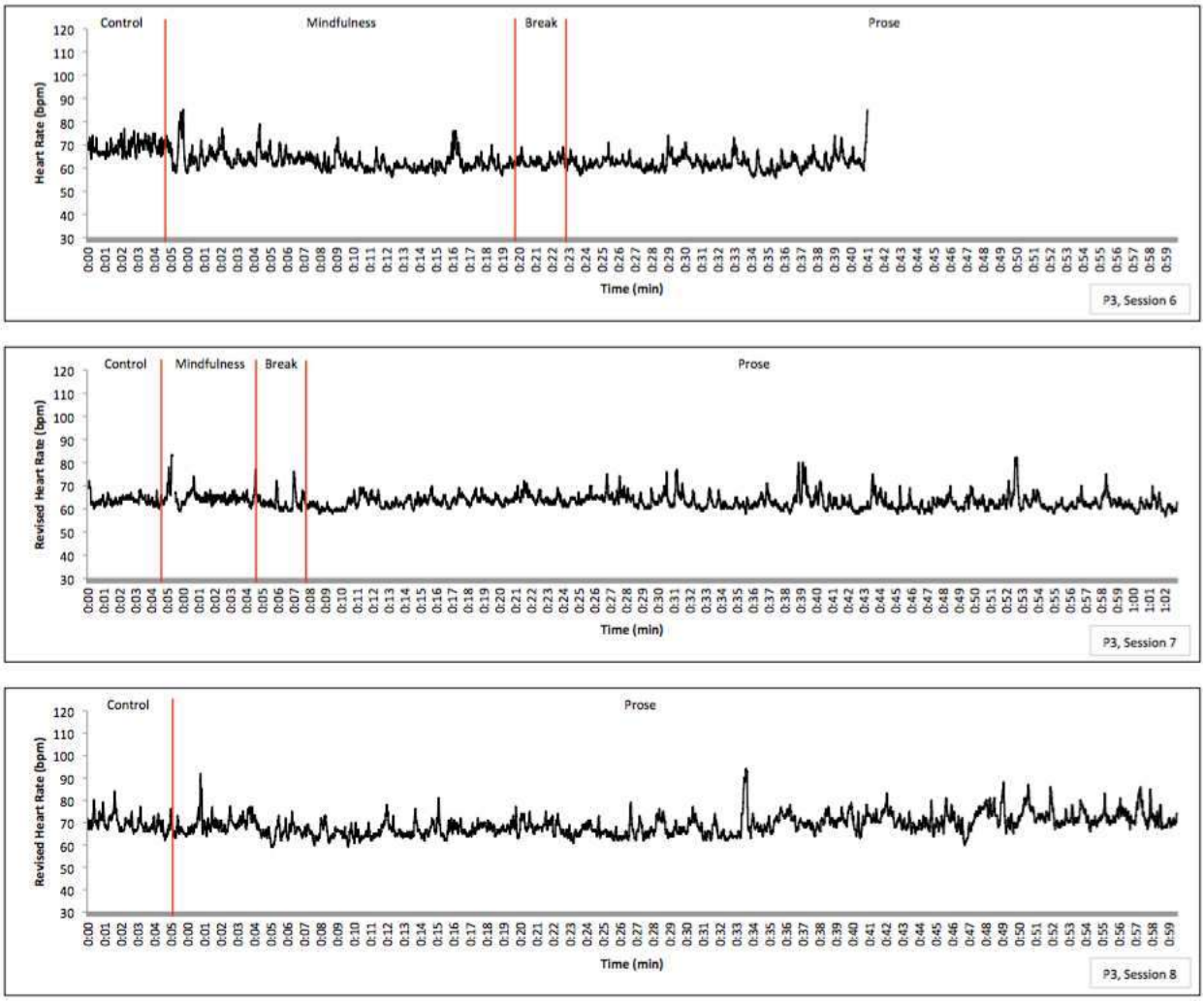


Figure N28. Revised heart rate for Sessions 1-8 for Participant 3.

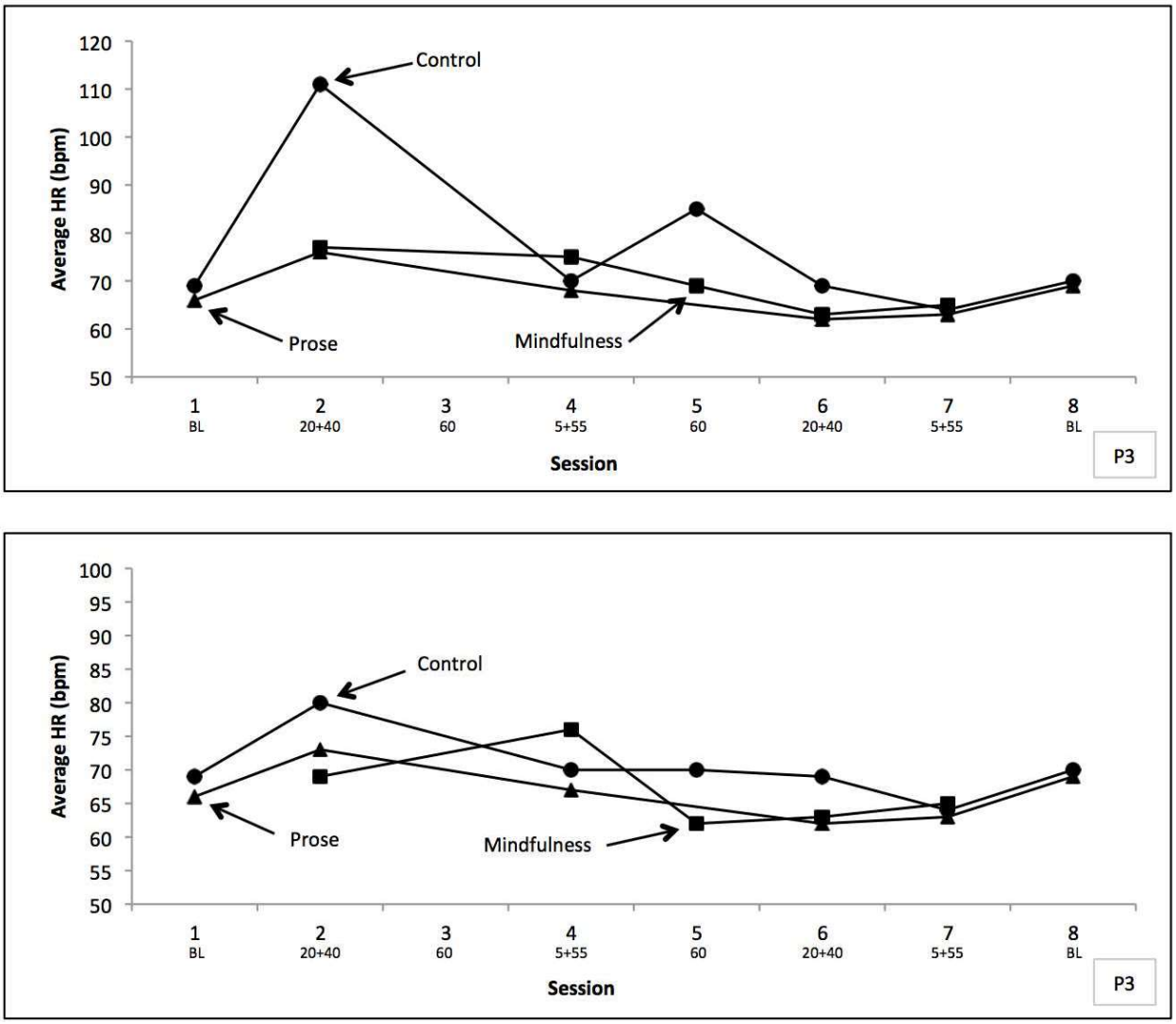


Figure N29. Average heart rate (top) and revised average heart rate (bottom) per condition for Sessions 1-8 for Participant 3.

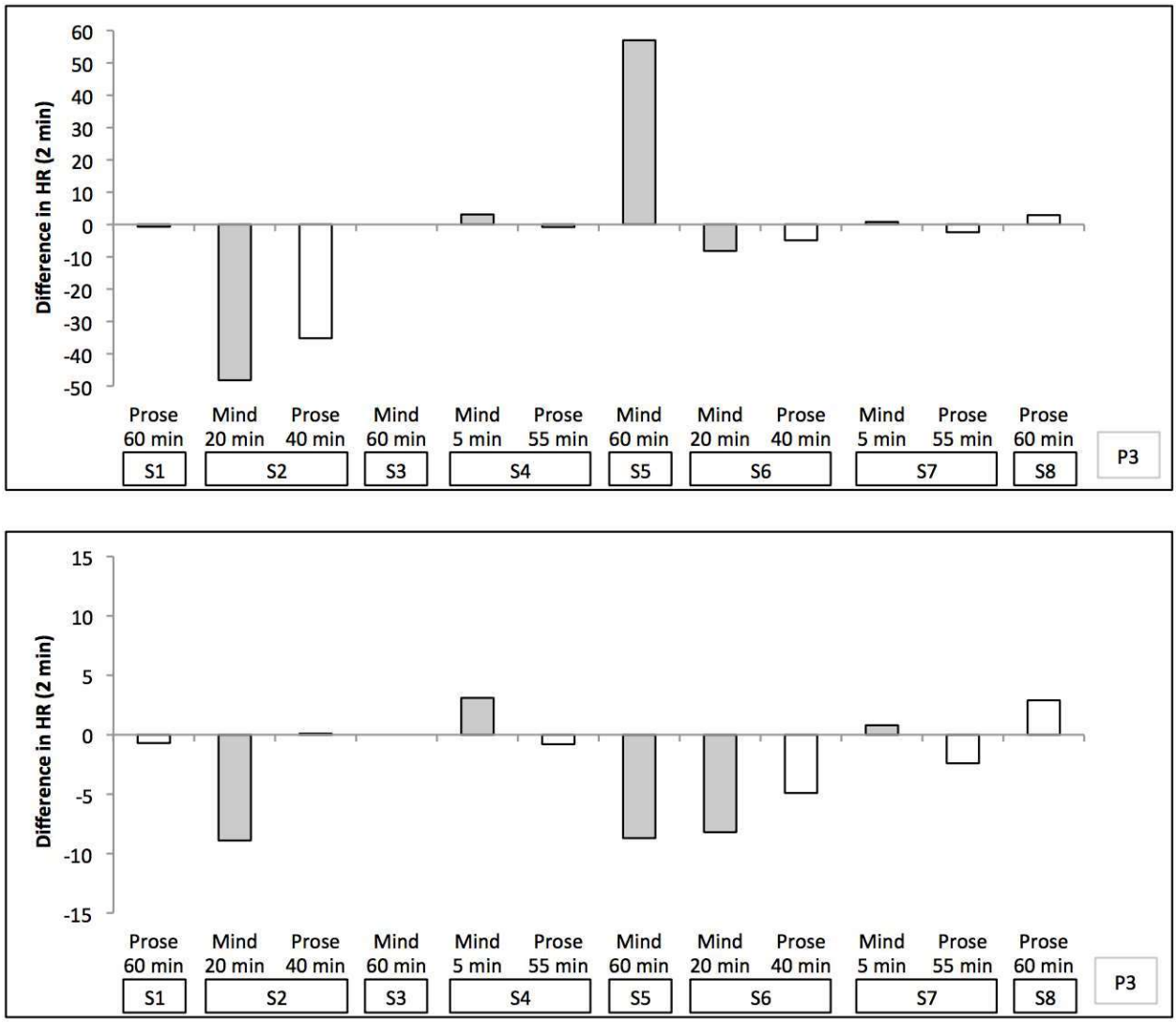


Figure N30. The difference (top) and revised difference (bottom) in average heart rate from the final 2 minutes of control to the final 2 minutes of each condition for Sessions 1-8 for Participant 3.

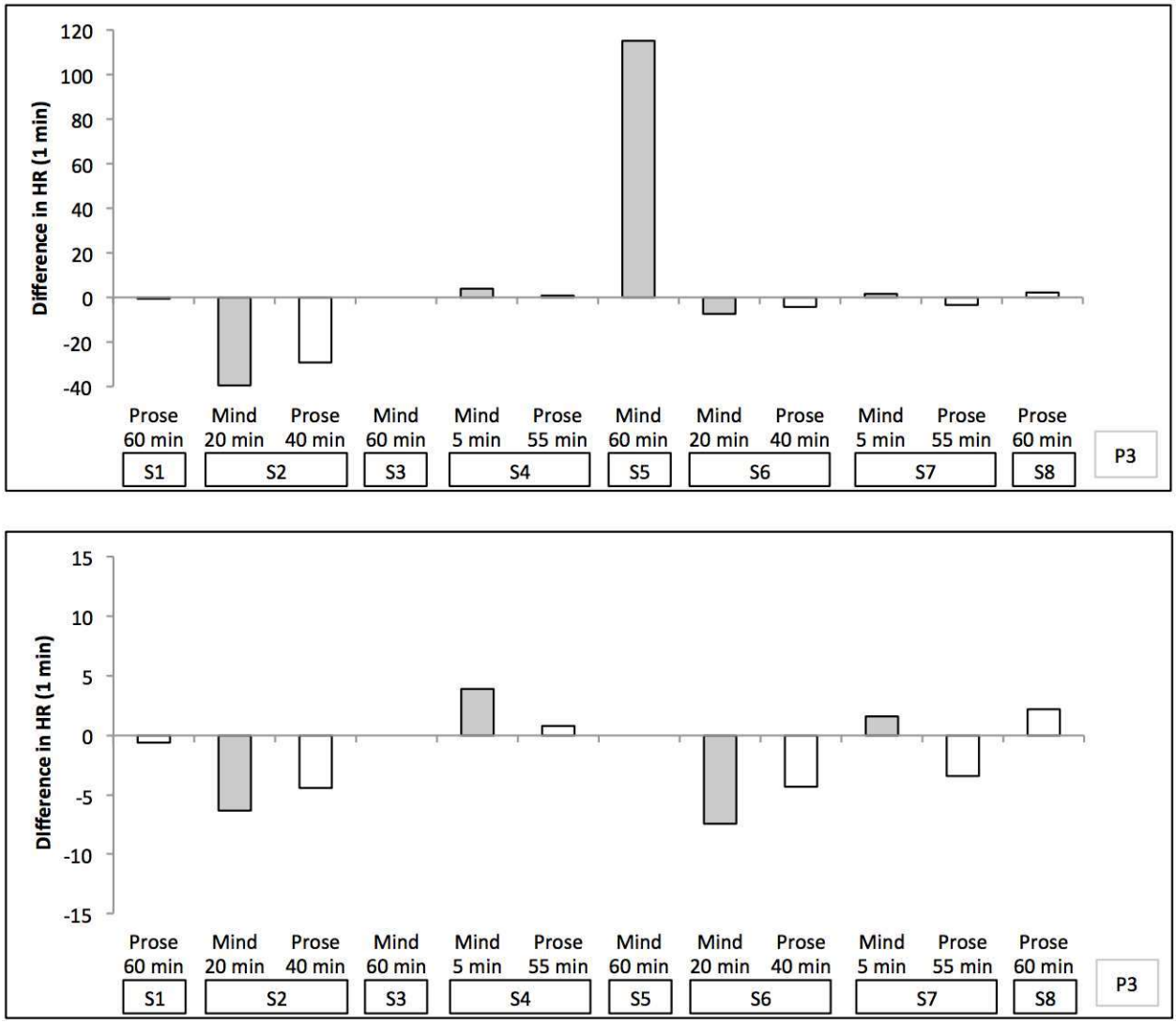


Figure N31. The difference (top) and revised difference (bottom) in average heart rate from the final 1 minute of control to the final 1 minute of each condition for Sessions 1-8 for Participant 3.

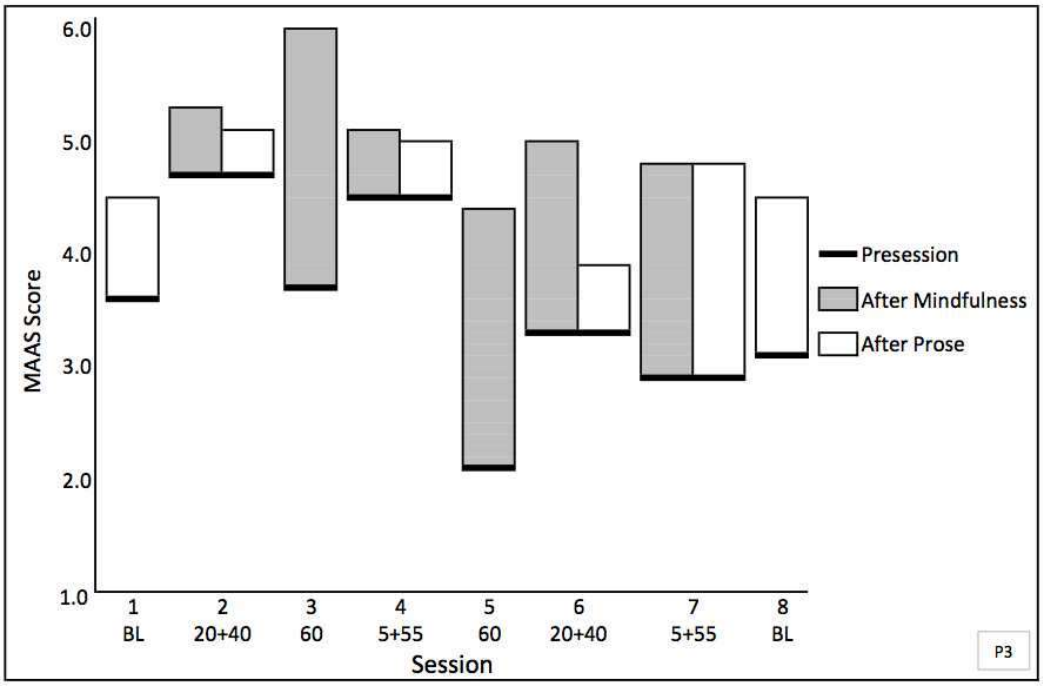


Figure N32. Pre-, mid- (when applicable), and post-session MAAS scores for Sessions 1-8 for Participant 3, where higher scores indicate a higher level of mindfulness.

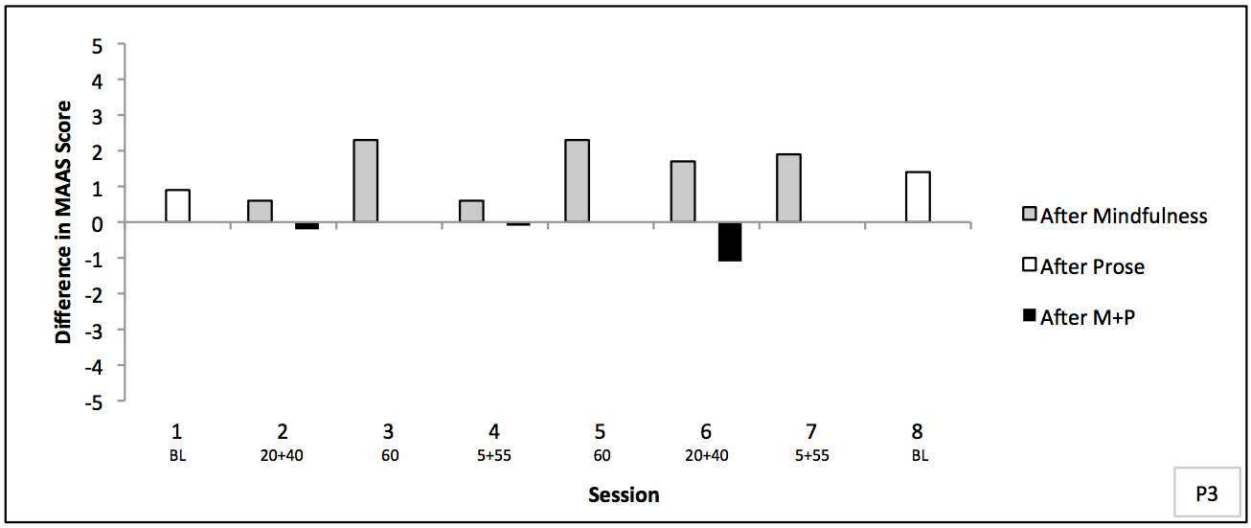


Figure N33. The difference in MAAS scores pre-session to post-mindfulness, pre-session to post-prose, and post-mindfulness to post-prose for Sessions 1-8 for Participant 3.

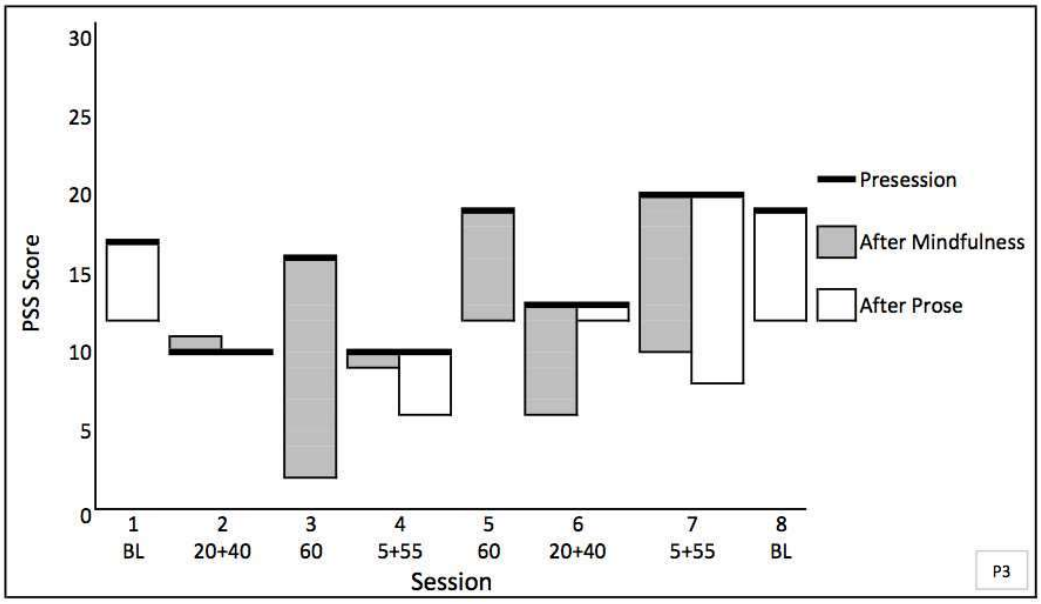


Figure N34. Pre-, mid- (when applicable), and post-session PSS scores for Sessions 1-8 for Participant 3, where higher scores indicate a higher level of stress.

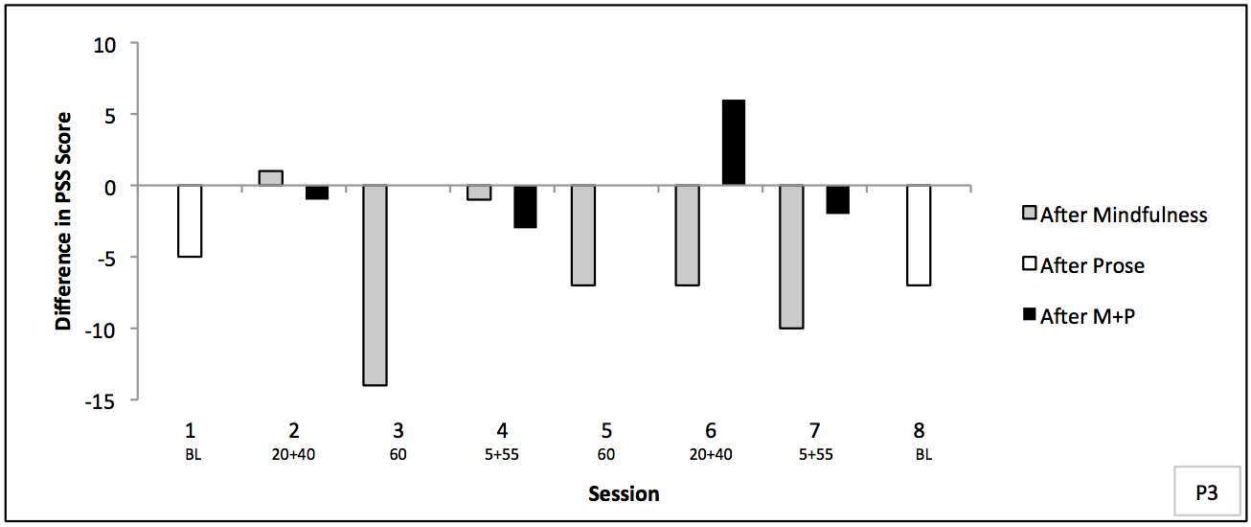
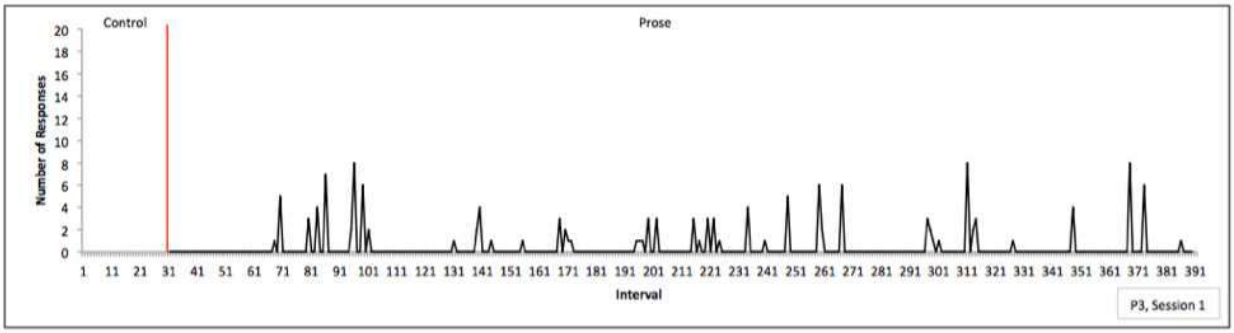
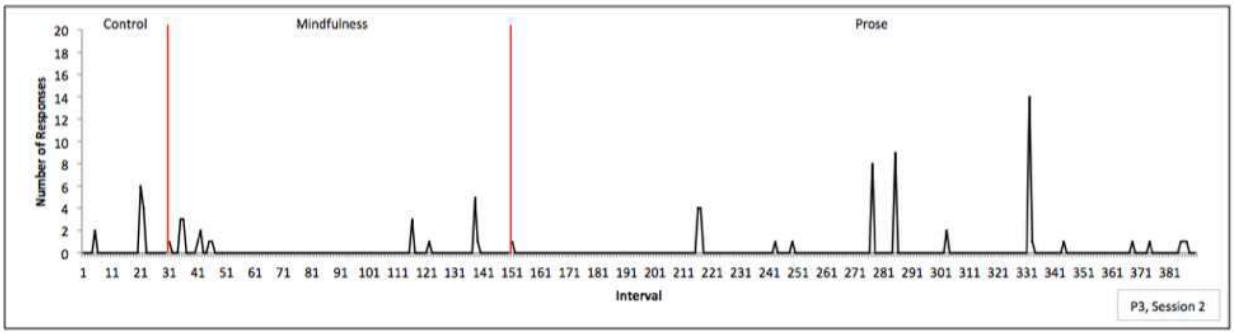
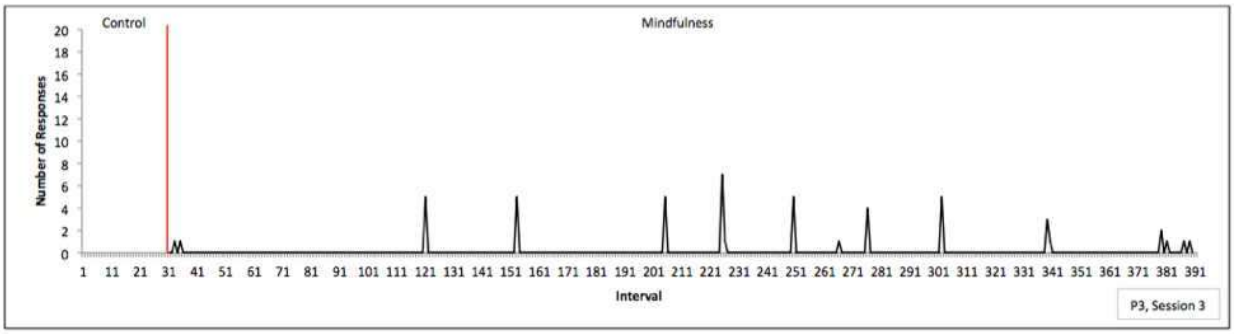
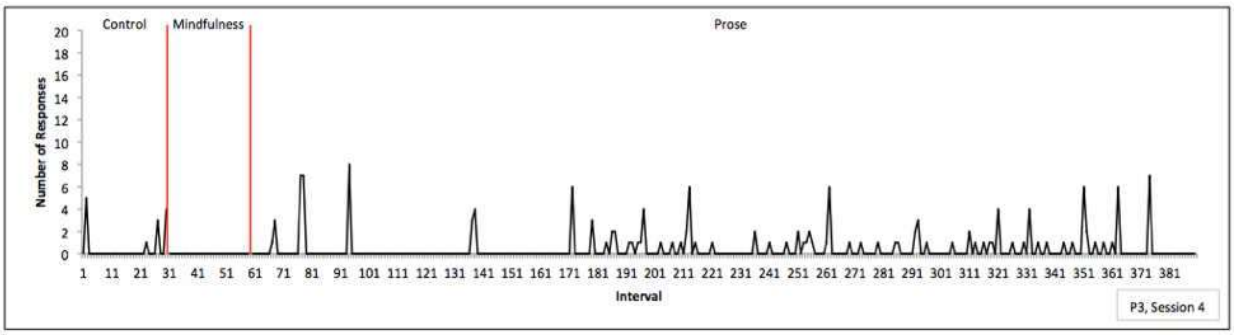


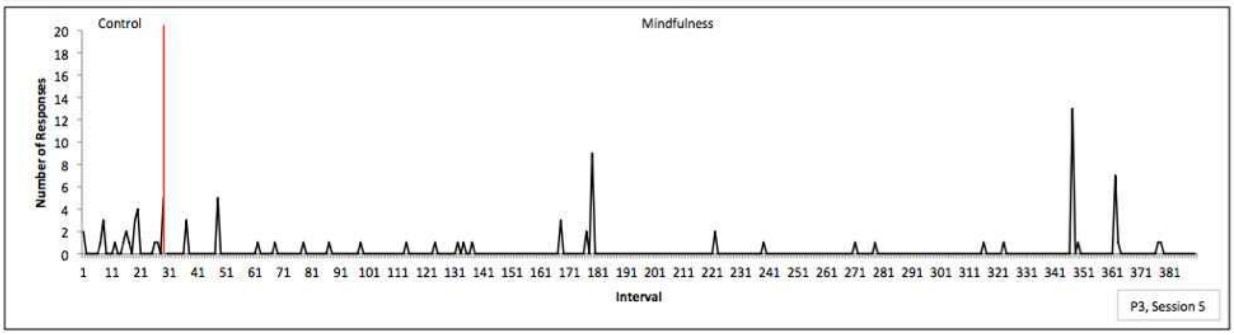
Figure N35. The difference in PSS scores pre-session to post-mindfulness, pre-session to post-prose, and post-mindfulness to post-prose for Sessions 1-8 for Participant 3.


Control
Prose
Number of Responses
Interval
P3, Session 1


Control
Mindfulness
Prose
Number of Responses
Interval
P3, Session 2


Control
Mindfulness
Number of Responses
Interval
P3, Session 3


Control
Mindfulness
Prose
Number of Responses
Interval
P3, Session 4


Control
Mindfulness
Number of Responses
Interval
P3, Session 5

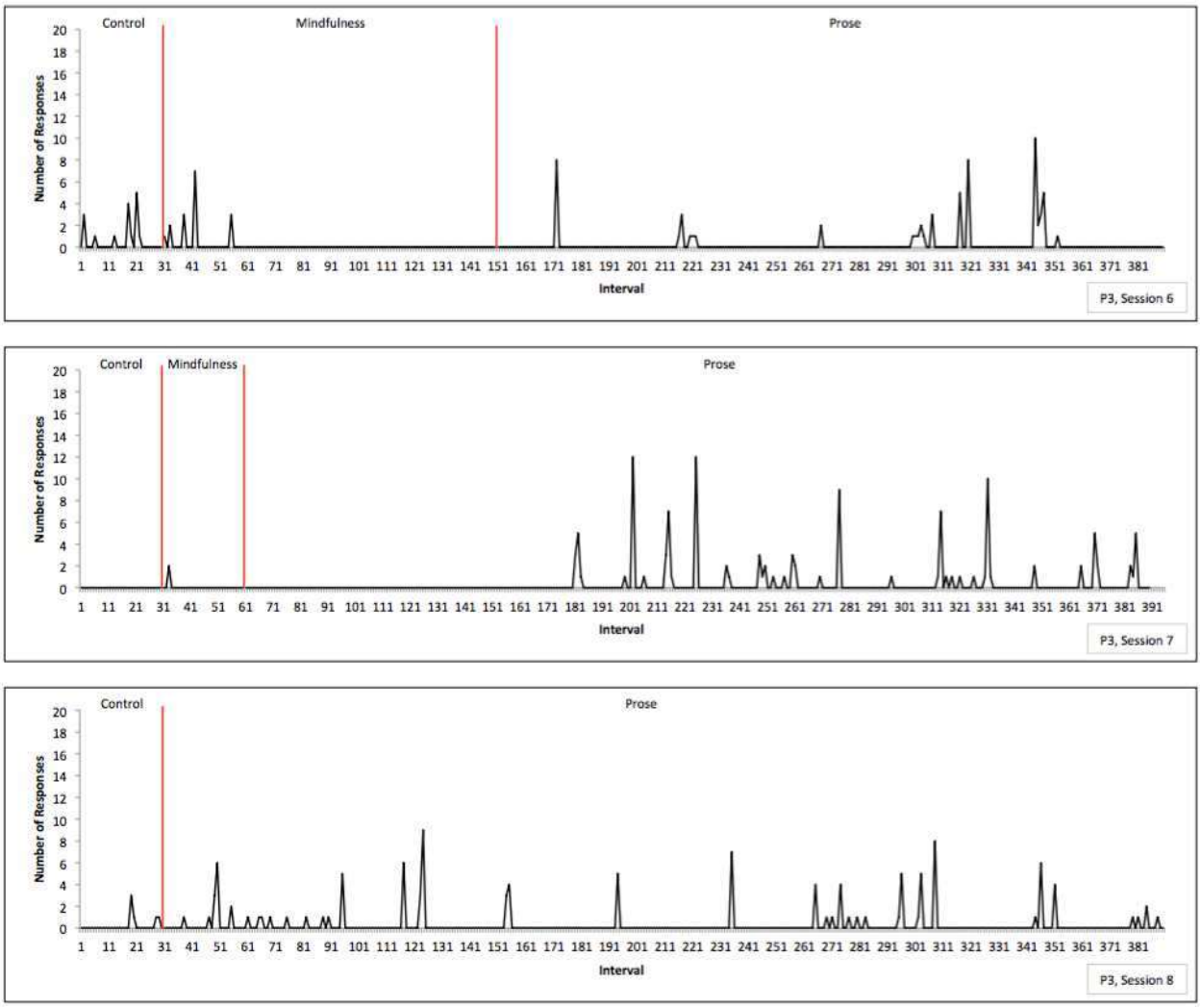
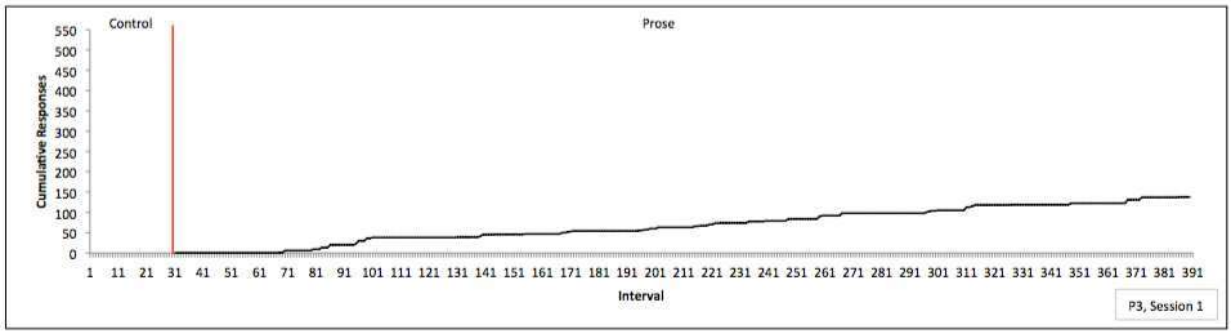
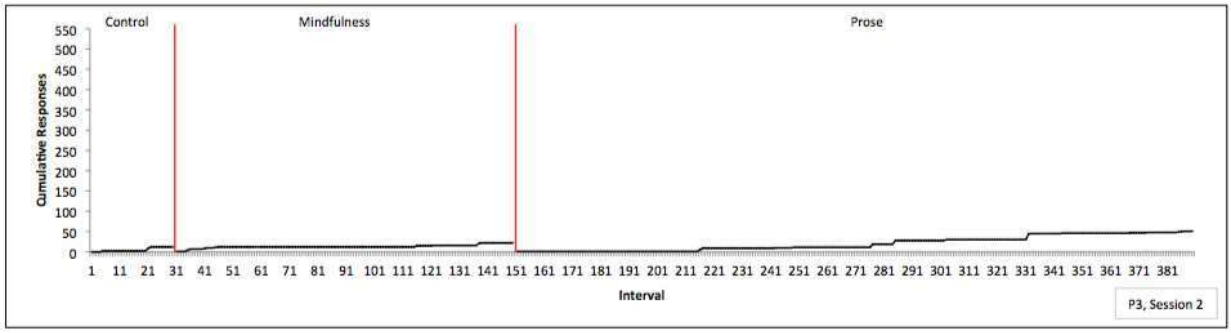
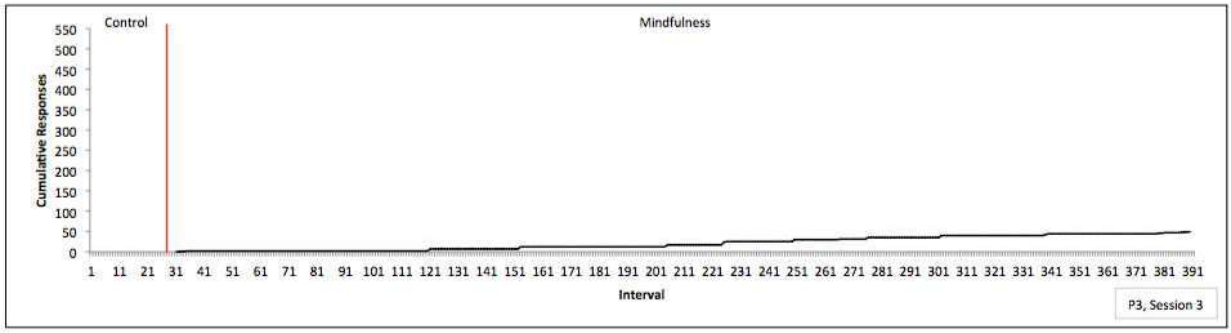
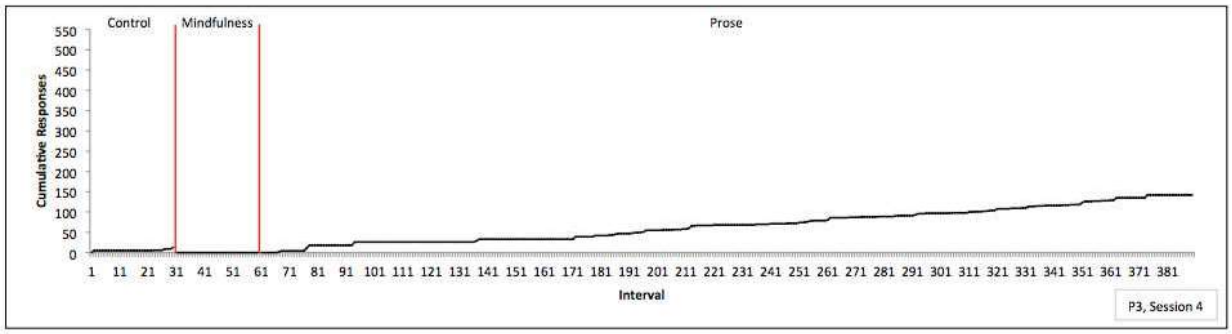


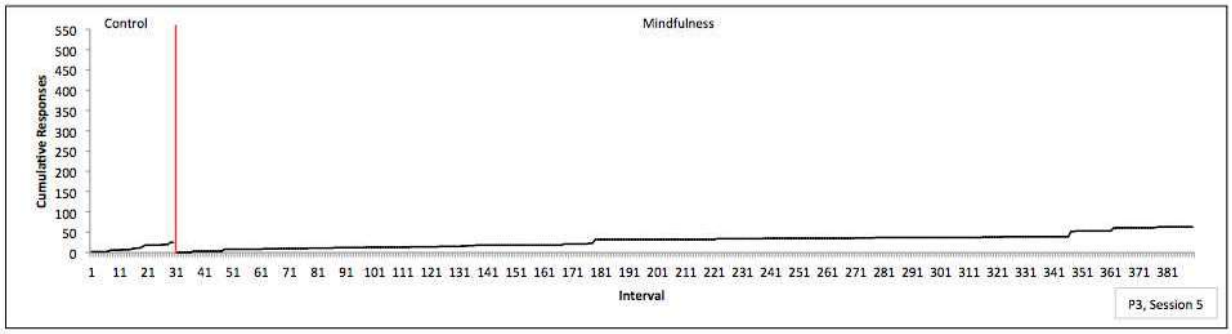
Figure N36. The number of displacement behaviors emitted per 10-second interval for Sessions 1-8 for Participant 3.


Control
Prose
Cumulative Responses
Interval
P3, Session 1


Control
Mindfulness
Prose
Cumulative Responses
Interval
P3, Session 2


Control
Mindfulness
Cumulative Responses
Interval
P3, Session 3


Control
Mindfulness
Prose
Cumulative Responses
Interval
P3, Session 4


Control
Mindfulness
Cumulative Responses
Interval
P3, Session 5

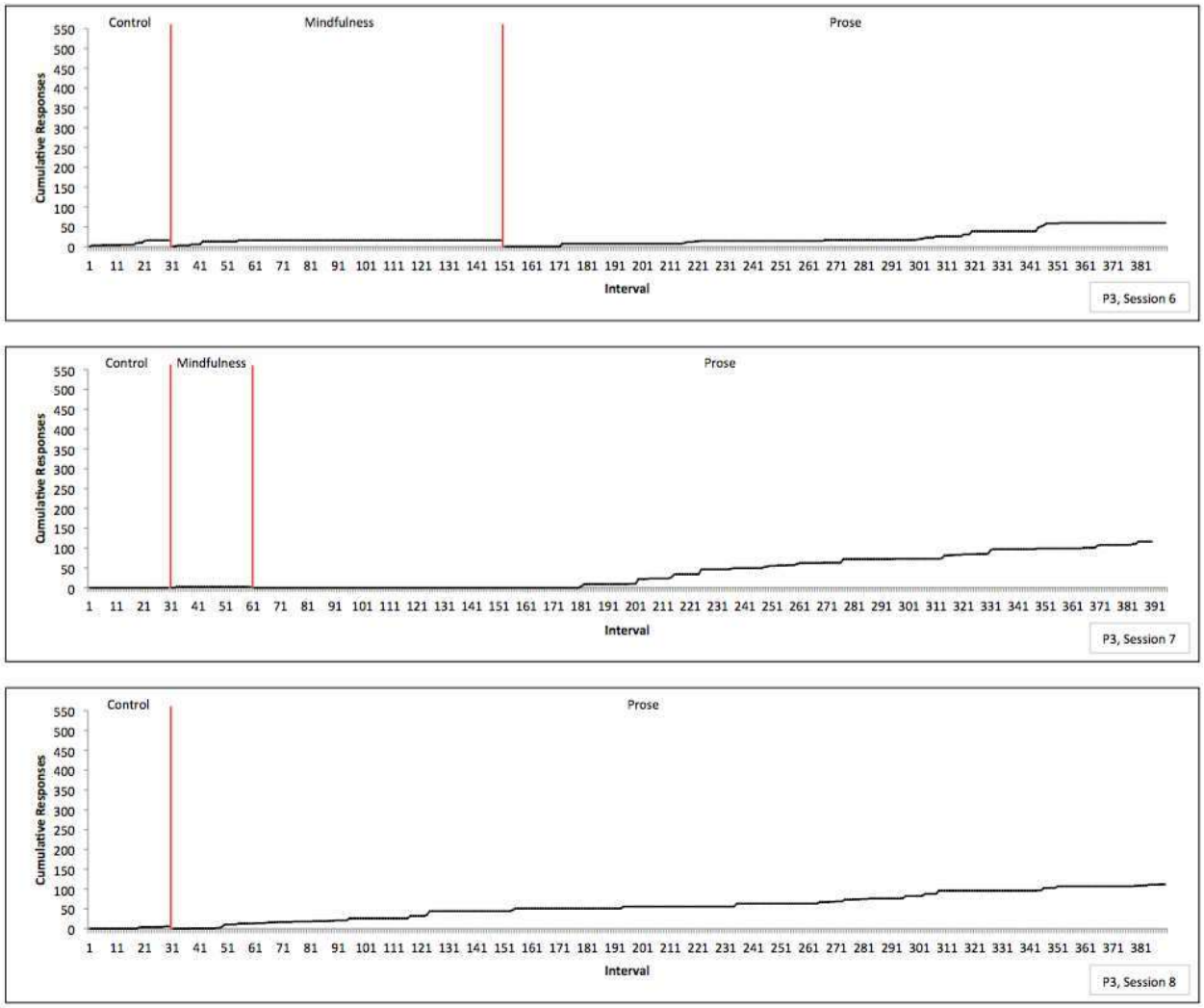
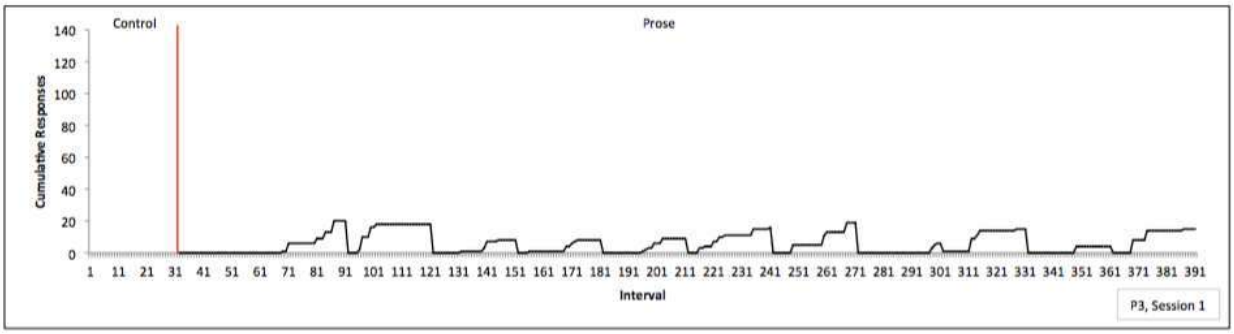
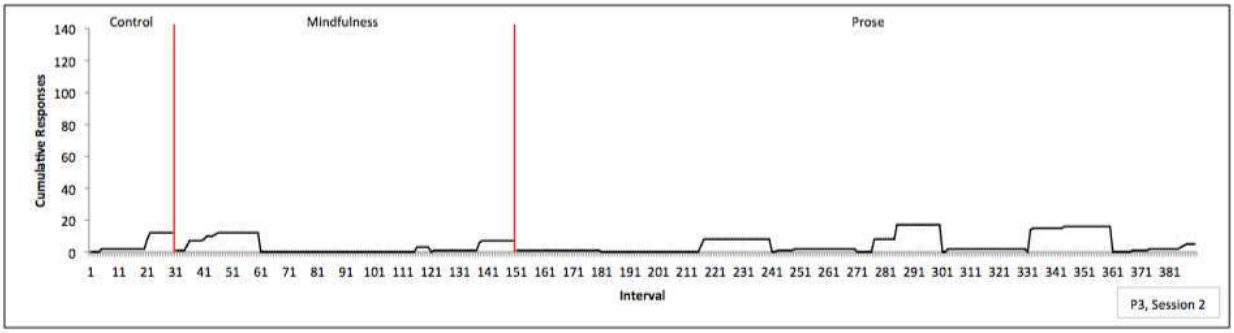
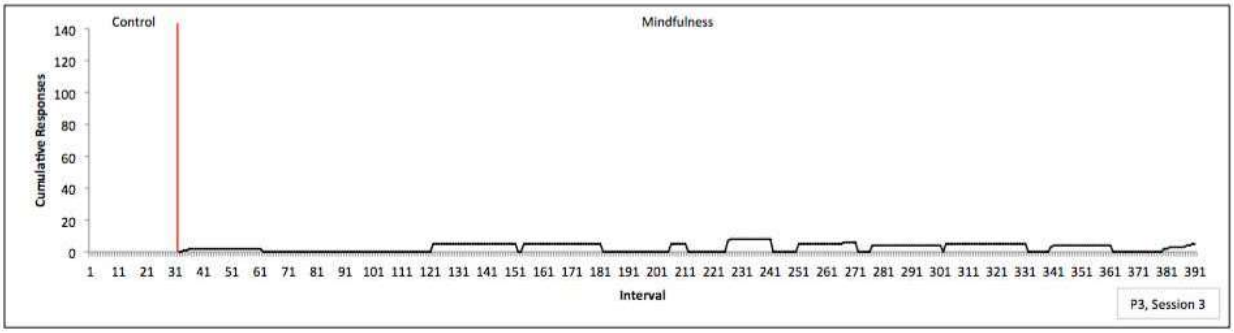
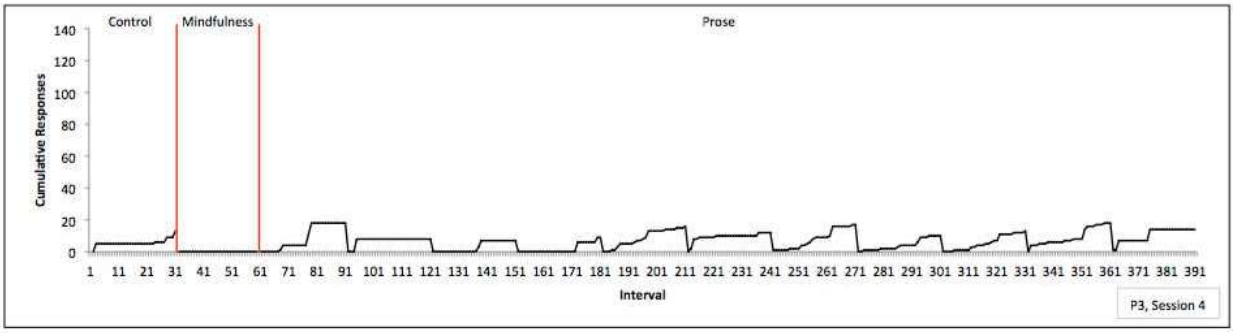


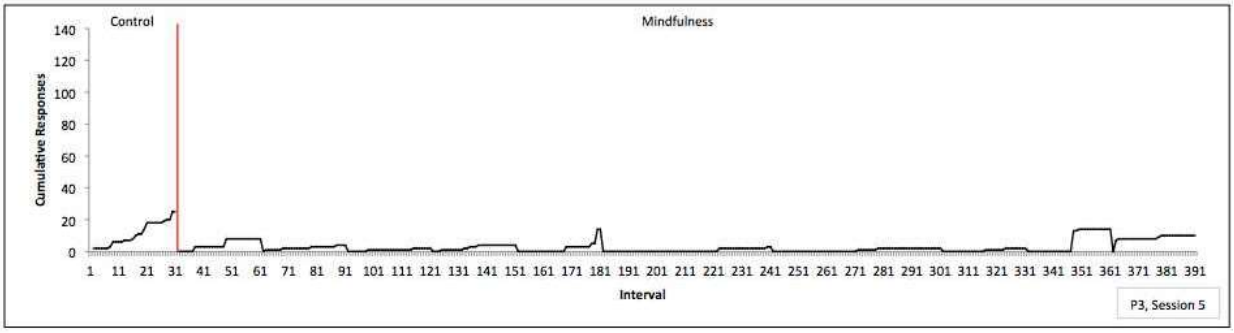
Figure N37. Cumulative displacement behaviors per 10-second interval for Sessions 1-8 for Participant 3.


Control
Prose
Cumulative Responses
Interval
P3, Session 1


Control
Mindfulness
Prose
Cumulative Responses
Interval
P3, Session 2


Control
Mindfulness
Cumulative Responses
Interval
P3, Session 3


Control
Mindfulness
Prose
Cumulative Responses
Interval
P3, Session 4


Control
Mindfulness
Cumulative Responses
Interval
P3, Session 5

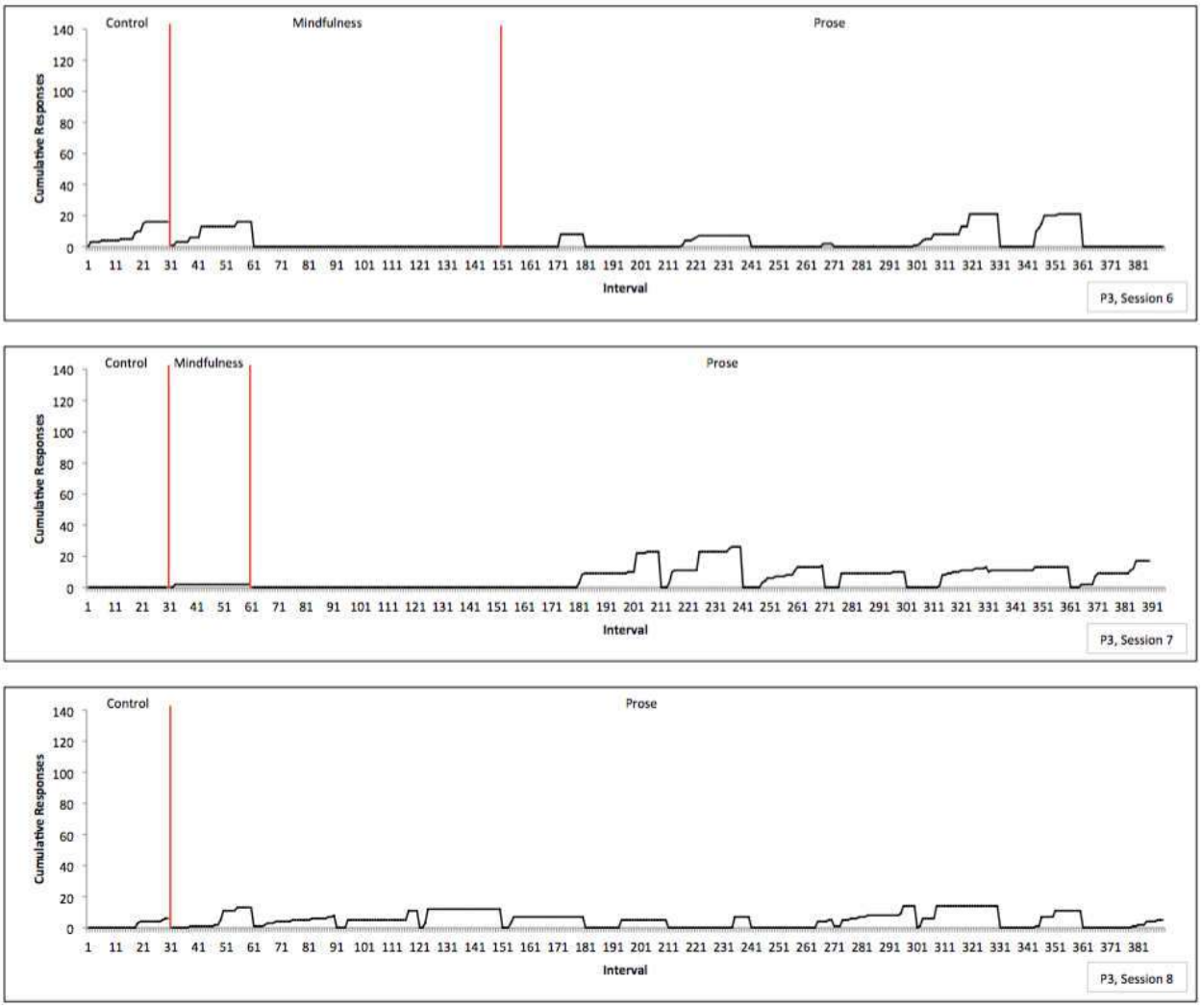


Figure N38. Cumulative displacement behaviors per 10-second interval with pen reset every 5 minutes for Sessions 1-8 for Participant 3.

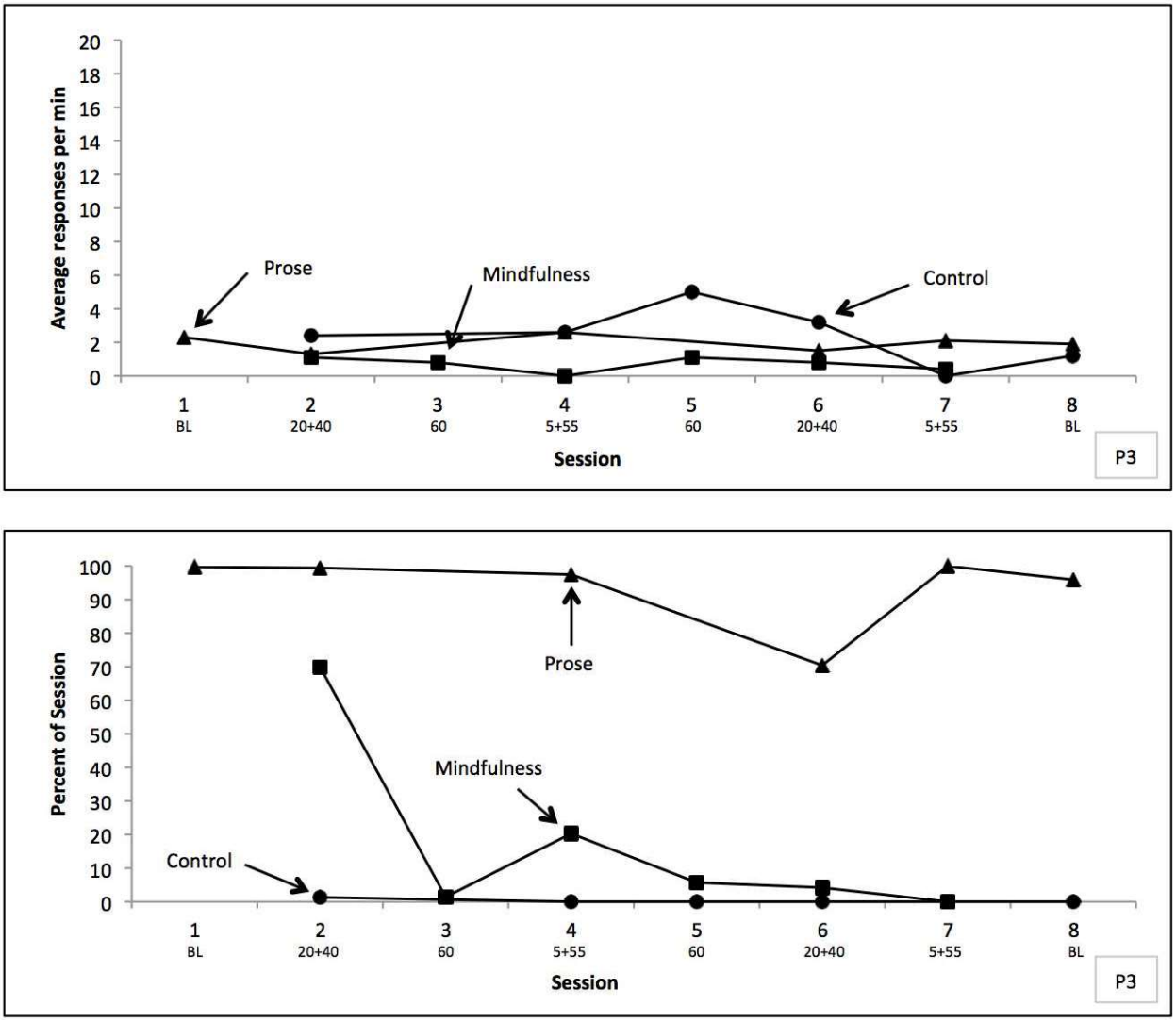
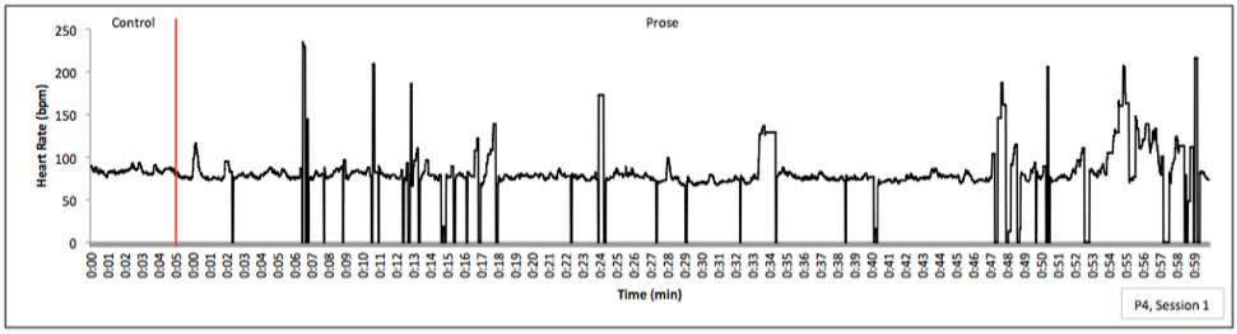
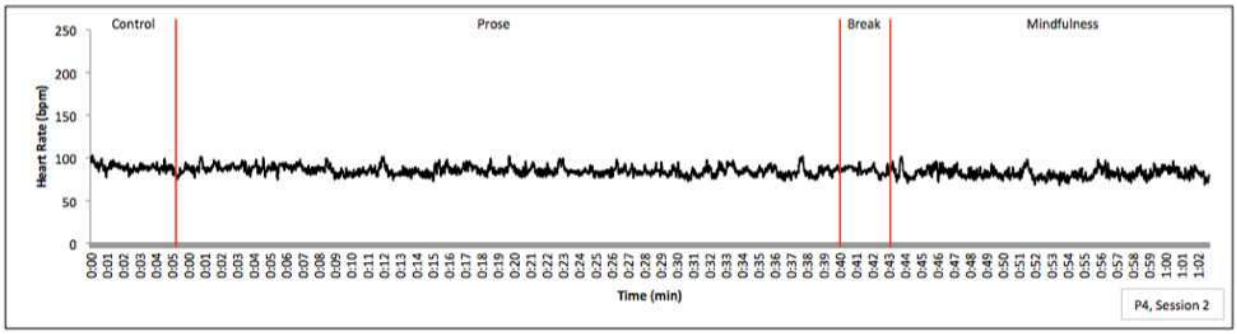
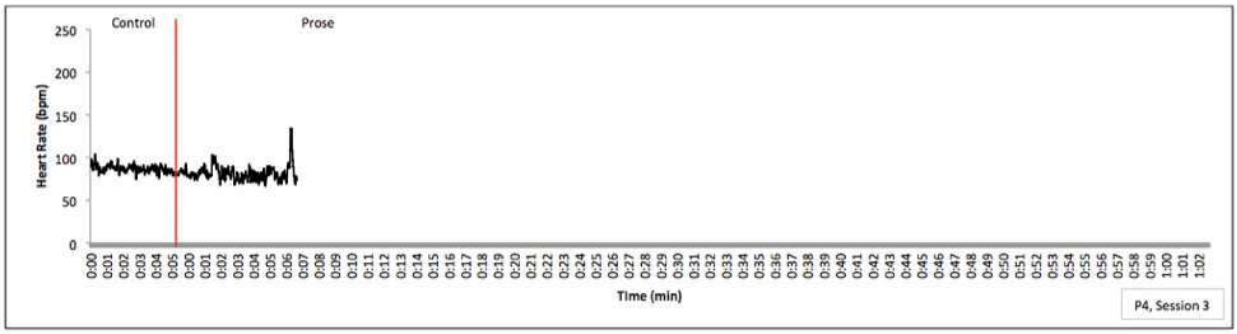
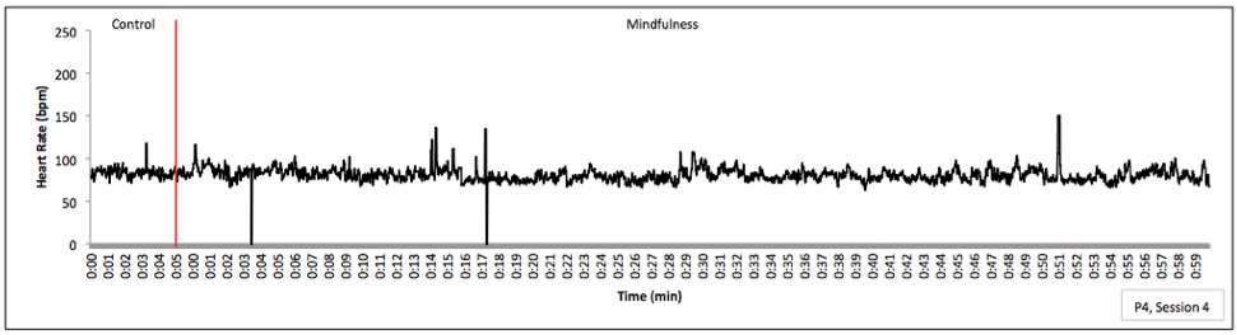


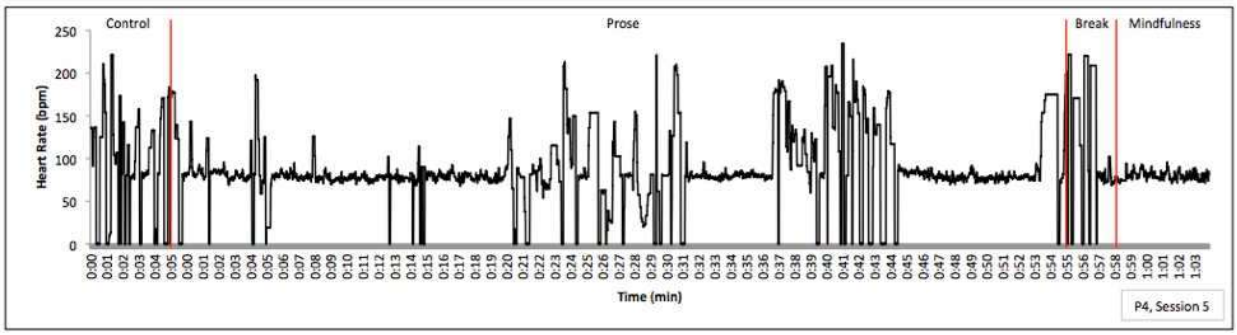
Figure N39. Average frequency of discrete displacement behaviors (top) and percent of engagement in continuous displacement behaviors (bottom) per condition for Sessions 1-8 for Participant 3.


Control
Prose
Heart Rate (bpm)
Time (min)
P4, Session 1


Control
Prose
Break
Mindfulness
Heart Rate (bpm)
Time (min)
P4, Session 2


Control
Prose
Heart Rate (bpm)
Time (min)
P4, Session 3


Control
Mindfulness
Heart Rate (bpm)
Time (min)
P4, Session 4


Control
Prose
Break
Mindfulness
Heart Rate (bpm)
Time (min)
P4, Session 5

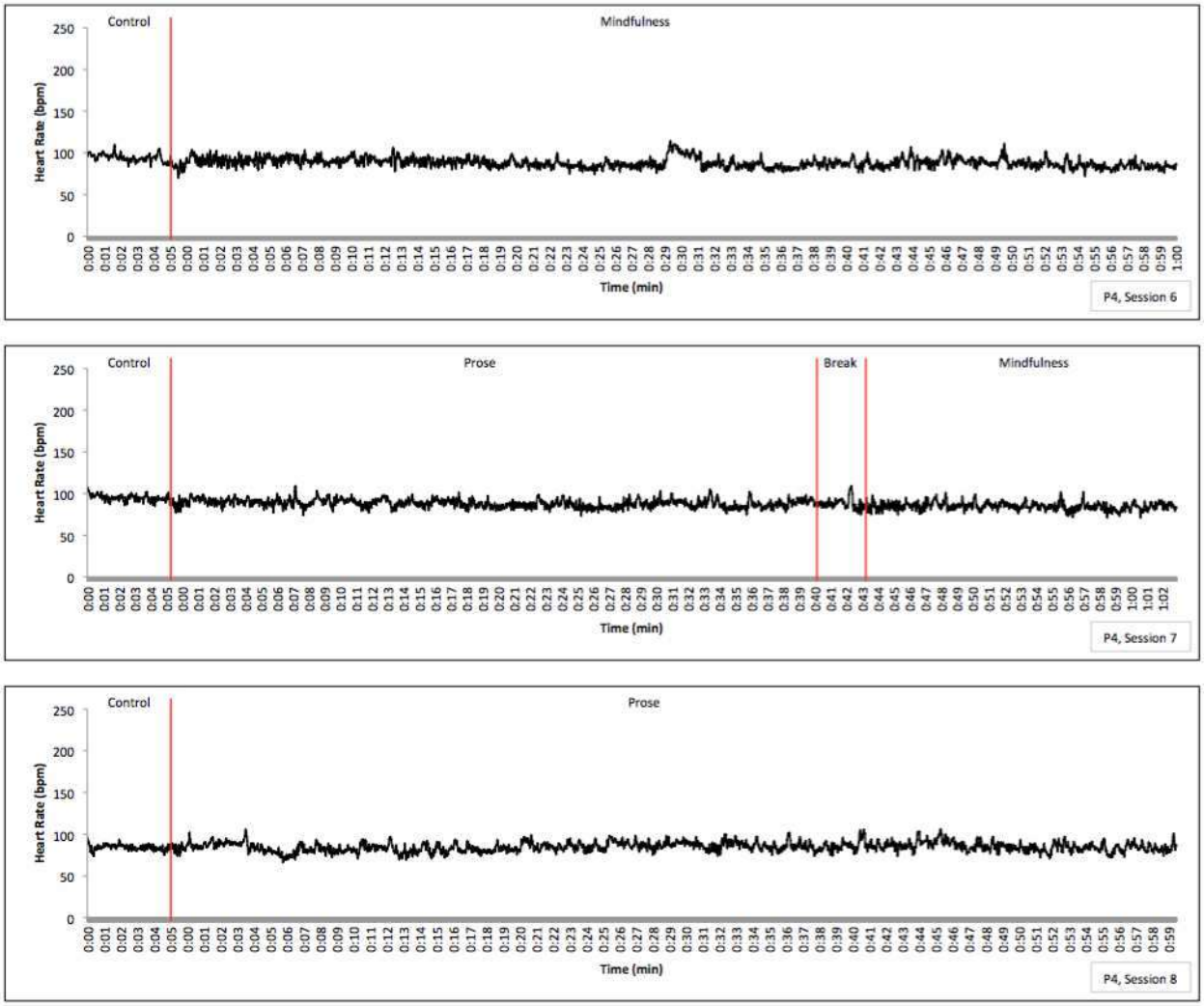
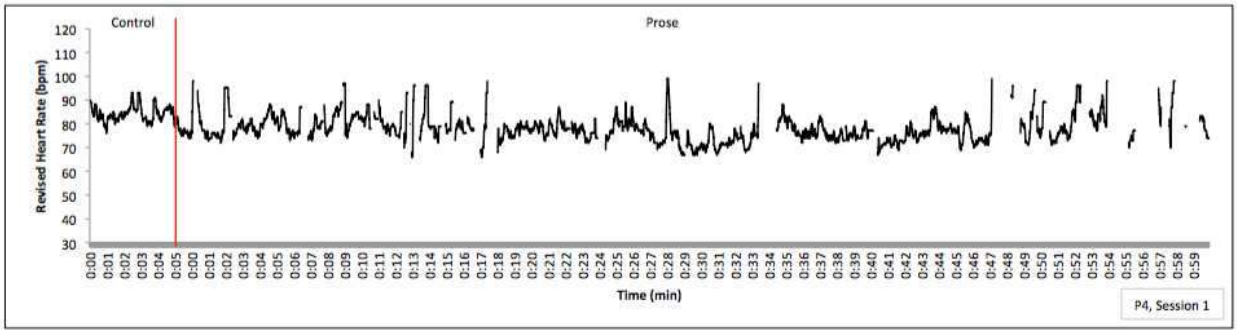
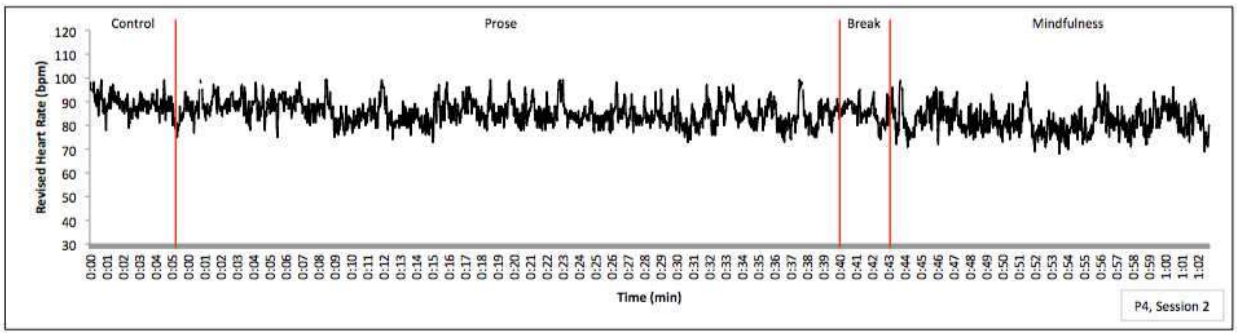
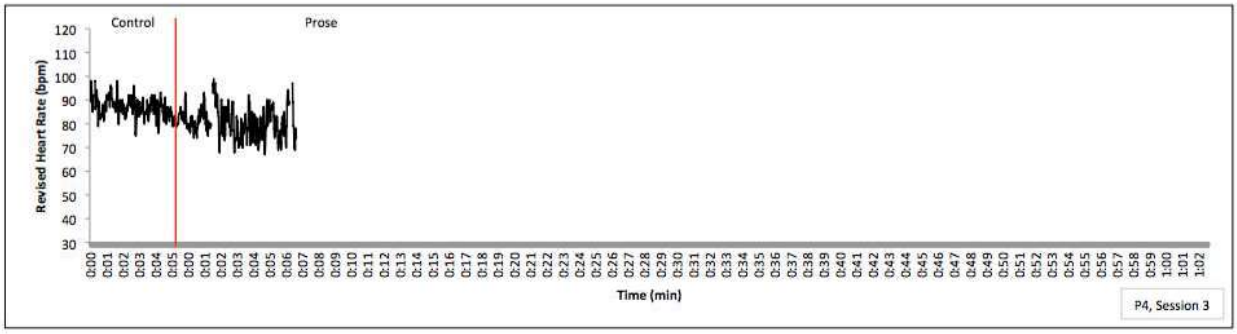
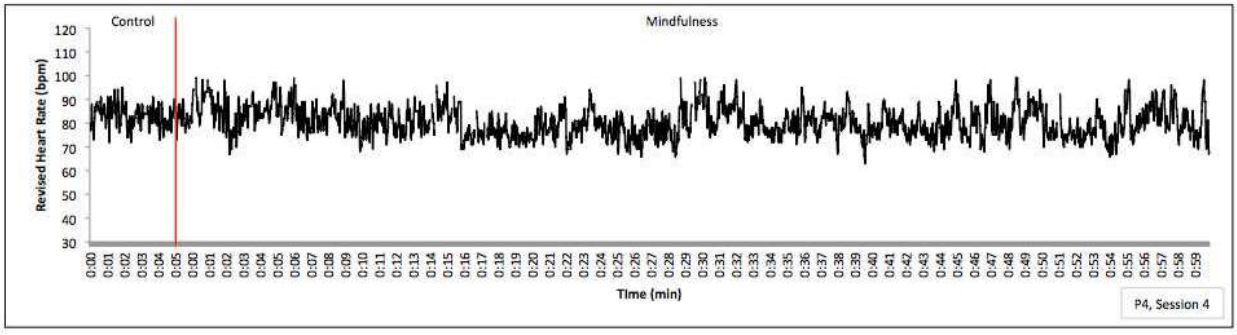


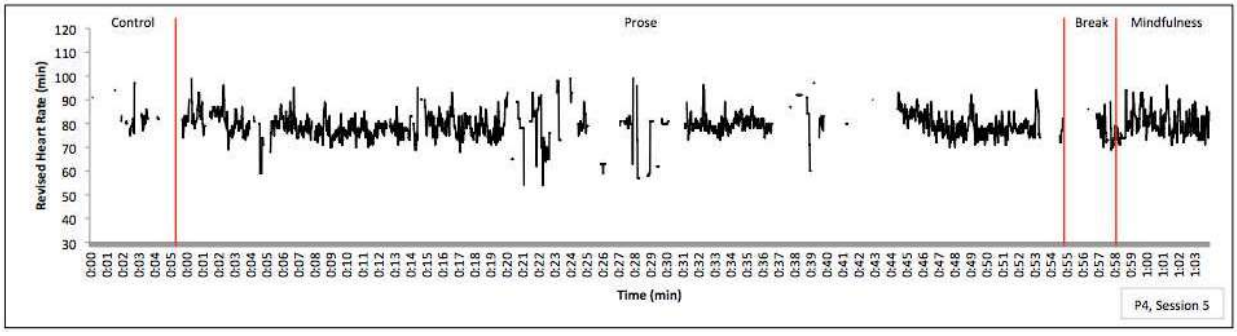
Figure N40. Heart rate for Sessions 1-8 for Participant 4.


Control
Prose
Revised Heart Rate (bpm)
Time (min)
P4, Session 1


Control
Prose
Break
Mindfulness
Revised Heart Rate (bpm)
Time (min)
P4, Session 2


Control
Prose
Revised Heart Rate (bpm)
Time (min)
P4, Session 3


Control
Mindfulness
Revised Heart Rate (bpm)
Time (min)
P4, Session 4


Control
Prose
Break
Mindfulness
Revised Heart Rate (min)
Time (min)
P4, Session 5

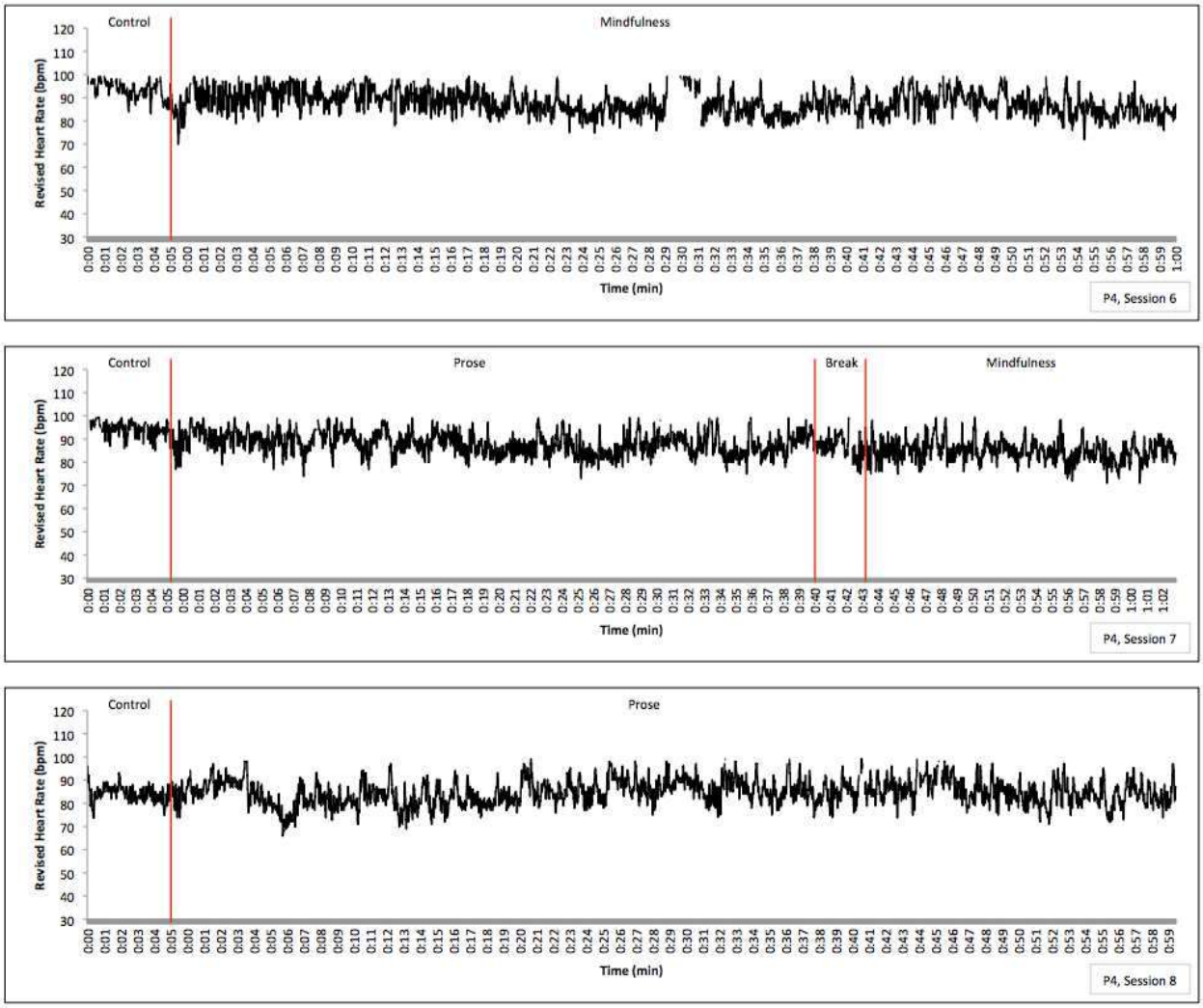


Figure N41. Revised heart rate for Sessions 1-8 for Participant 4.

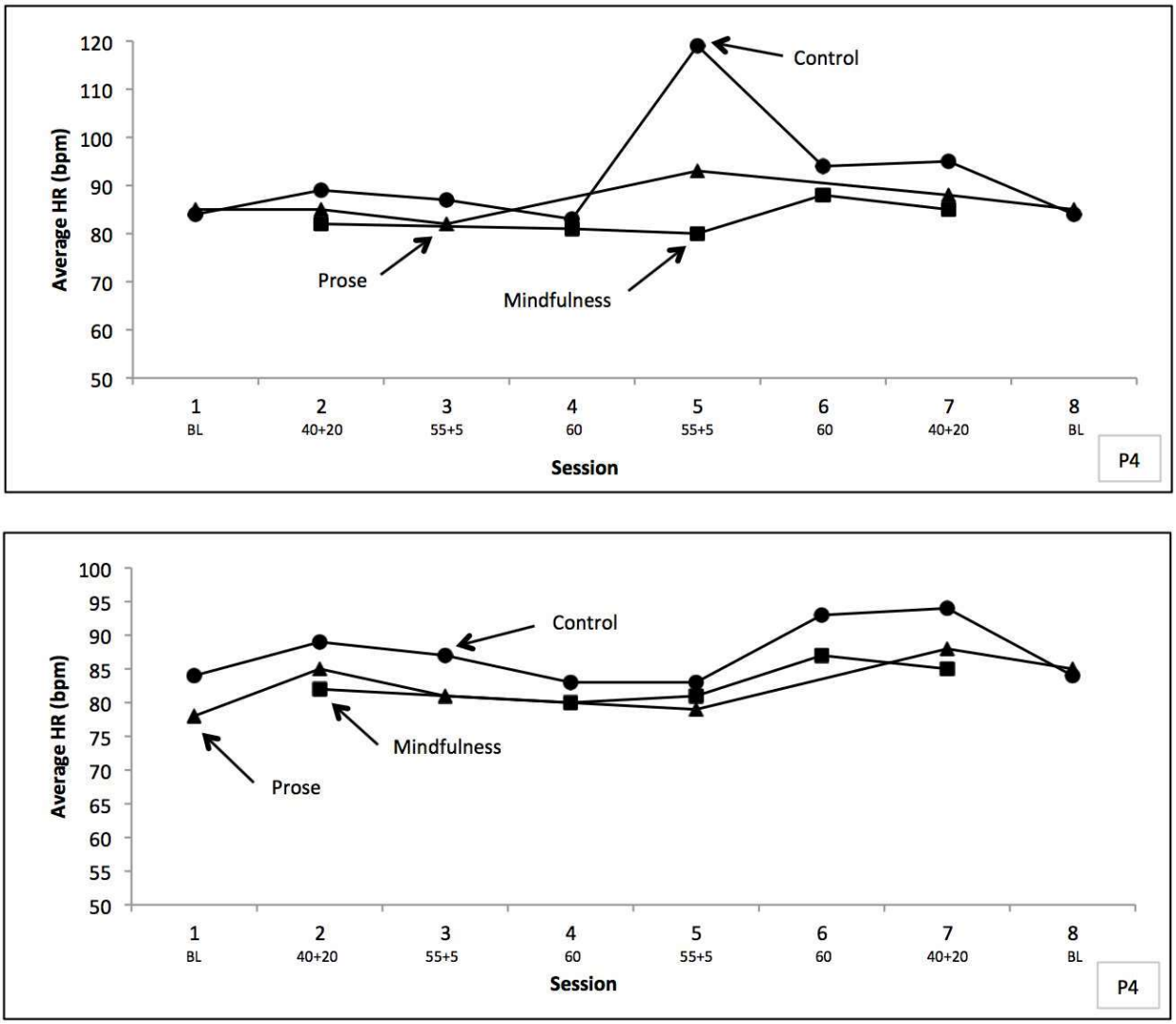


Figure N42. Average heart rate (top) and revised average heart rate (bottom) per condition for Sessions 1-8 for Participant 4.

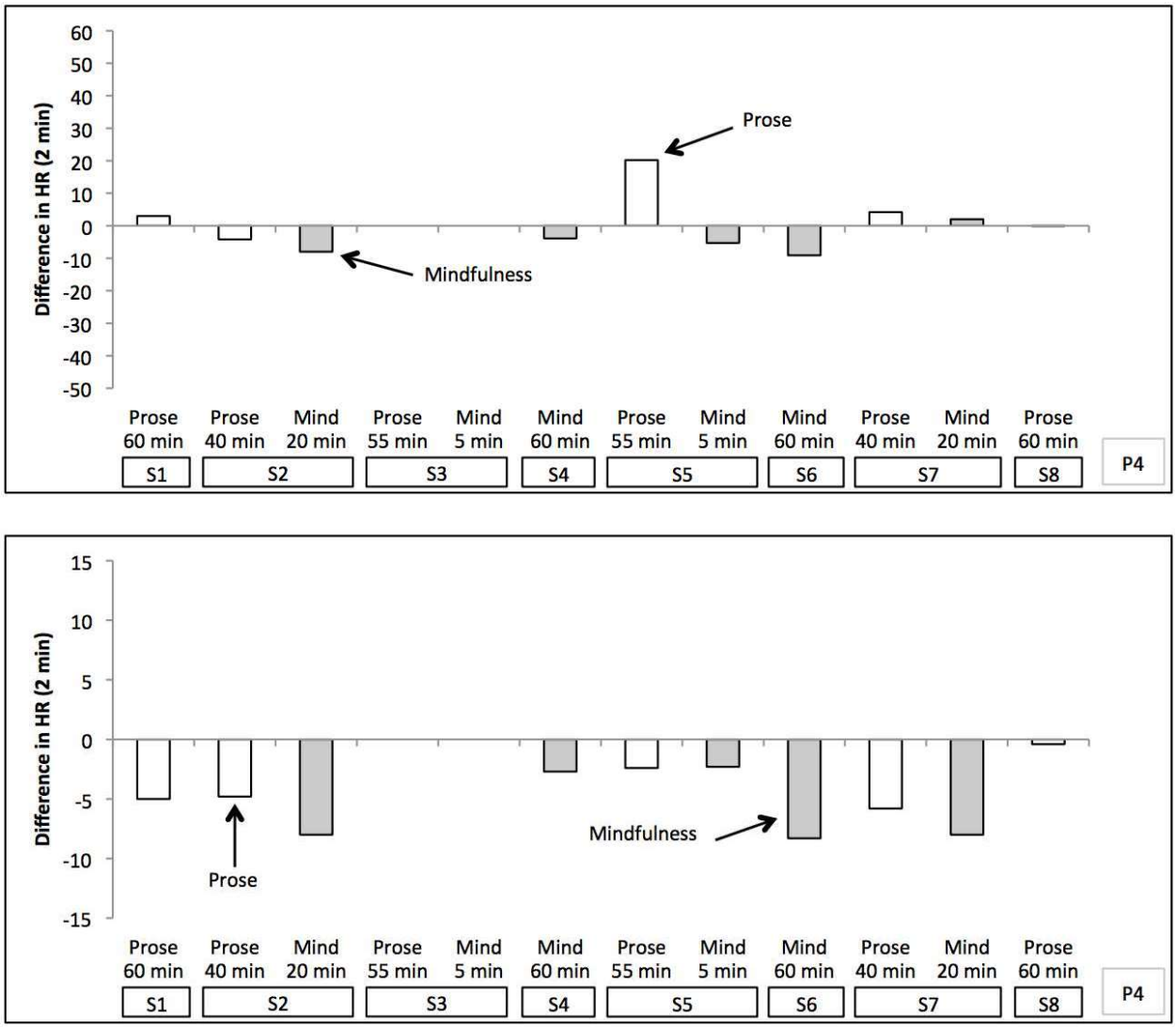


Figure N43. The difference (top) and revised difference (bottom) in average heart rate from the final 2 minutes of control to the final 2 minutes of each condition for Sessions 1-8 for Participant 4.

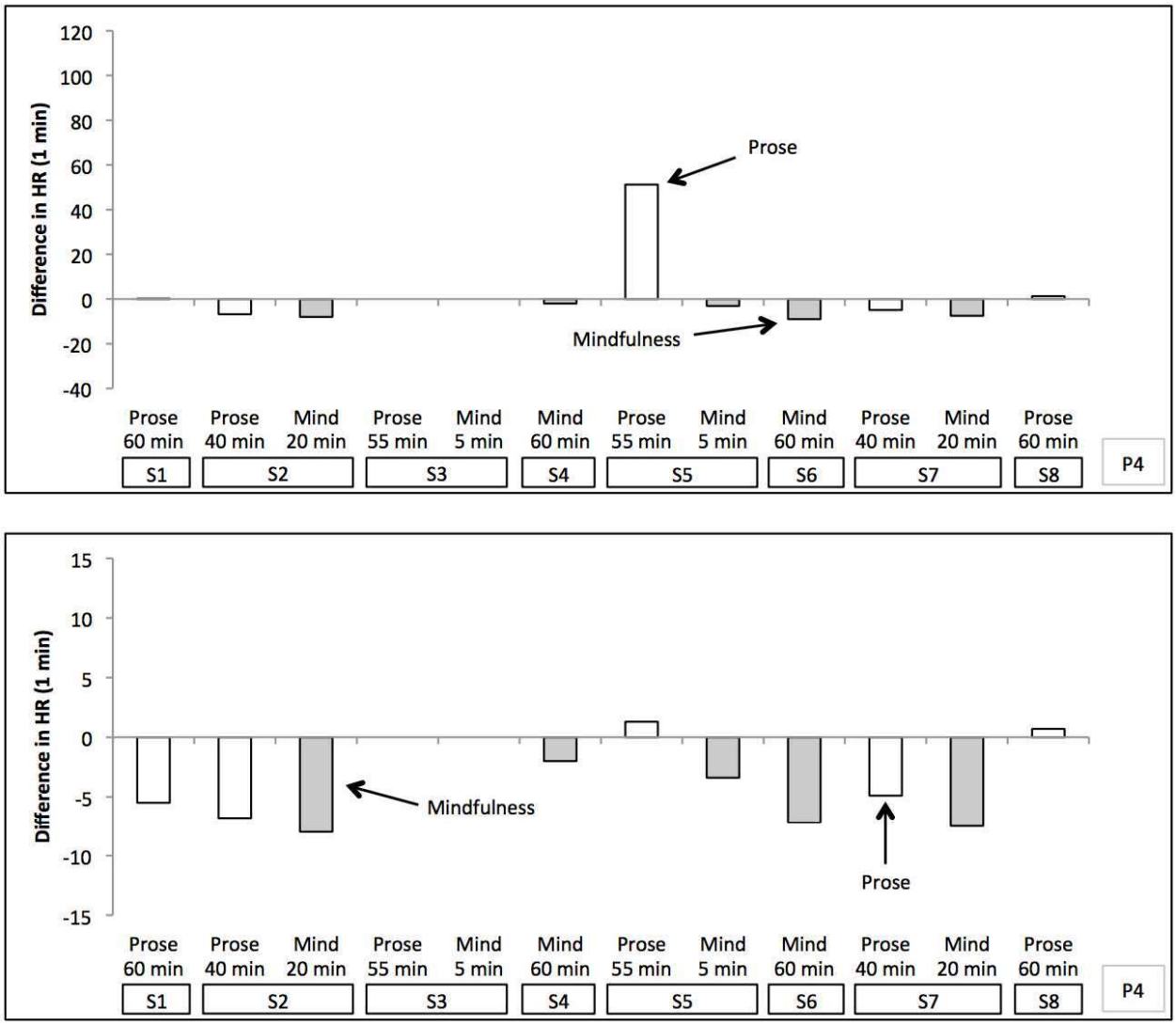


Figure N44. The difference (top) and revised difference (bottom) in average heart rate from the final 1 minute of control to the final 1 minute of each condition for Sessions 1-8 for Participant 4.

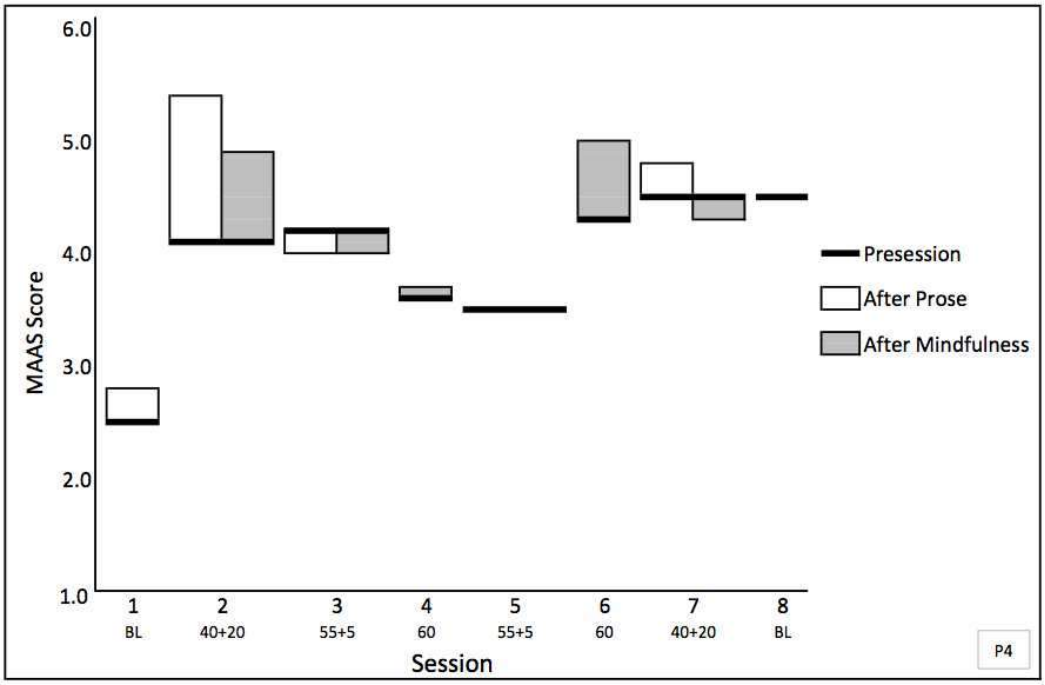


Figure N45. Pre-, mid- (when applicable), and post-session MAAS scores for Sessions 1-8 for Participant 4, where higher scores indicate a higher level of mindfulness.

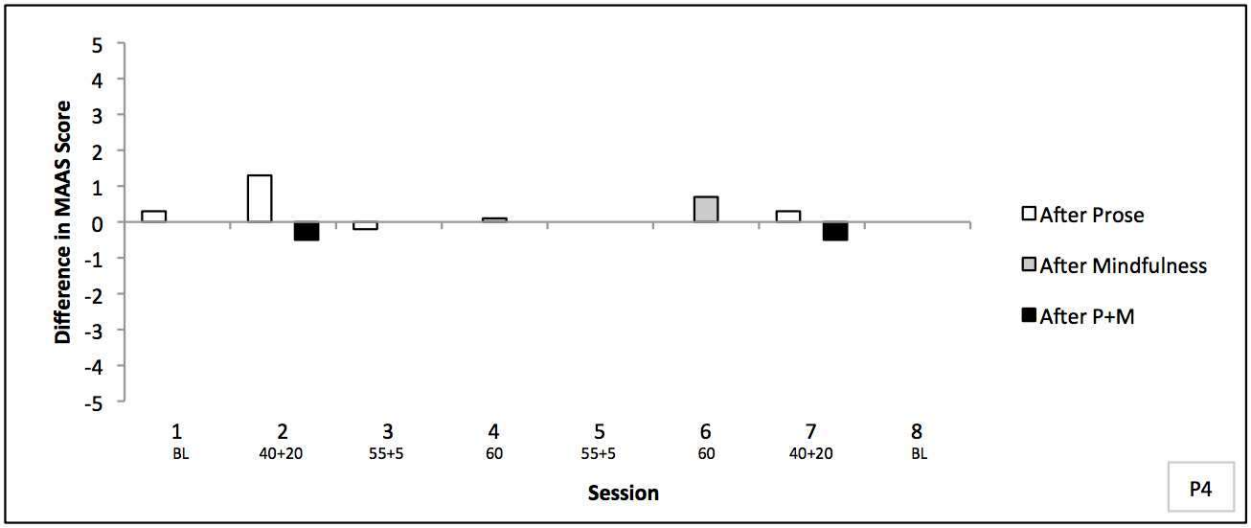


Figure N46. The difference in MAAS scores pre-session to post-prose, pre-session to post-mindfulness, and post-prose to post-mindfulness for Sessions 1-8 for Participant 4.

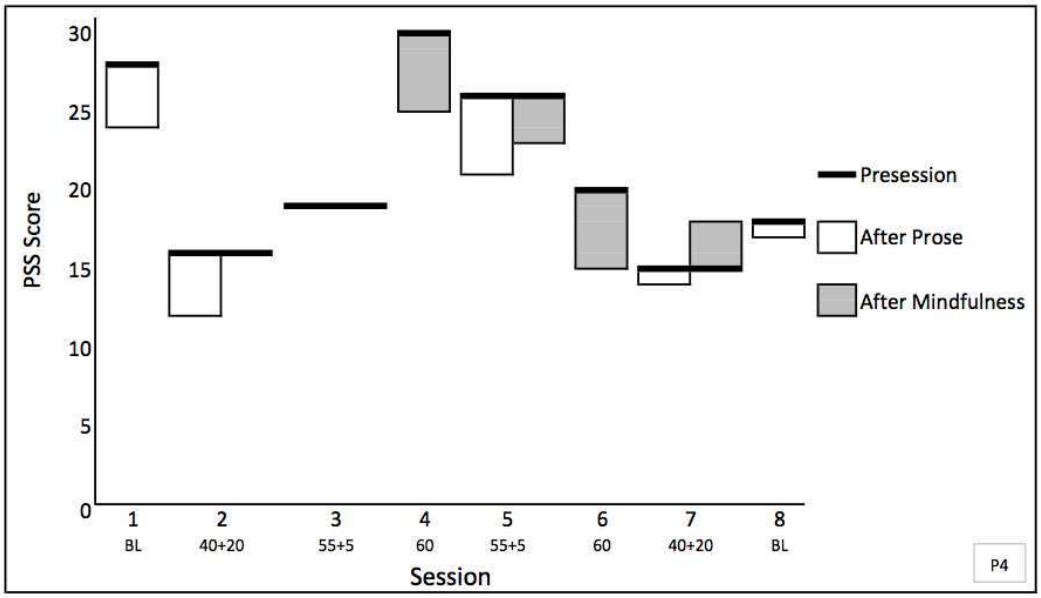


Figure N47. Pre-, mid- (when applicable), and post-session PSS scores for Sessions 1-8 for Participant 4, where higher scores indicate a higher level of stress.

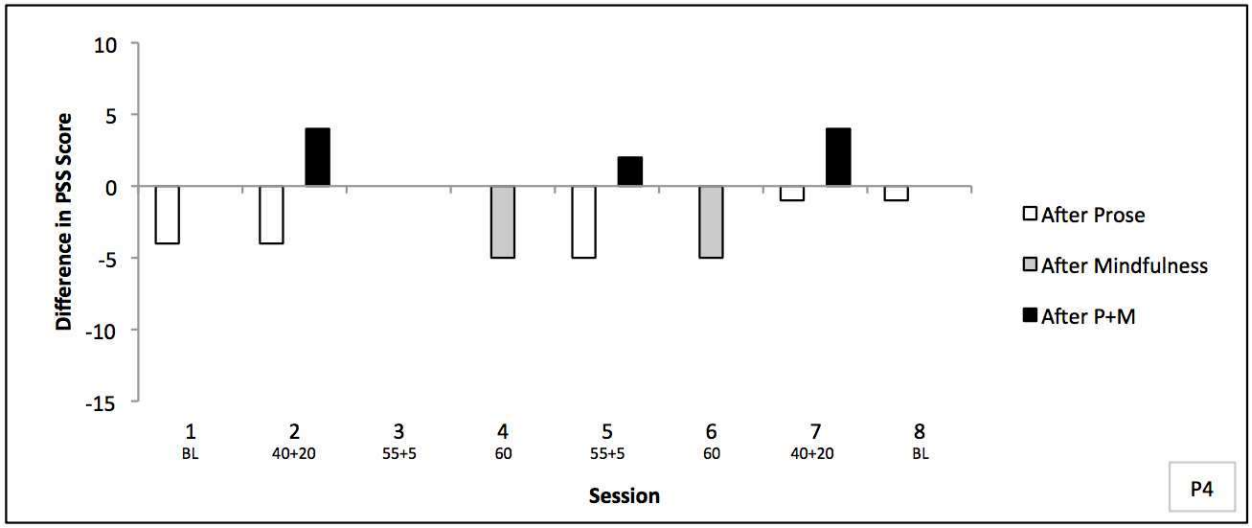
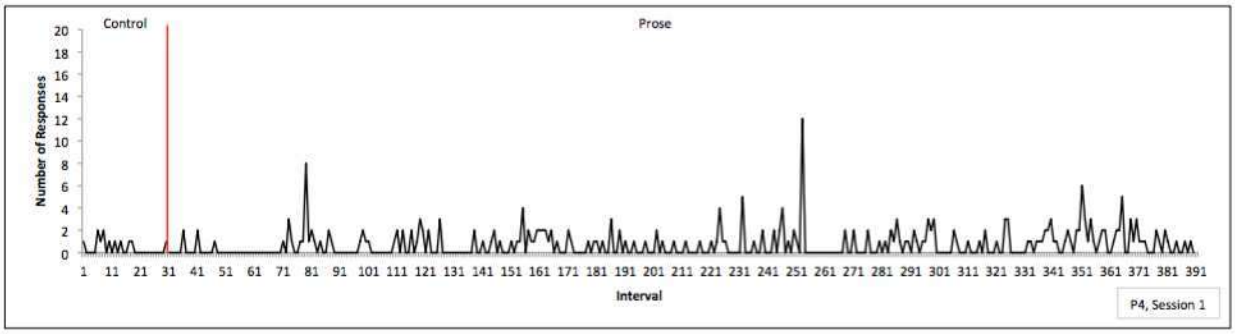
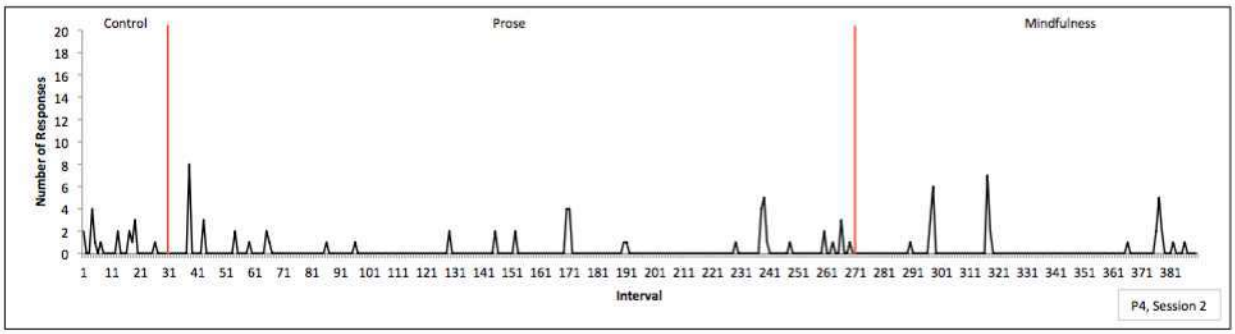
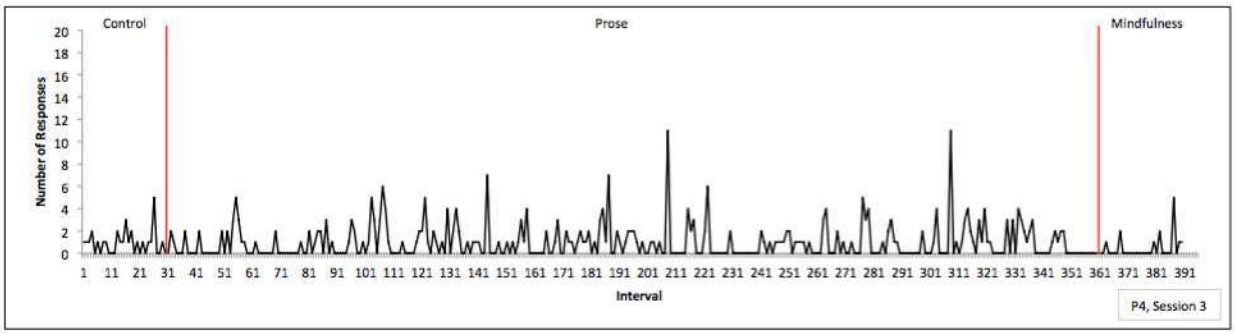
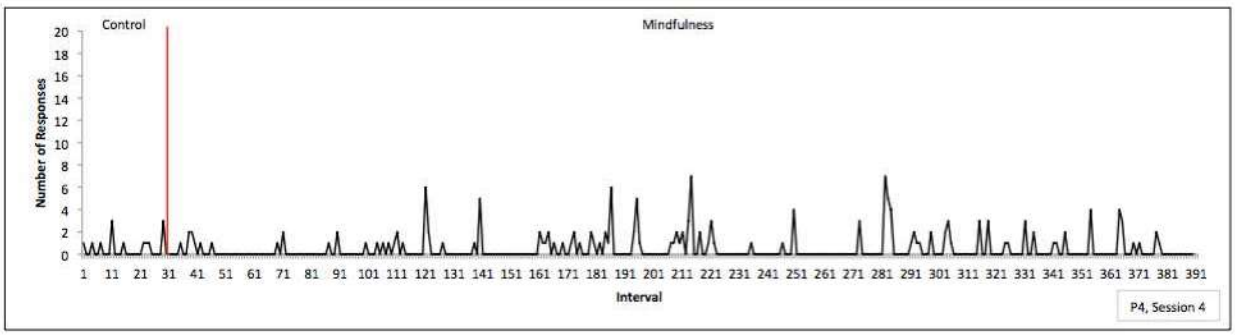


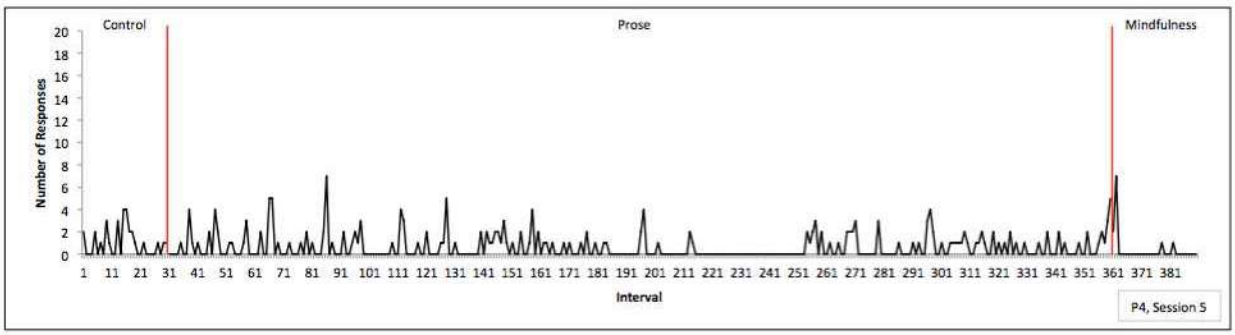
Figure N48. The difference in PSS scores pre-session to post-prose, pre-session to post-mindfulness, and post-prose to post-mindfulness for Sessions 1-8 for Participant 4.


Control
Prose
Number of Responses
Interval
P4, Session 1


Control
Prose
Mindfulness
Number of Responses
Interval
P4, Session 2


Control
Prose
Mindfulness
Number of Responses
Interval
P4, Session 3


Control
Mindfulness
Number of Responses
Interval
P4, Session 4


Control
Prose
Mindfulness
Number of Responses
Interval
P4, Session 5

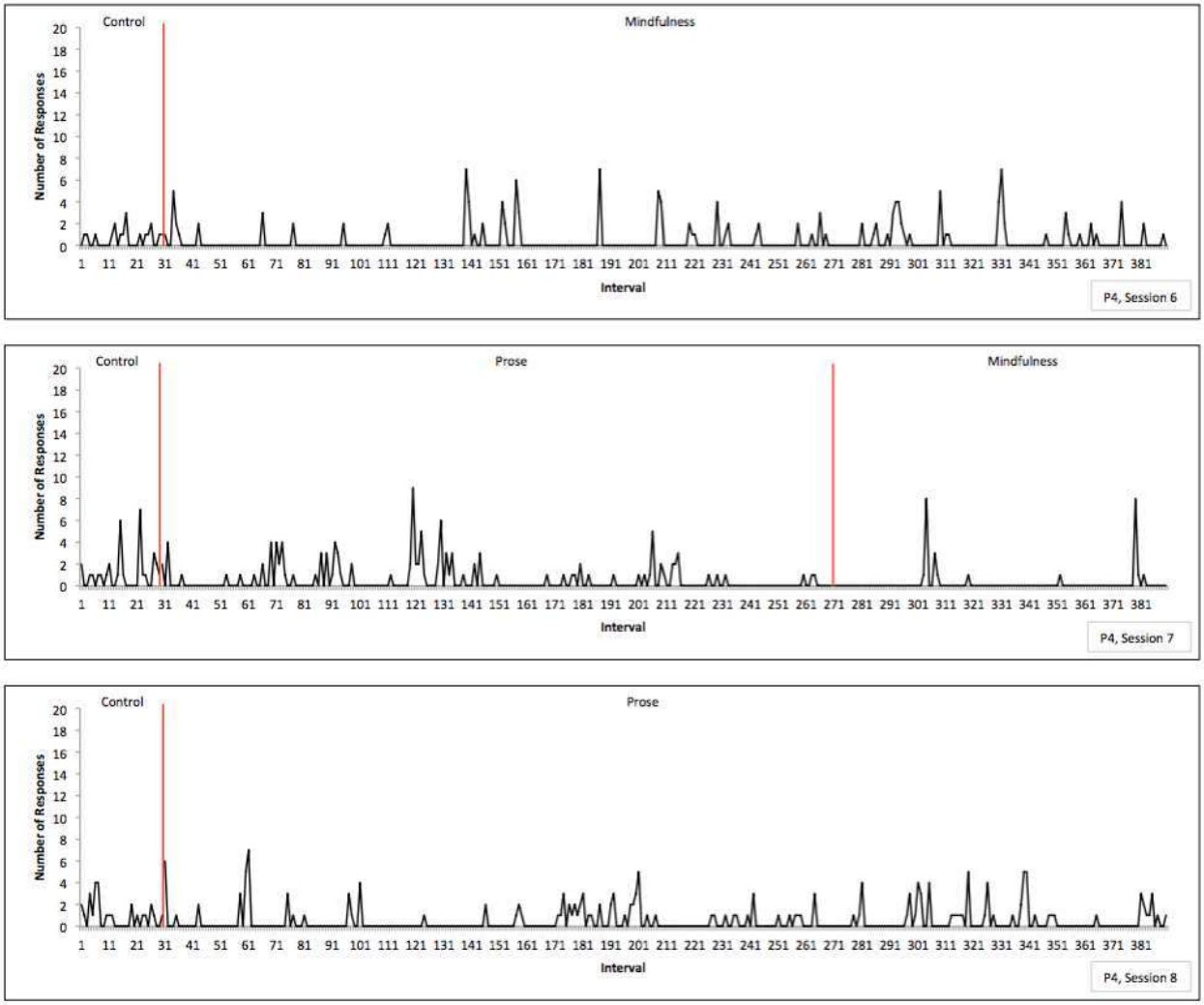
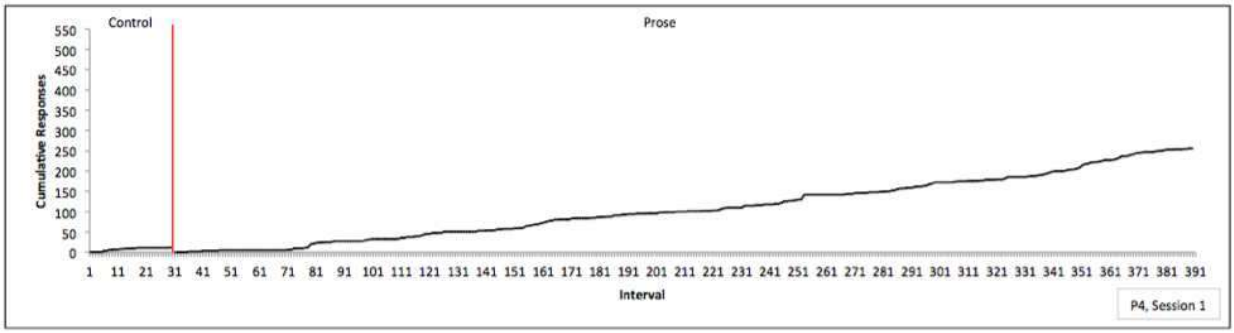
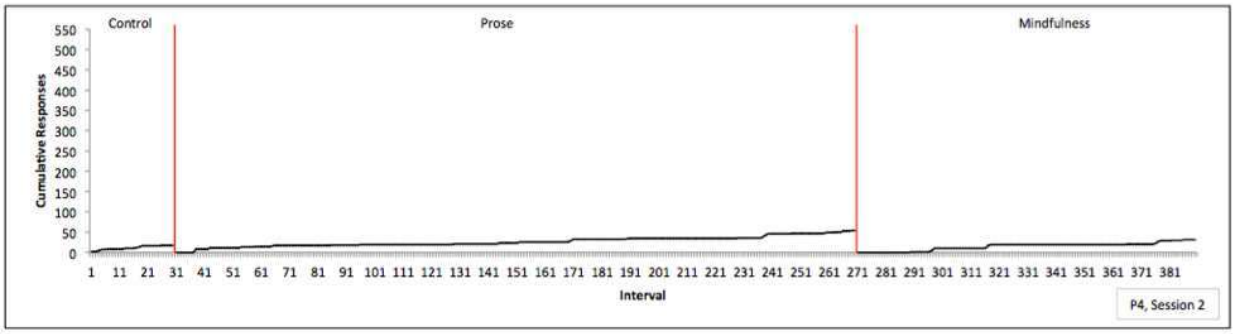
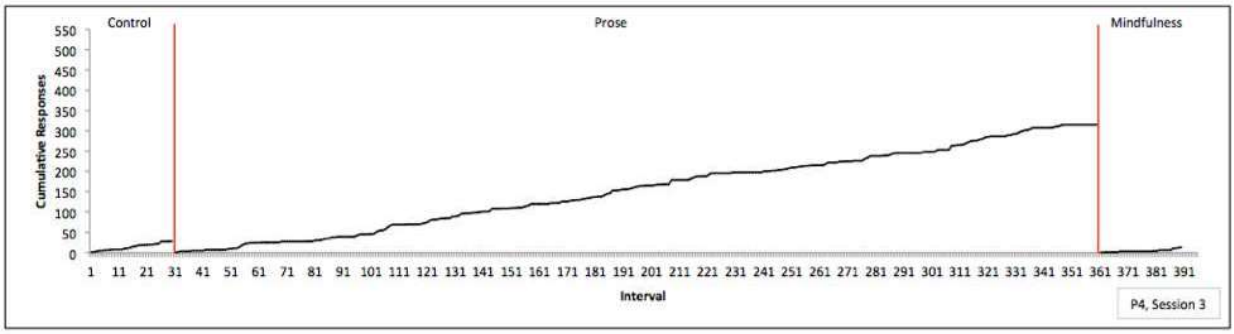
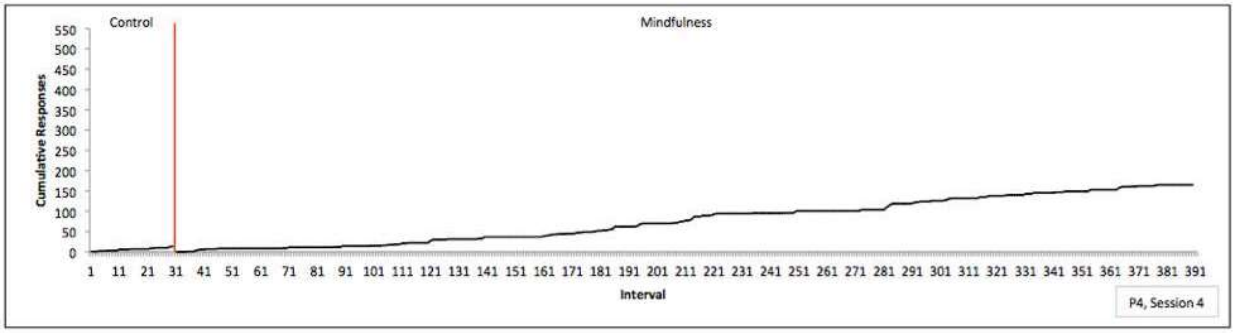


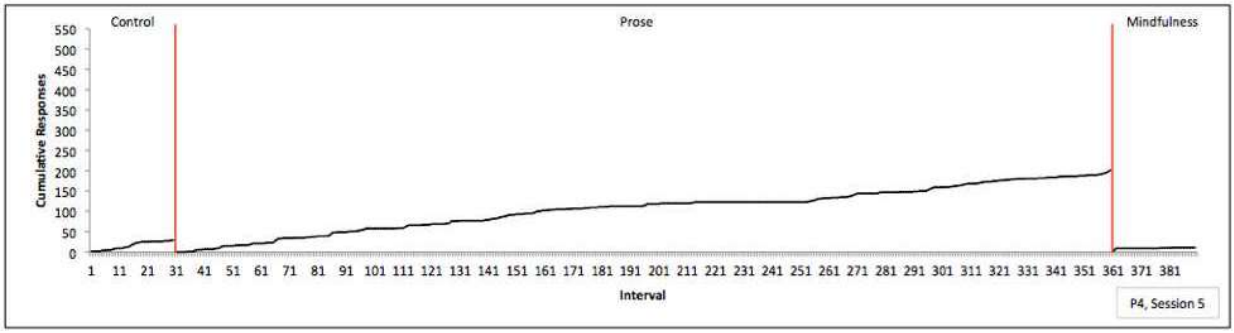
Figure N49. The number of displacement behaviors emitted per 10-second interval for Sessions 1-8 for Participant 4.


Control
Prose
Cumulative Responses
Interval
P4, Session 1


Control
Prose
Mindfulness
Cumulative Responses
Interval
P4, Session 2


Control
Prose
Mindfulness
Cumulative Responses
Interval
P4, Session 3


Control
Mindfulness
Cumulative Responses
Interval
P4, Session 4


Control
Prose
Mindfulness
Cumulative Responses
Interval
P4, Session 5

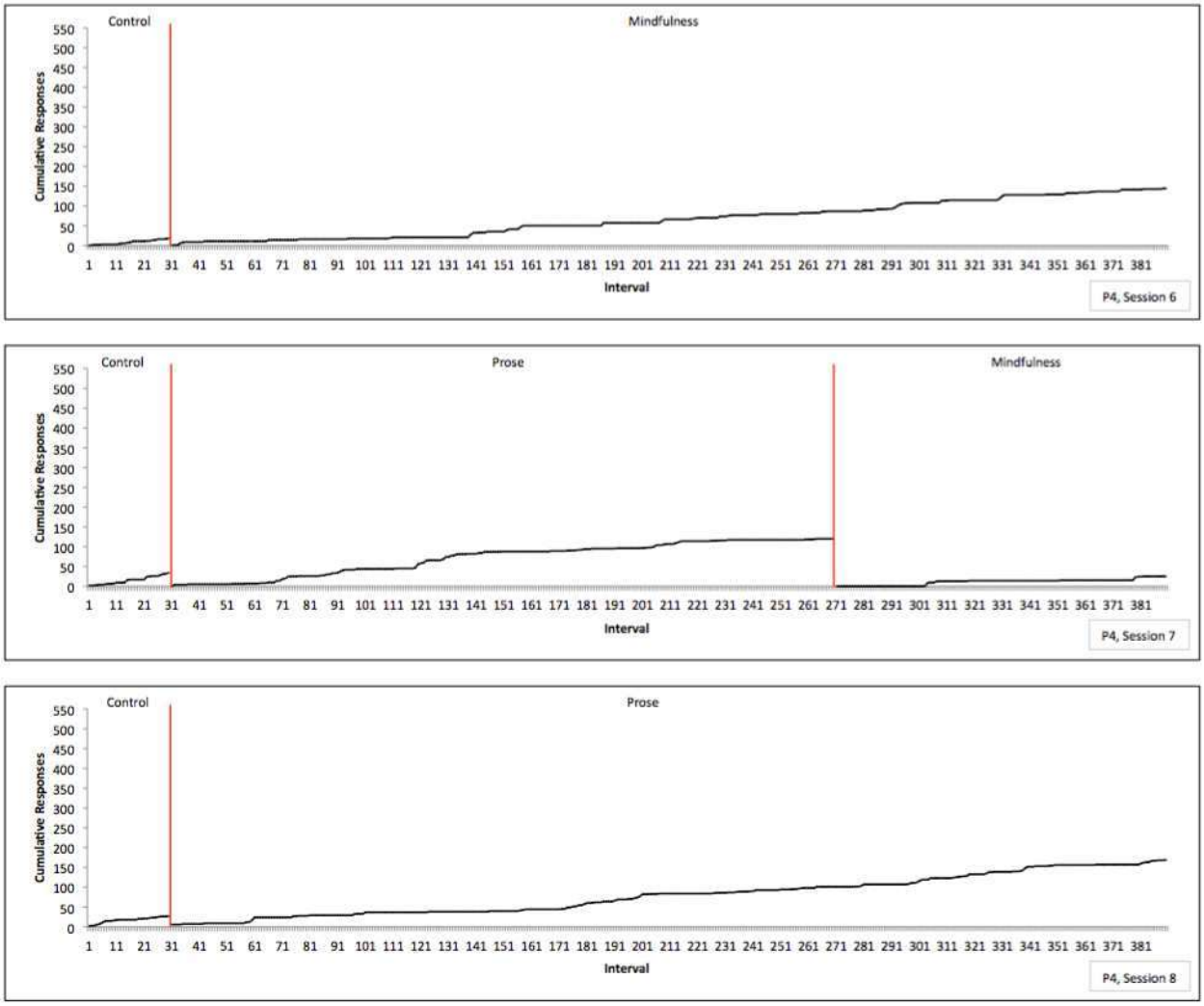
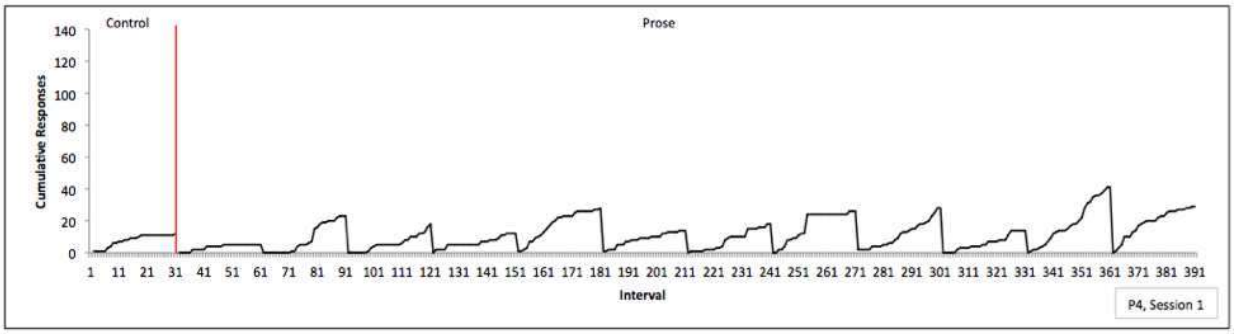
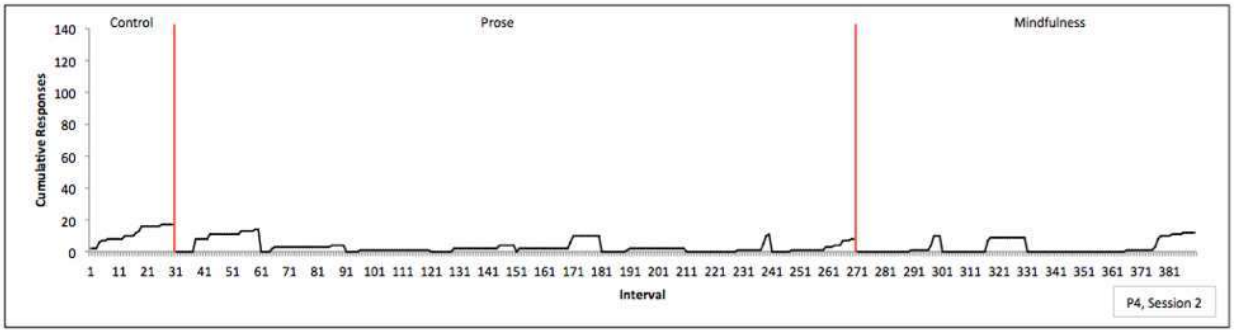
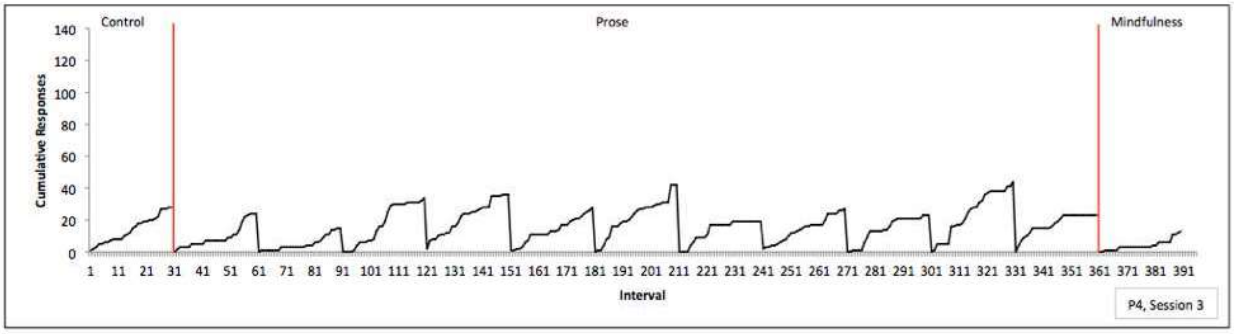
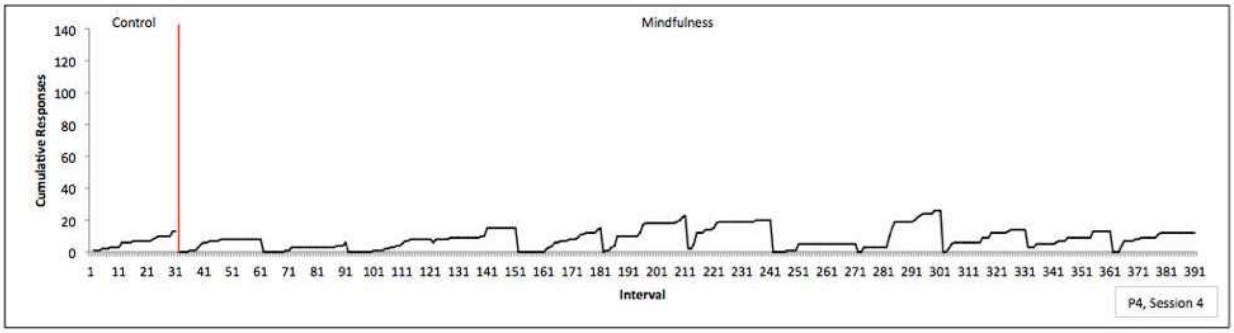


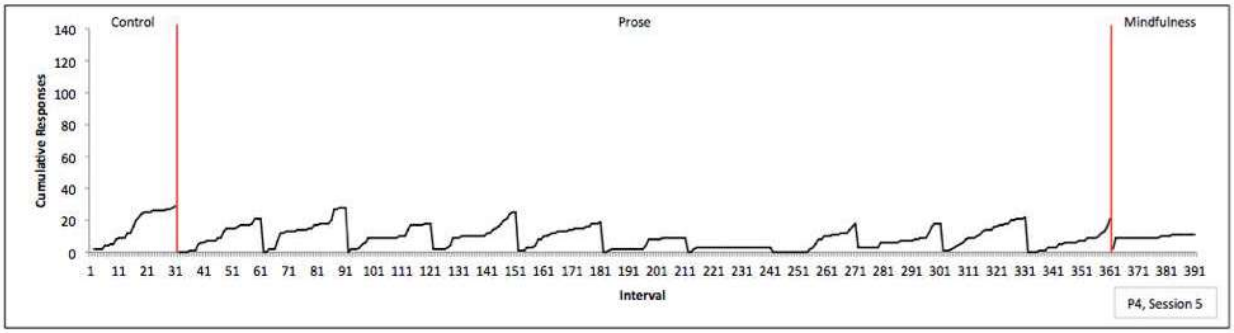
Figure N50. Cumulative displacement behaviors per 10-second interval for Sessions 1-8 for Participant 4.


Control
Prose
Cumulative Responses
Interval
P4, Session 1


Control
Prose
Mindfulness
Cumulative Responses
Interval
P4, Session 2


Control
Prose
Mindfulness
Cumulative Responses
Interval
P4, Session 3


Control
Mindfulness
Cumulative Responses
Interval
P4, Session 4


Control
Prose
Mindfulness
Cumulative Responses
Interval
P4, Session 5

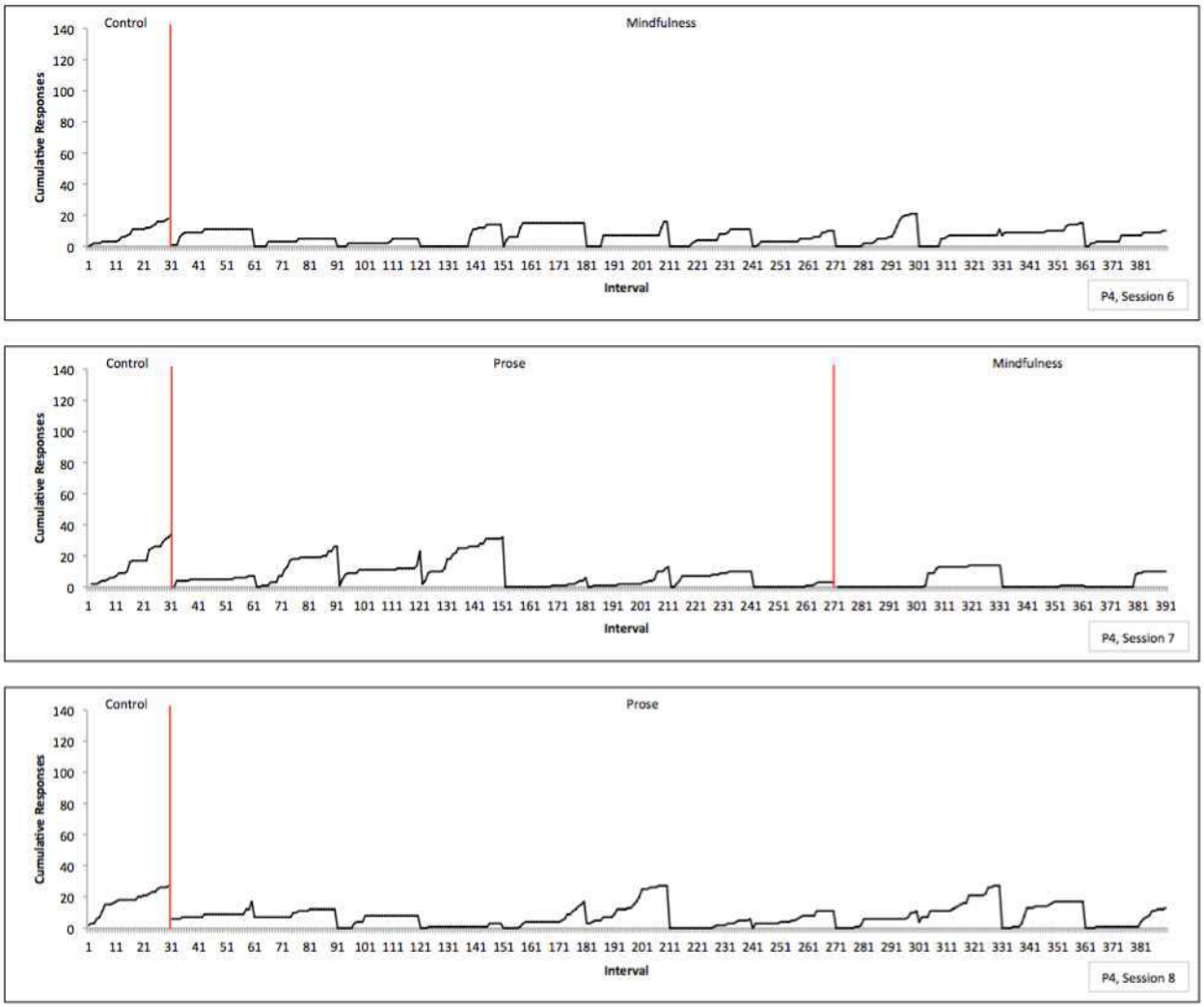


Figure N51. Cumulative displacement behaviors per 10-second interval with pen reset every 5 minutes for Sessions 1-8 for Participant 4.

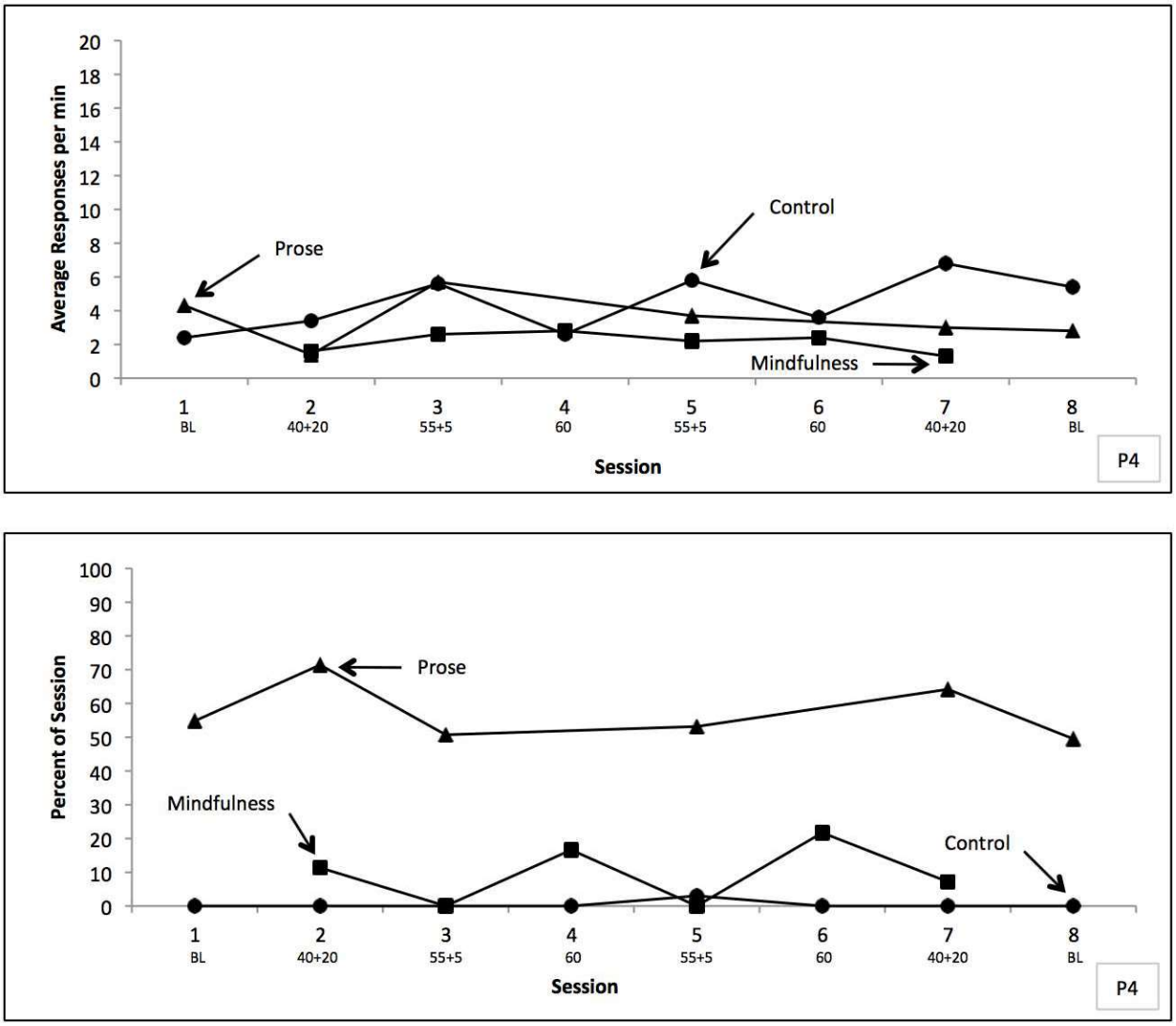
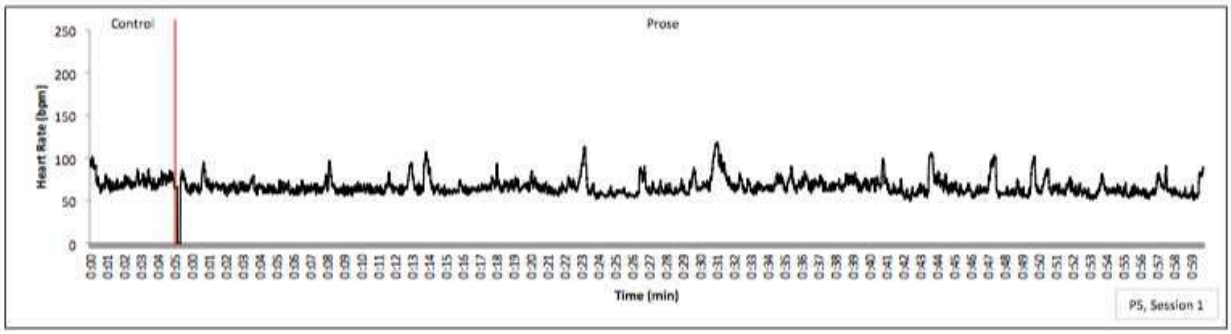
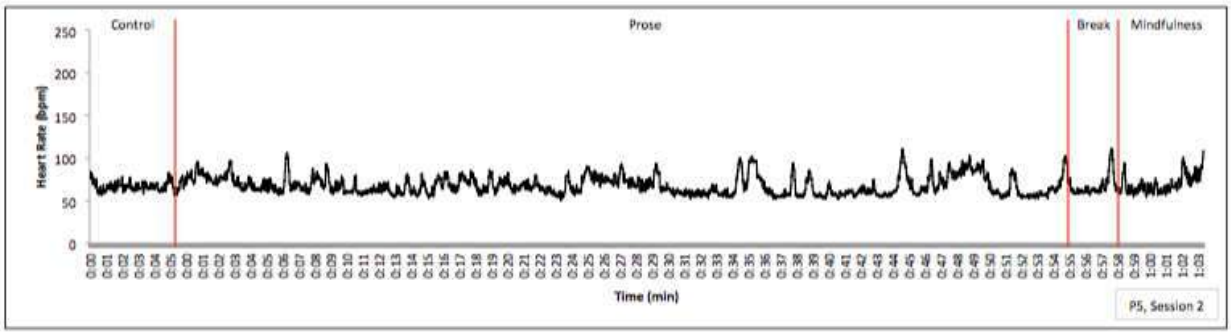
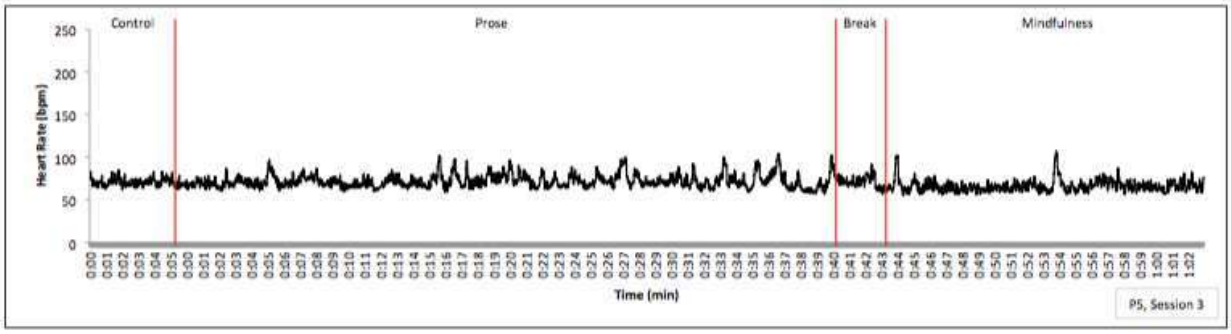
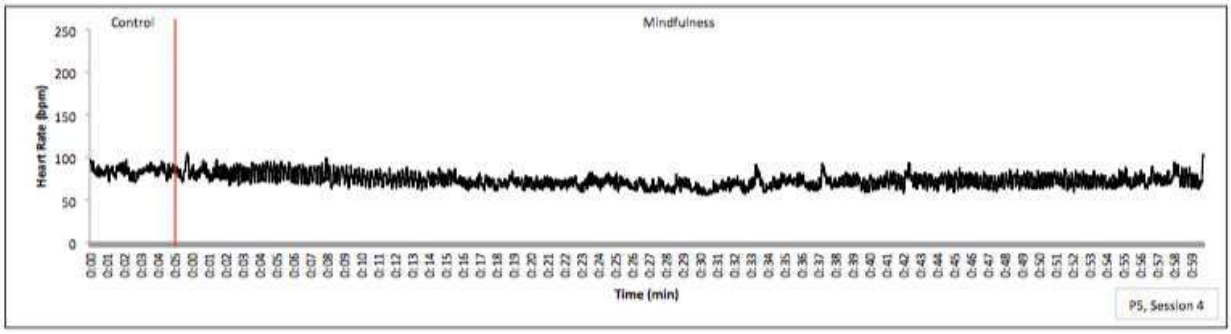


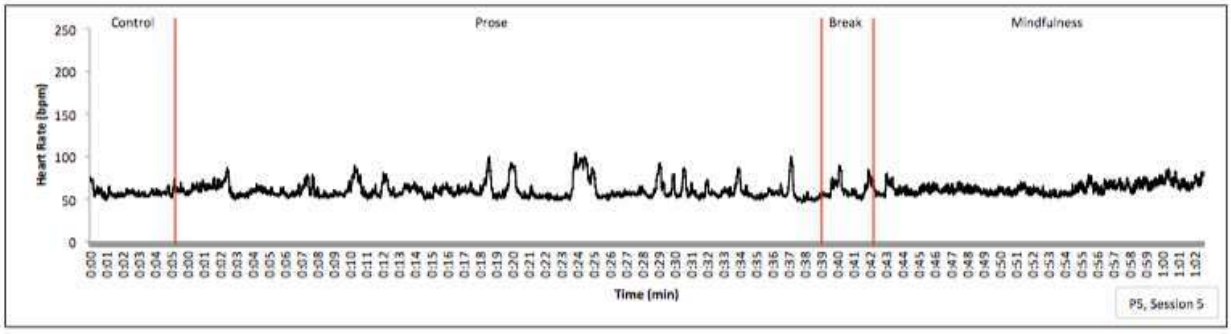
Figure N52. Average frequency of discrete displacement behaviors (top) and percent of engagement in continuous displacement behaviors (bottom) per condition for Sessions 1-8 for Participant 4.


Control
Prose
Heart Rate (bpm)
Time (min)
P5, Session 1


Control
Prose
Break
Mindfulness
Heart Rate (bpm)
Time (min)
P5, Session 2


Control
Prose
Break
Mindfulness
Heart Rate (bpm)
Time (min)
P5, Session 3


Control
Mindfulness
Heart Rate (bpm)
Time (min)
P5, Session 4


Control
Prose
Break
Mindfulness
Heart Rate (bpm)
Time (min)
P5, Session 5

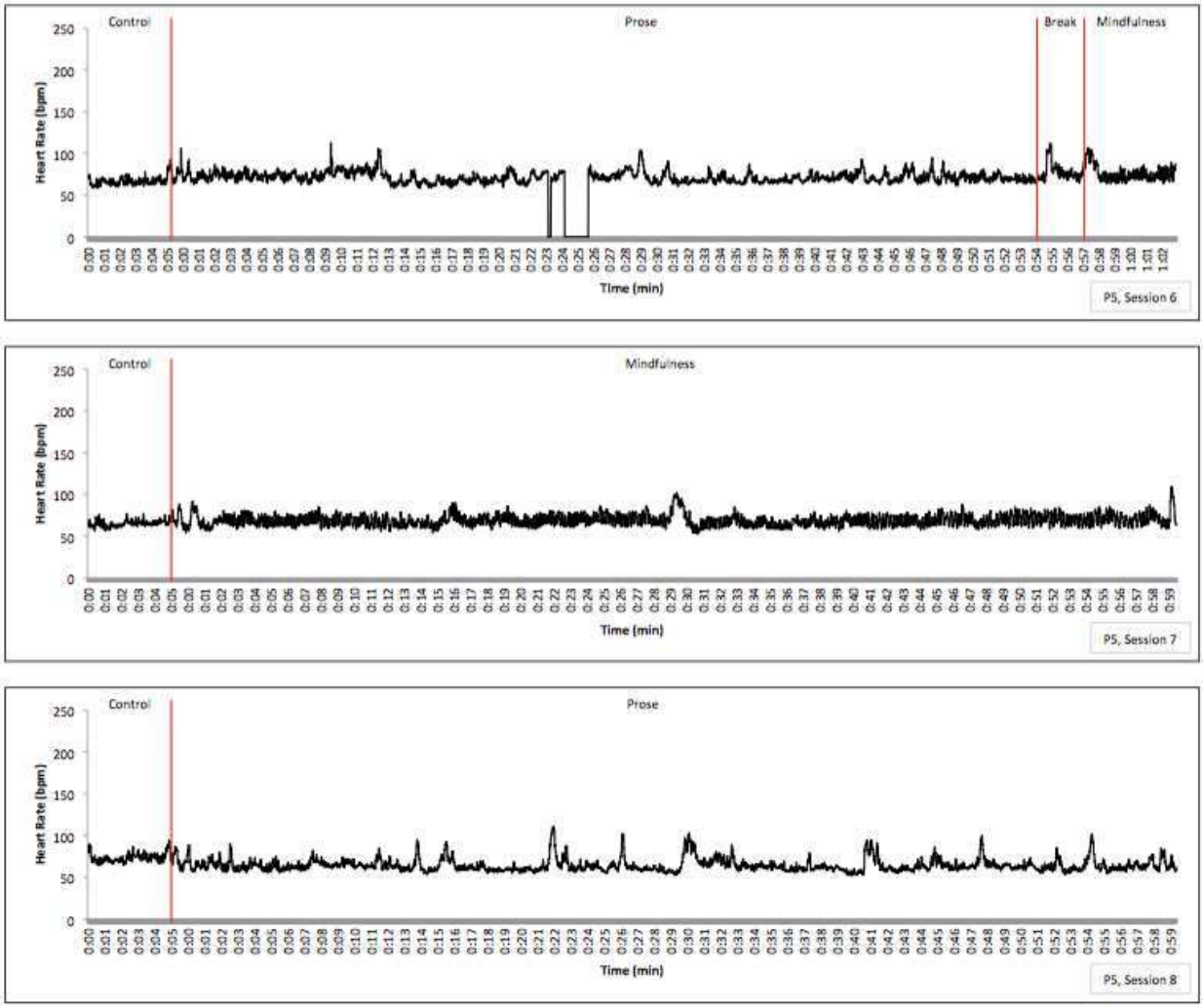
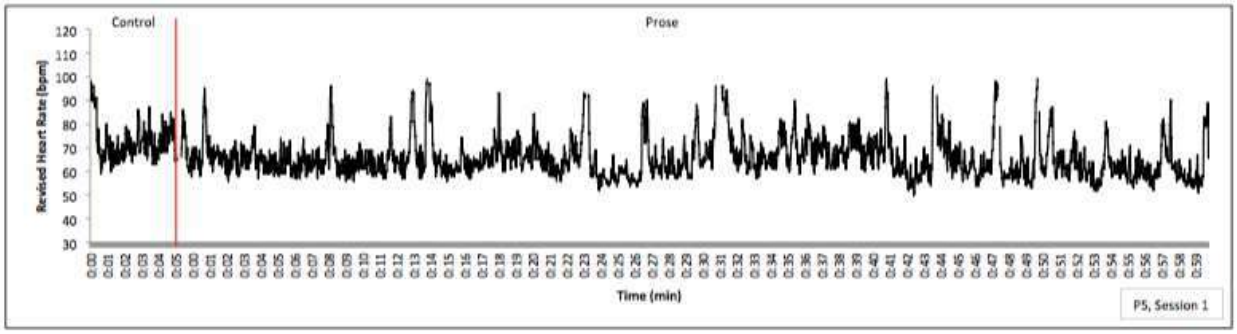
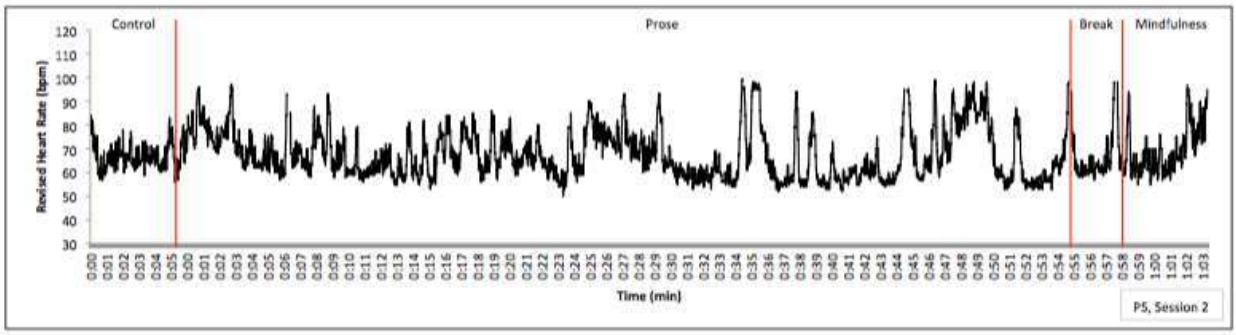
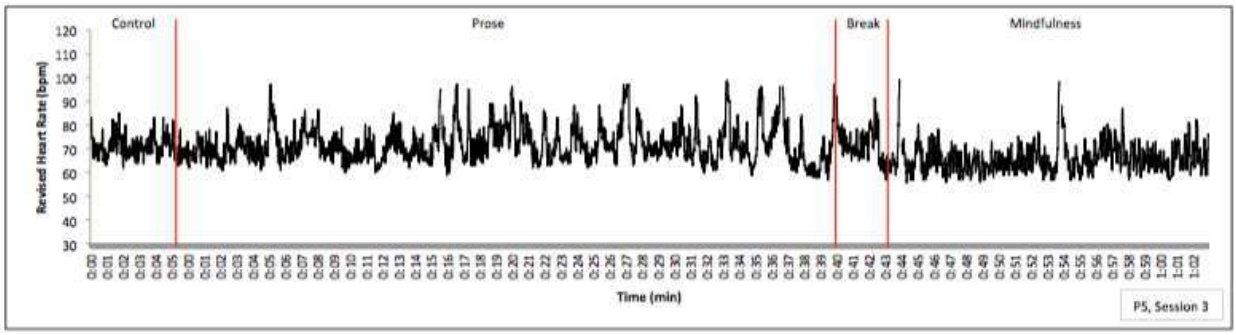
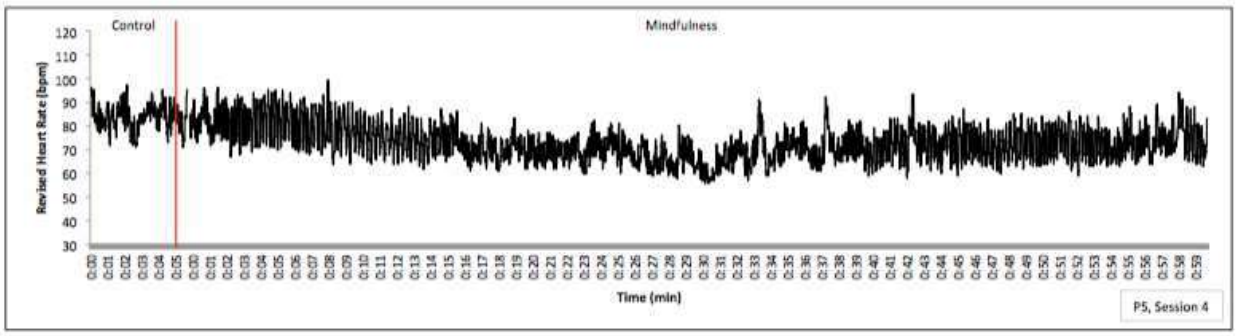


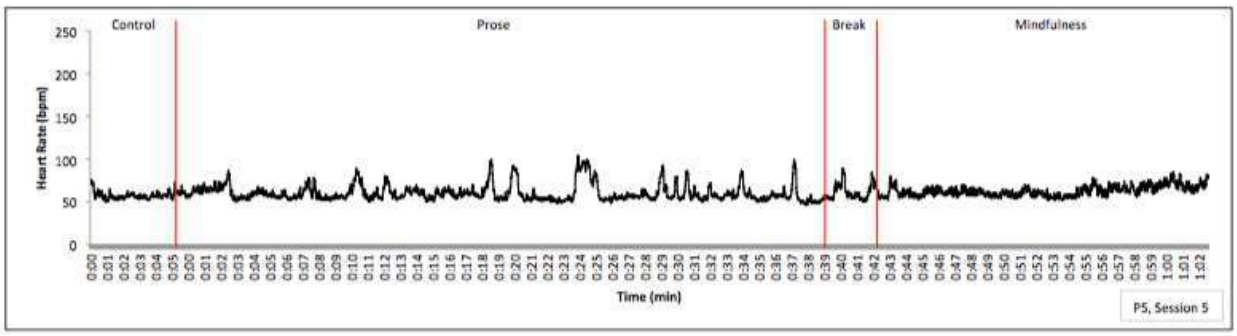
Figure N53. Heart rate for Sessions 1-8 for Participant 5.


Control
Prose
Revised Heart Rate (bpm)
Time (min)
P5, Session 1


Control
Prose
Break
Mindfulness
Revised Heart Rate (bpm)
Time (min)
P5, Session 2


Control
Prose
Break
Mindfulness
Revised Heart Rate (bpm)
Time (min)
P5, Session 3


Control
Mindfulness
Revised Heart Rate (bpm)
Time (min)
P5, Session 4


Control
Prose
Break
Mindfulness
Heart Rate (bpm)
Time (min)
P5, Session 5

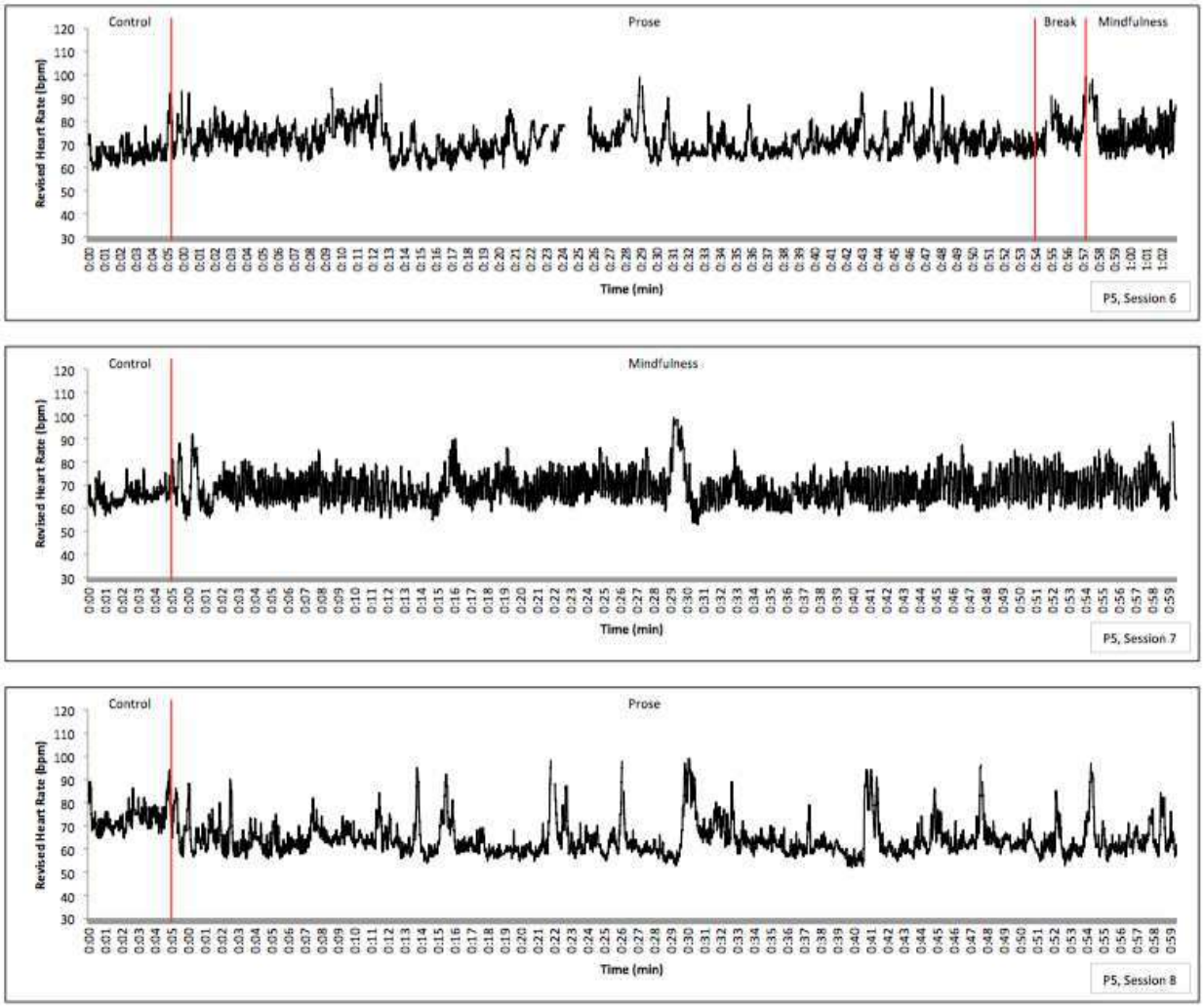


Figure N54. Revised heart rate for Sessions 1-8 for Participant 5.

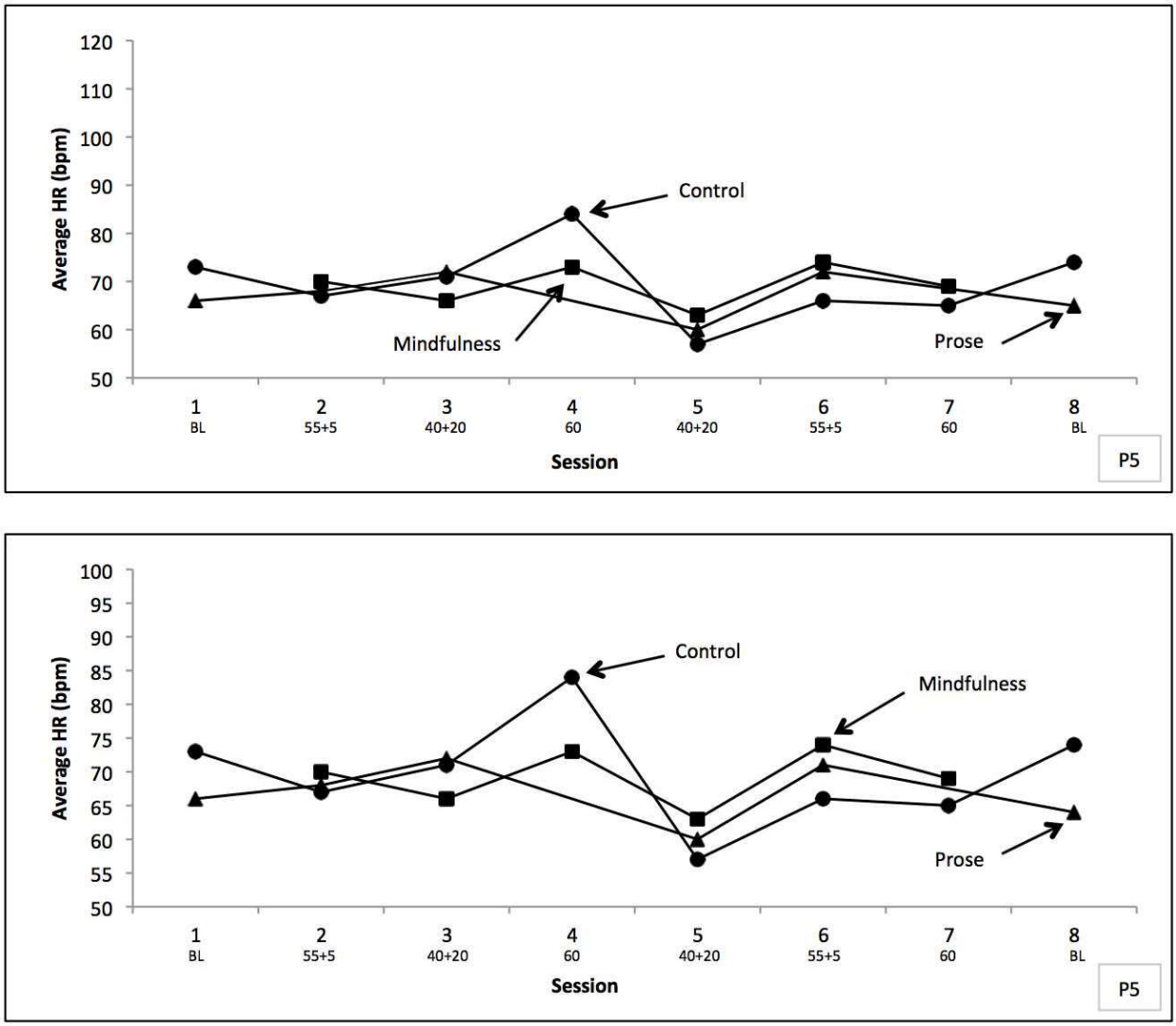


Figure N55. Average heart rate (top) and revised average heart rate (bottom) per condition for Sessions 1-8 for Participant 5.

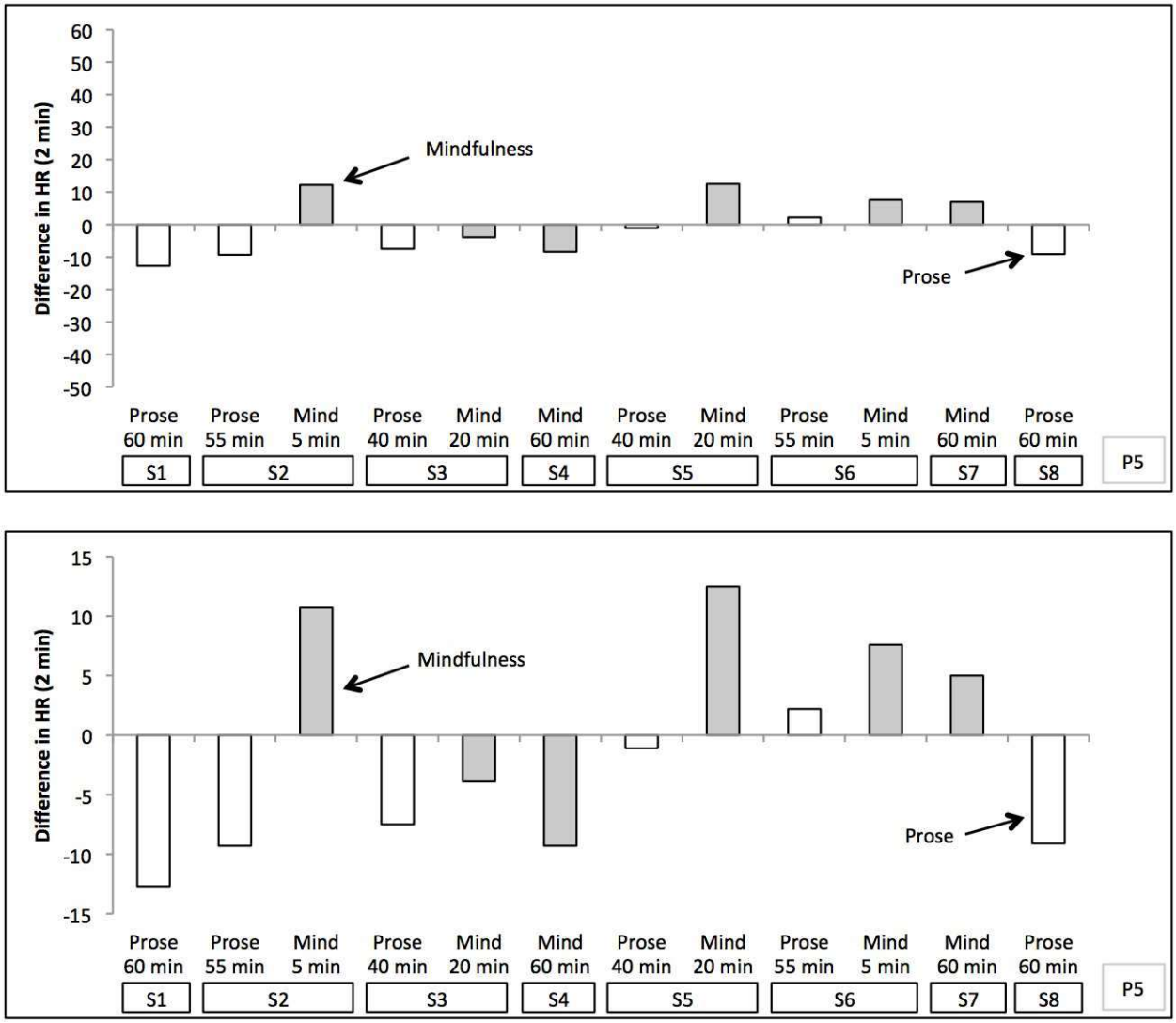


Figure N56. The difference (top) and revised difference (bottom) in average heart rate from the final 2 minutes of control to the final 2 minutes of each condition for Sessions 1-8 for Participant 5.

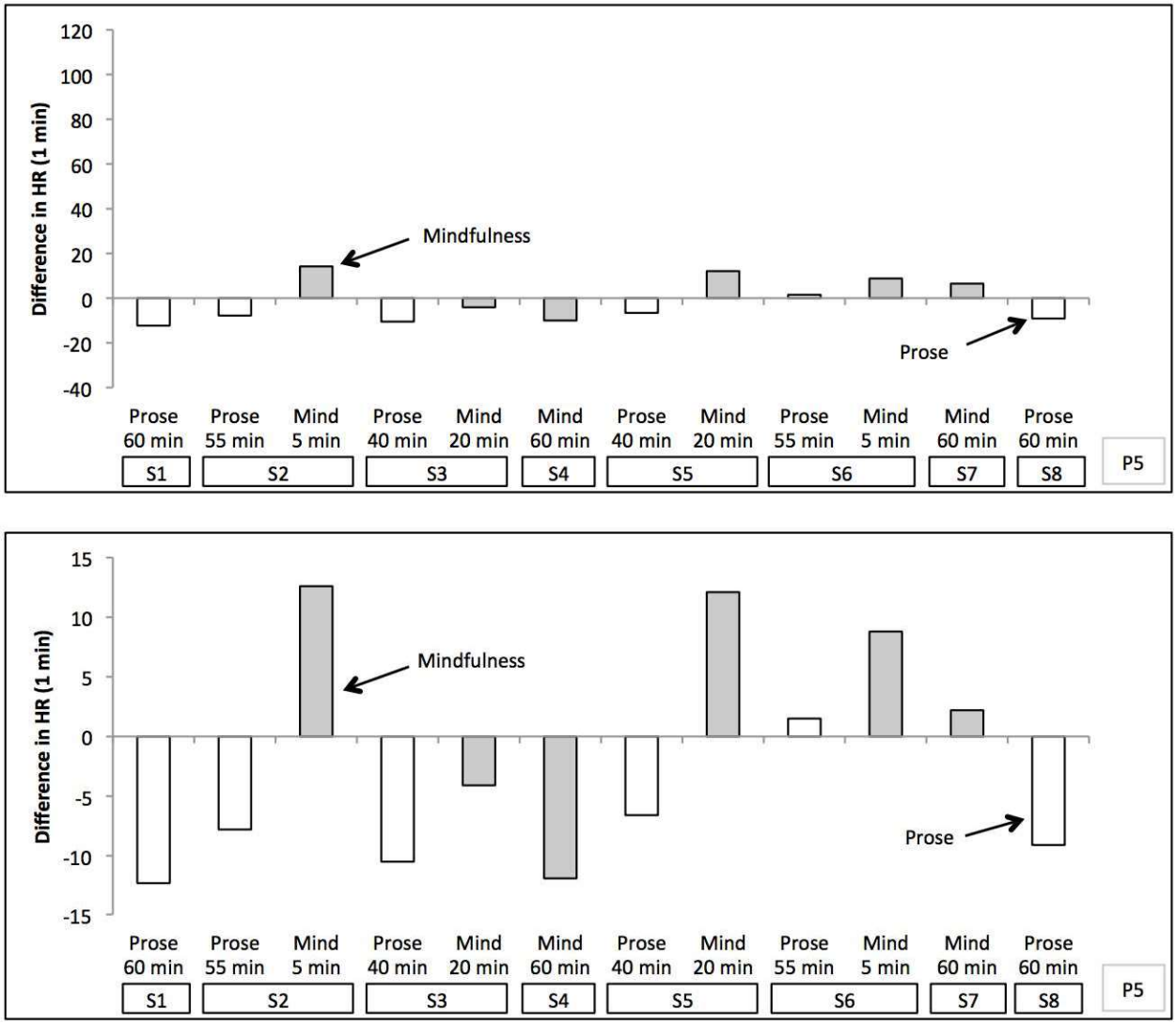


Figure N57. The difference (top) and revised difference (bottom) in average heart rate from the final 1 minute of control to the final 1 minute of each condition for Sessions 1-8 for Participant 5.

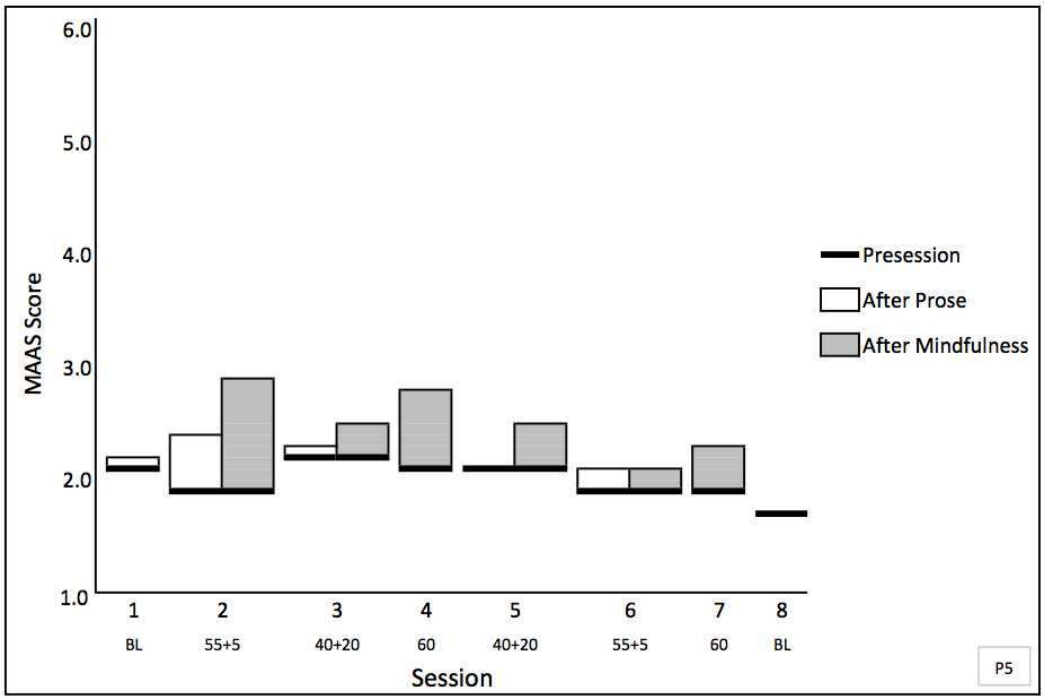


Figure N58. Pre-, mid- (when applicable), and post-session MAAS scores for Sessions 1-8 for Participant 5, where higher scores indicate a higher level of mindfulness.

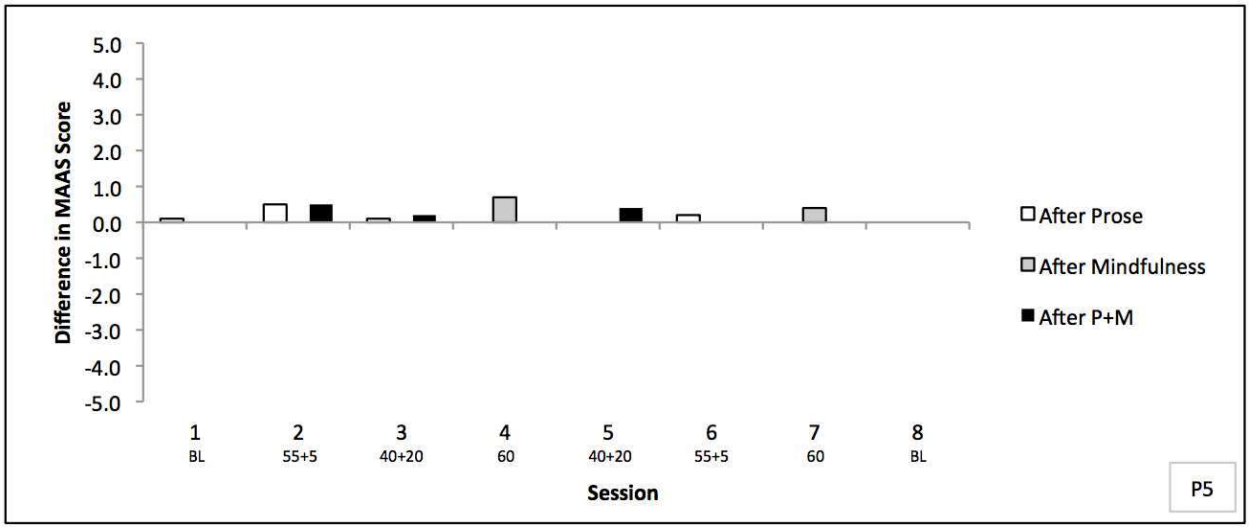


Figure N59. The difference in MAAS scores pre-session to post-prose, pre-session to post-mindfulness, and post-prose to post-mindfulness for Sessions 1-8 for Participant 5.

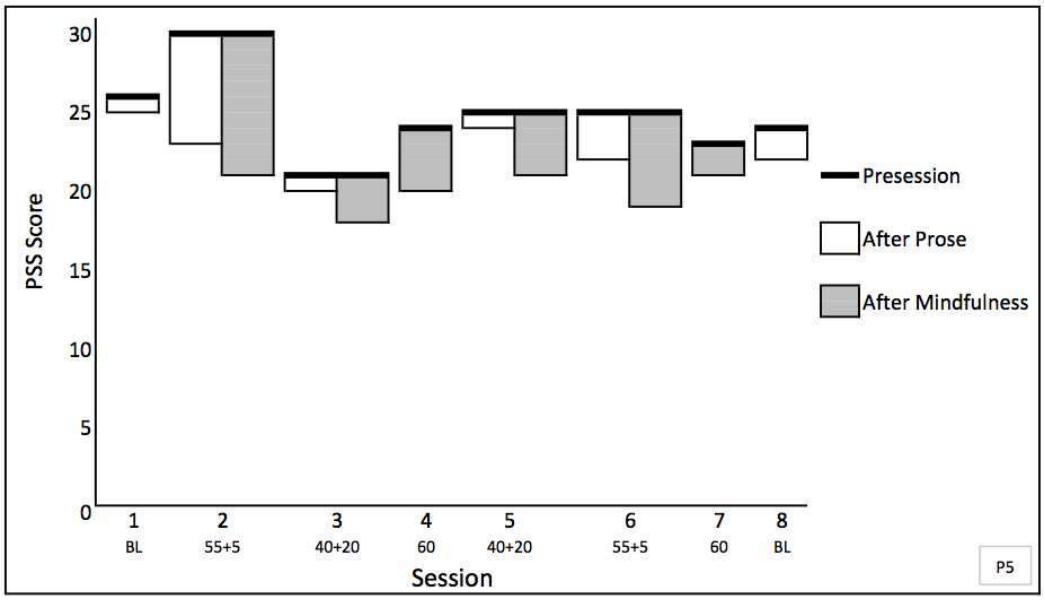


Figure N60. Pre-, mid- (when applicable), and post-session PSS scores for Sessions 1-8 for Participant 5, where higher scores indicate a higher level of stress.

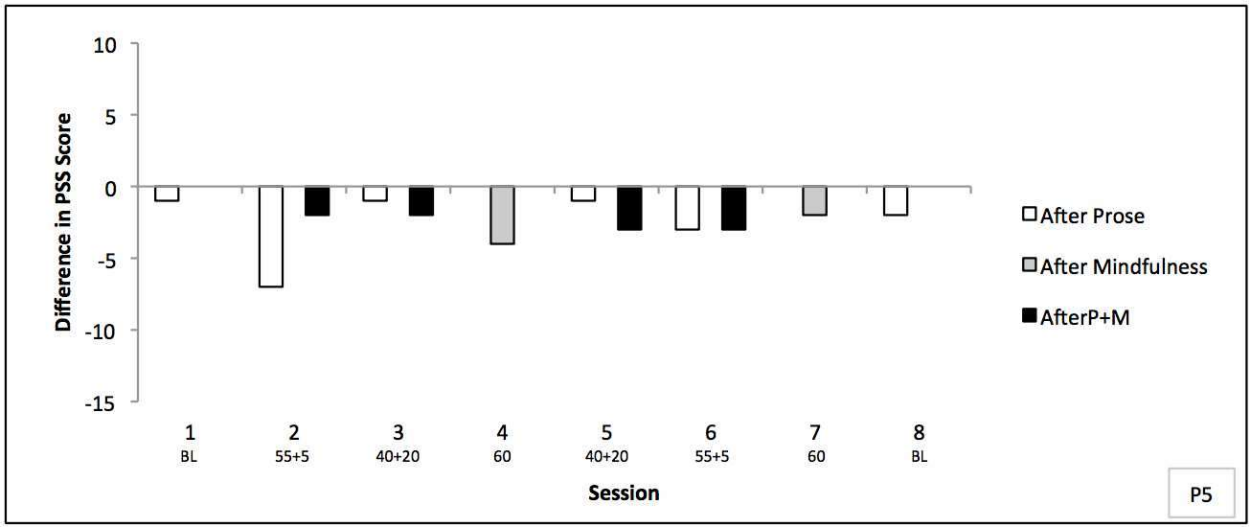
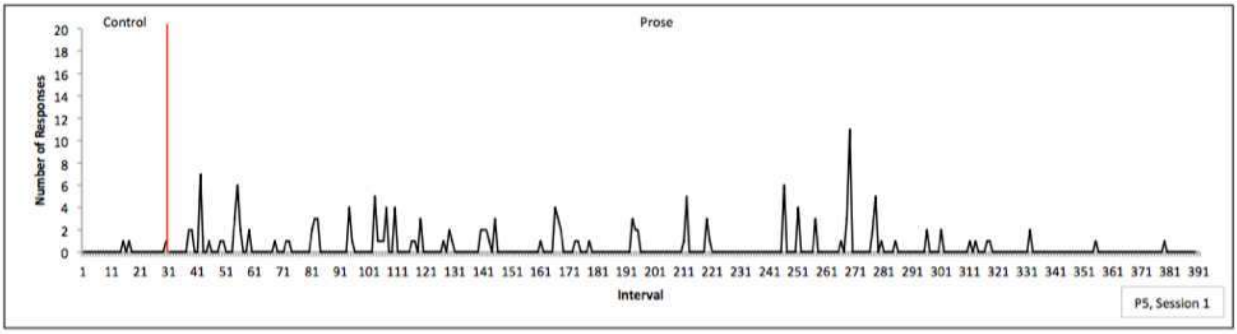
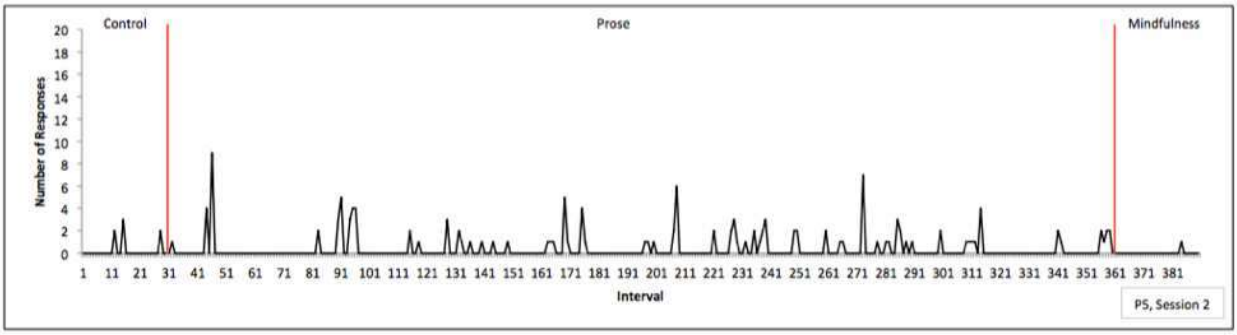
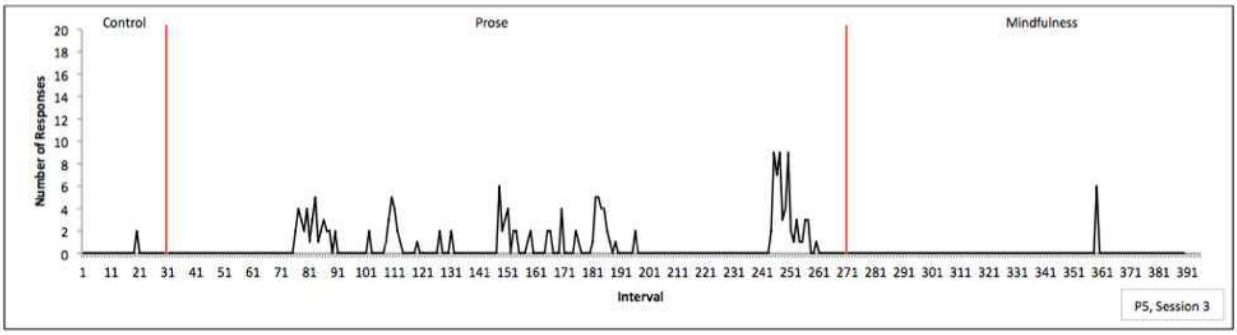
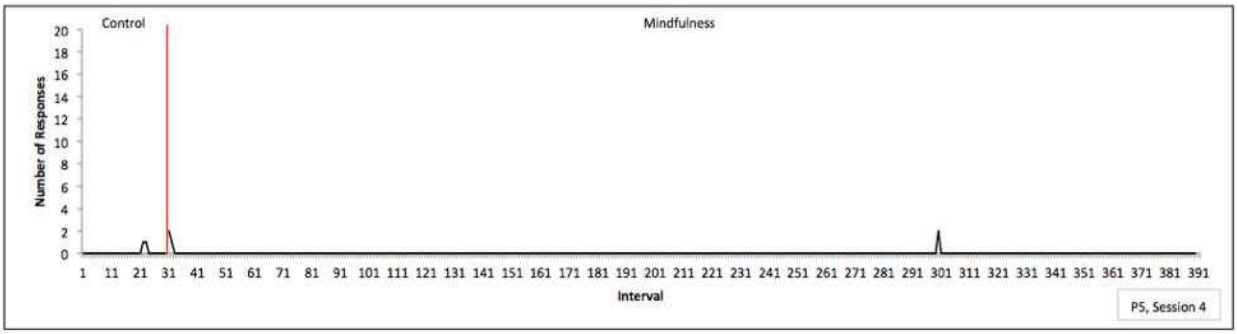


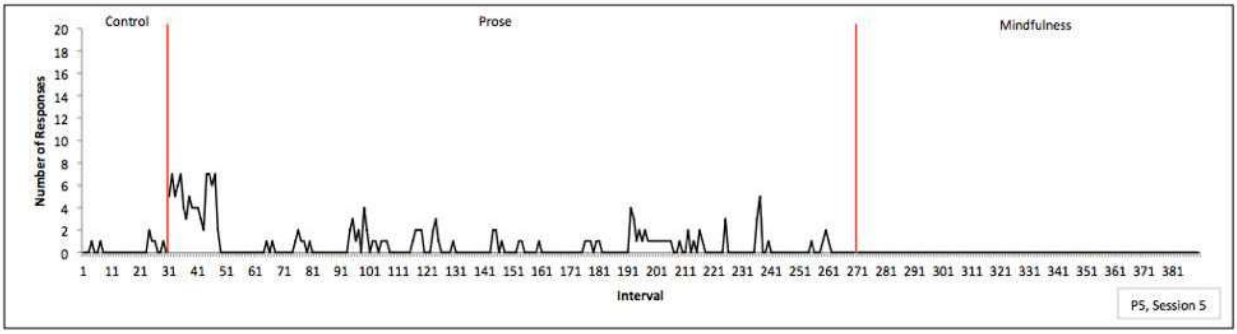
Figure N61. The difference in PSS scores pre-session to post-prose, pre-session to post-mindfulness, and post-prose to post-mindfulness for Sessions 1-8 for Participant 5.


Control
Prose
Number of Responses
Interval
P5, Session 1


Control
Prose
Mindfulness
Number of Responses
Interval
P5, Session 2


Control
Prose
Mindfulness
Number of Responses
Interval
P5, Session 3


Control
Mindfulness
Number of Responses
Interval
P5, Session 4


Control
Prose
Mindfulness
Number of Responses
Interval
P5, Session 5

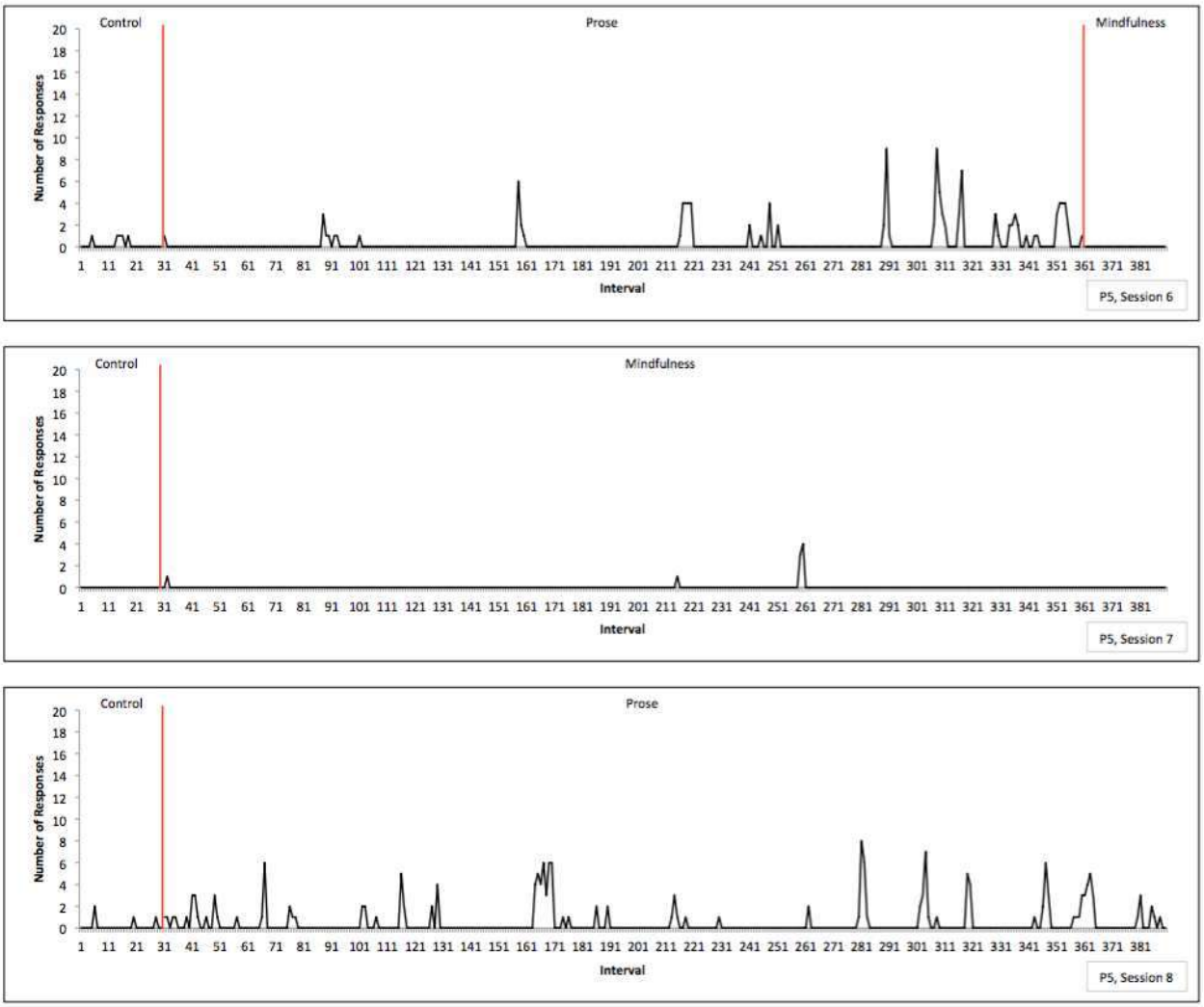
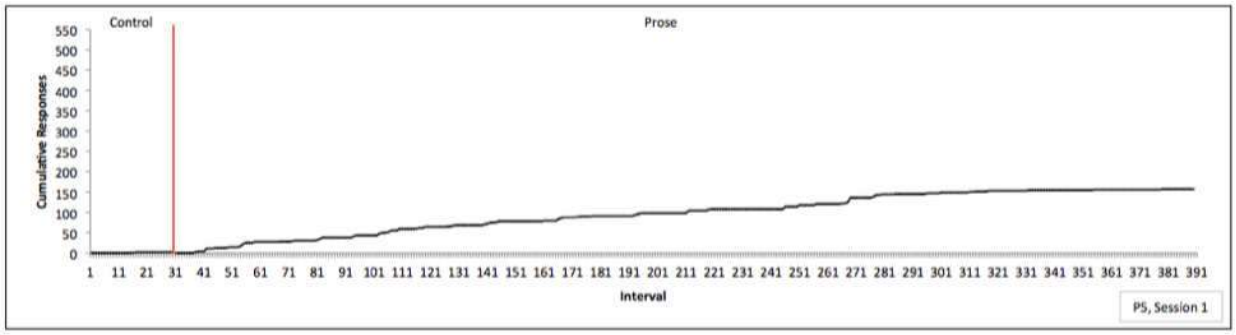
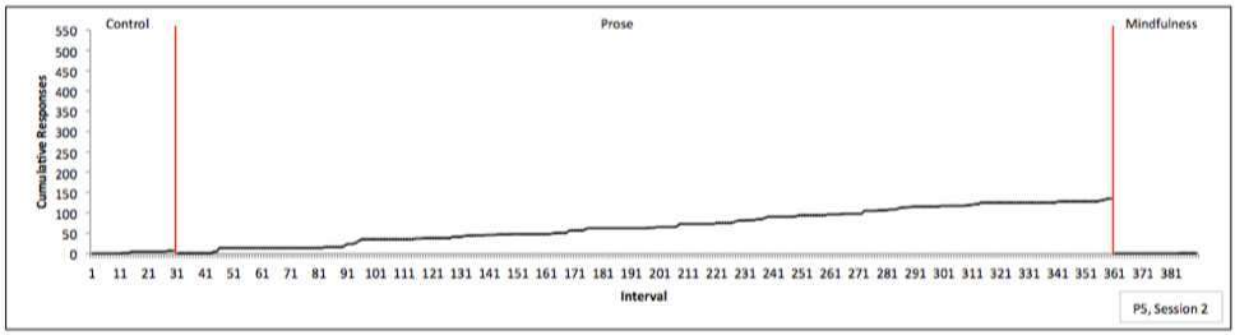
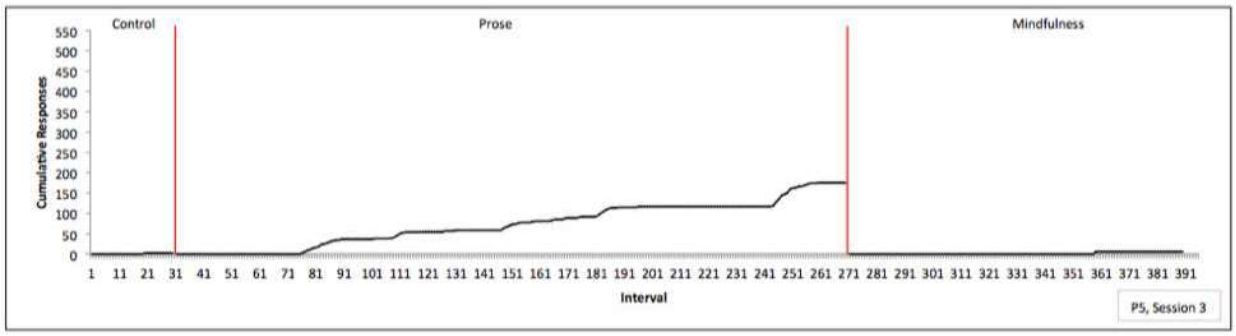
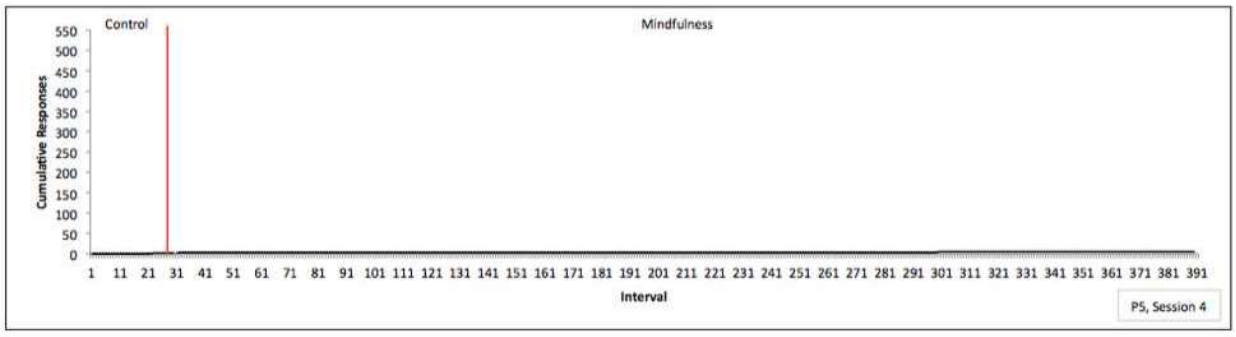


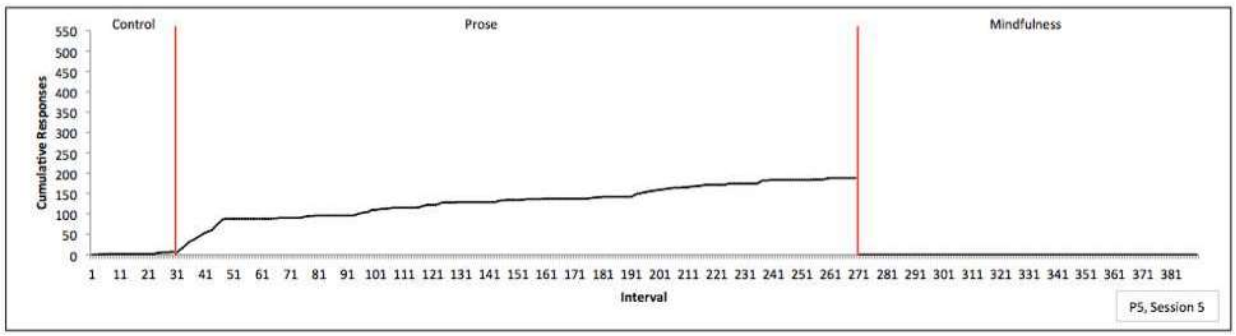
Figure N62. The number of displacement behaviors emitted per 10-second interval for Sessions 1-8 for Participant 5.


Control
Prose
Cumulative Responses
Interval
P5, Session 1


Control
Prose
Mindfulness
Cumulative Responses
Interval
P5, Session 2


Control
Prose
Mindfulness
Cumulative Responses
Interval
P5, Session 3


Control
Mindfulness
Cumulative Responses
Interval
P5, Session 4


Control
Prose
Mindfulness
Cumulative Responses
Interval
P5, Session 5

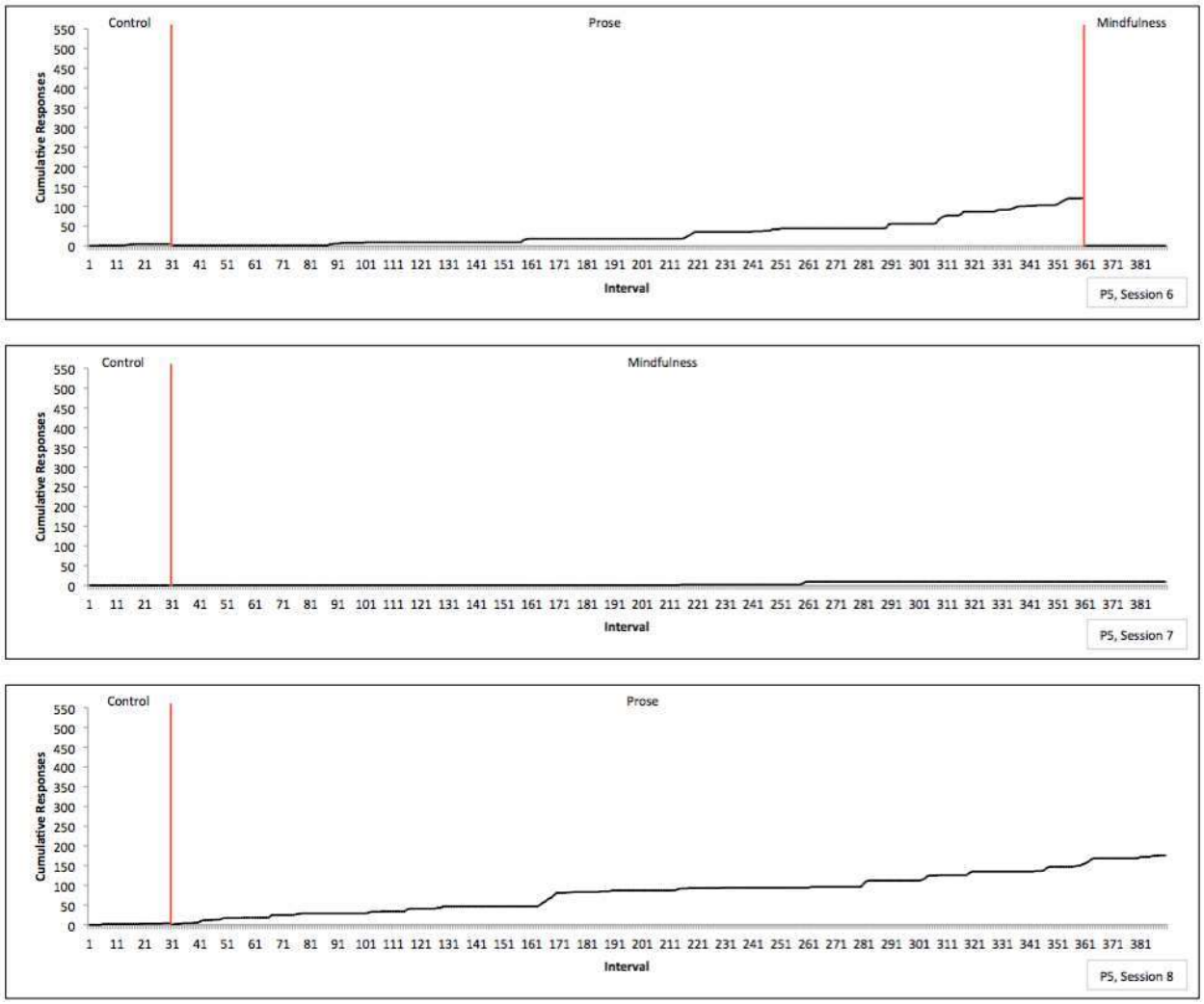
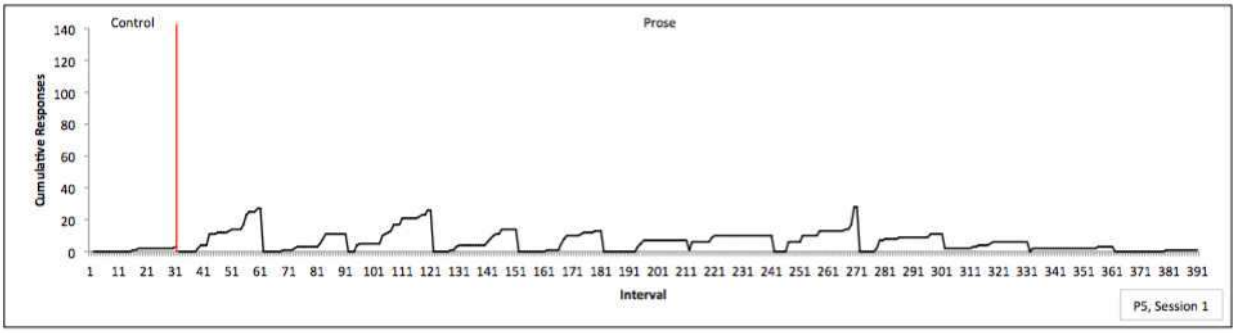
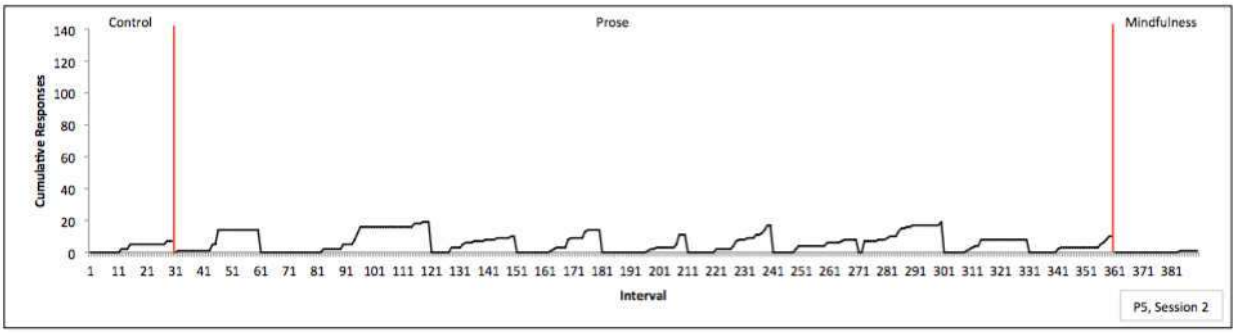
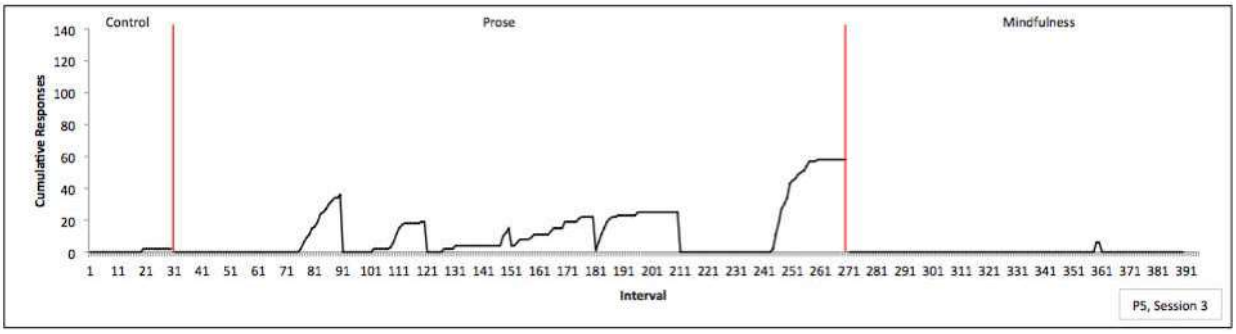
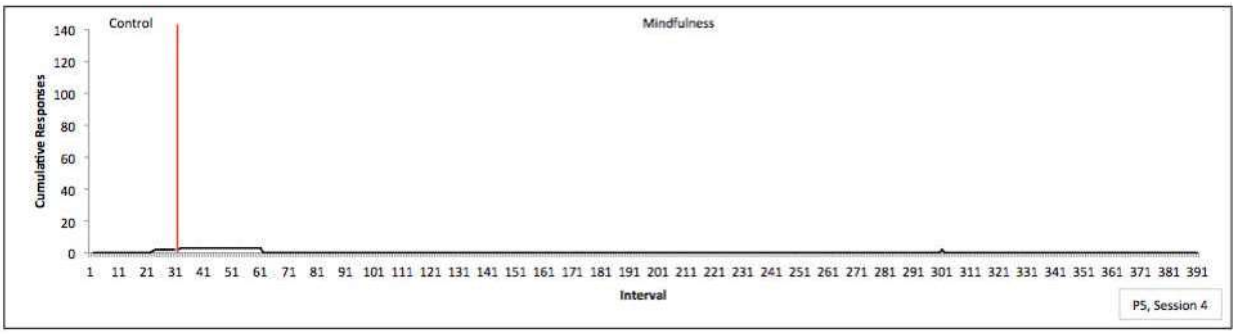


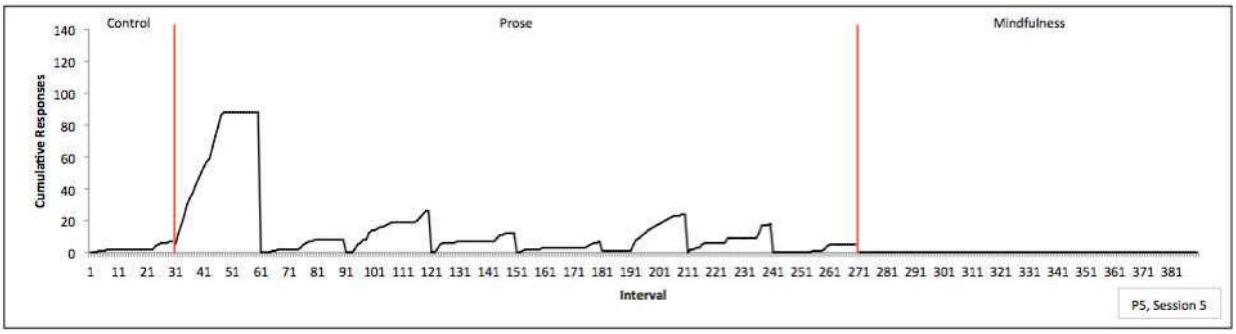
Figure N63. Cumulative displacement behaviors per 10-second interval for Sessions 1-8 for Participant 5.


Control
Prose
Cumulative Responses
Interval
P5, Session 1


Control
Prose
Mindfulness
Cumulative Responses
Interval
P5, Session 2


Control
Prose
Mindfulness
Cumulative Responses
Interval
P5, Session 3


Control
Mindfulness
Cumulative Responses
Interval
P5, Session 4


Control
Prose
Mindfulness
Cumulative Responses
Interval
P5, Session 5

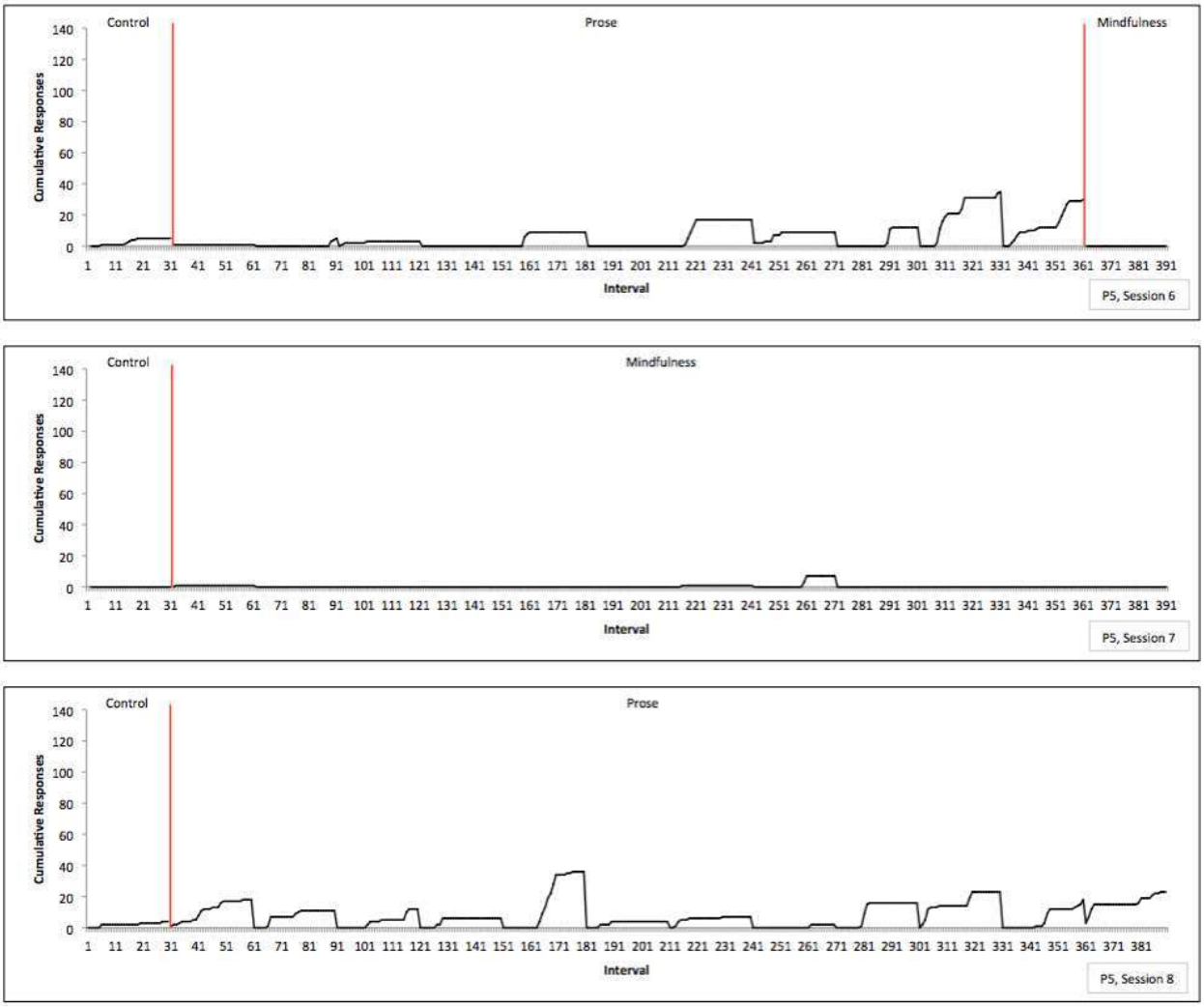


Figure N64. Cumulative displacement behaviors per 10-second interval with pen reset every 5 minutes for Sessions 1-8 for Participant 5.

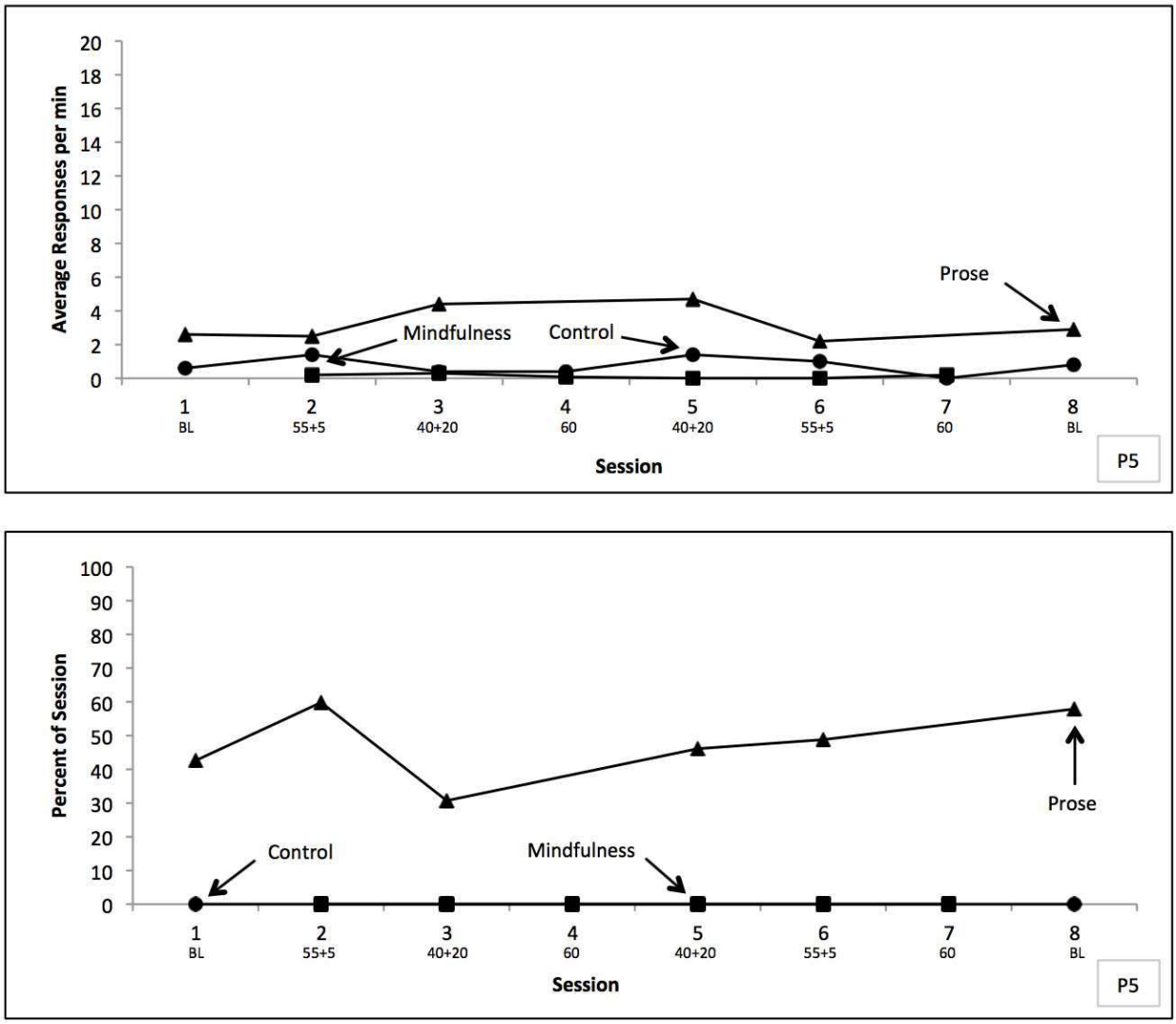
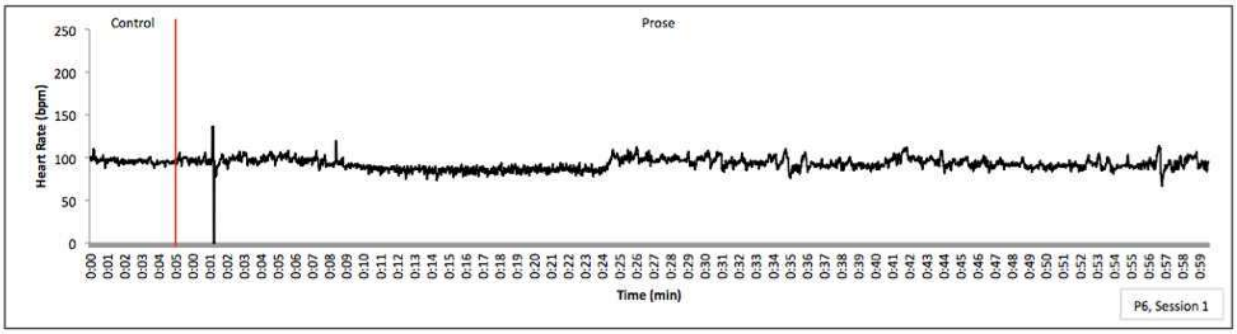
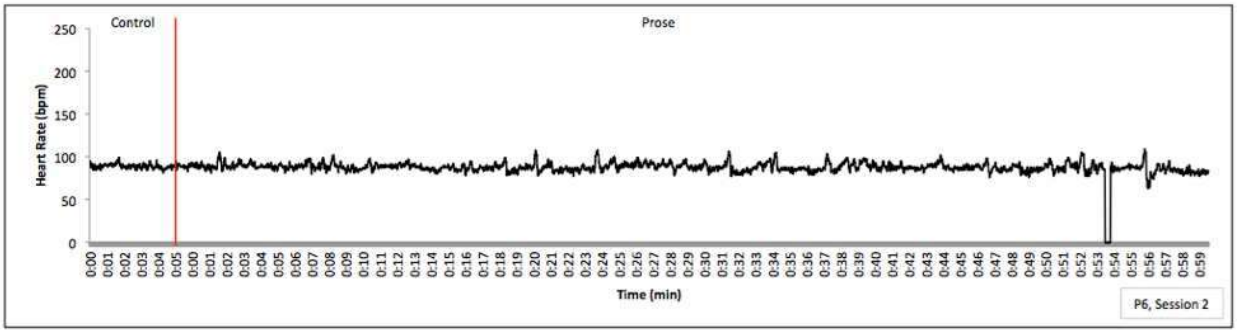
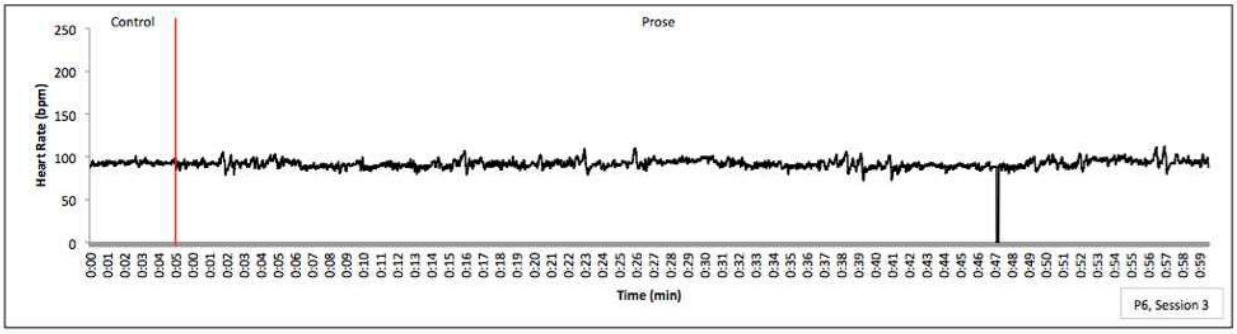
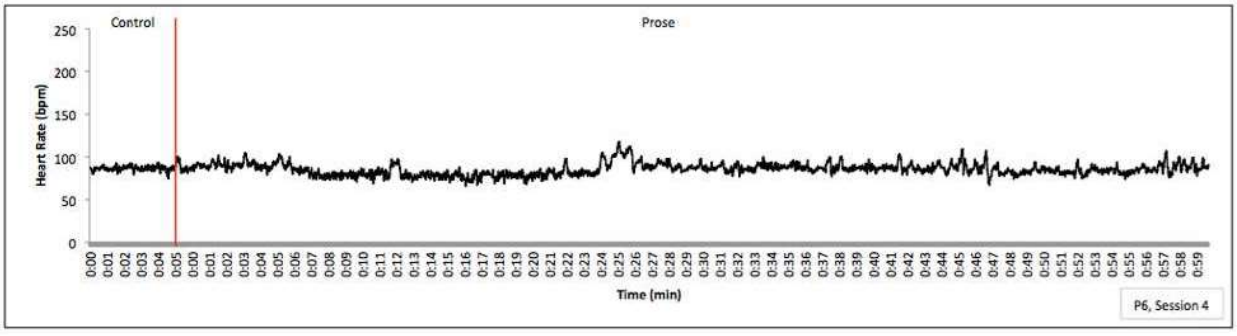


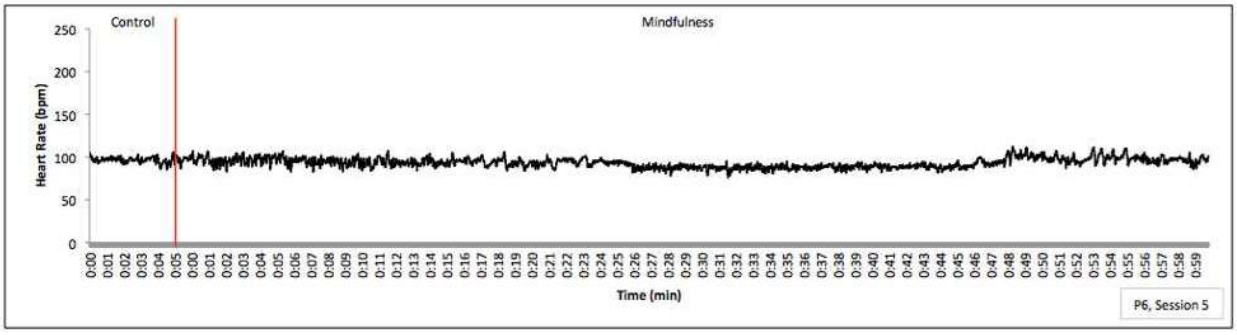
Figure N65. Average frequency of discrete displacement behaviors (top) and percent of engagement in continuous displacement behaviors (bottom) per condition for Sessions 1-8 for Participant 5.


Control
Prose
Heart Rate (bpm)
Time (min)
P6, Session 1


Control
Prose
Heart Rate (bpm)
Time (min)
P6, Session 2


Control
Prose
Heart Rate (bpm)
Time (min)
P6, Session 3


Control
Prose
Heart Rate (bpm)
Time (min)
P6, Session 4


Control
Mindfulness
Heart Rate (bpm)
Time (min)
P6, Session 5

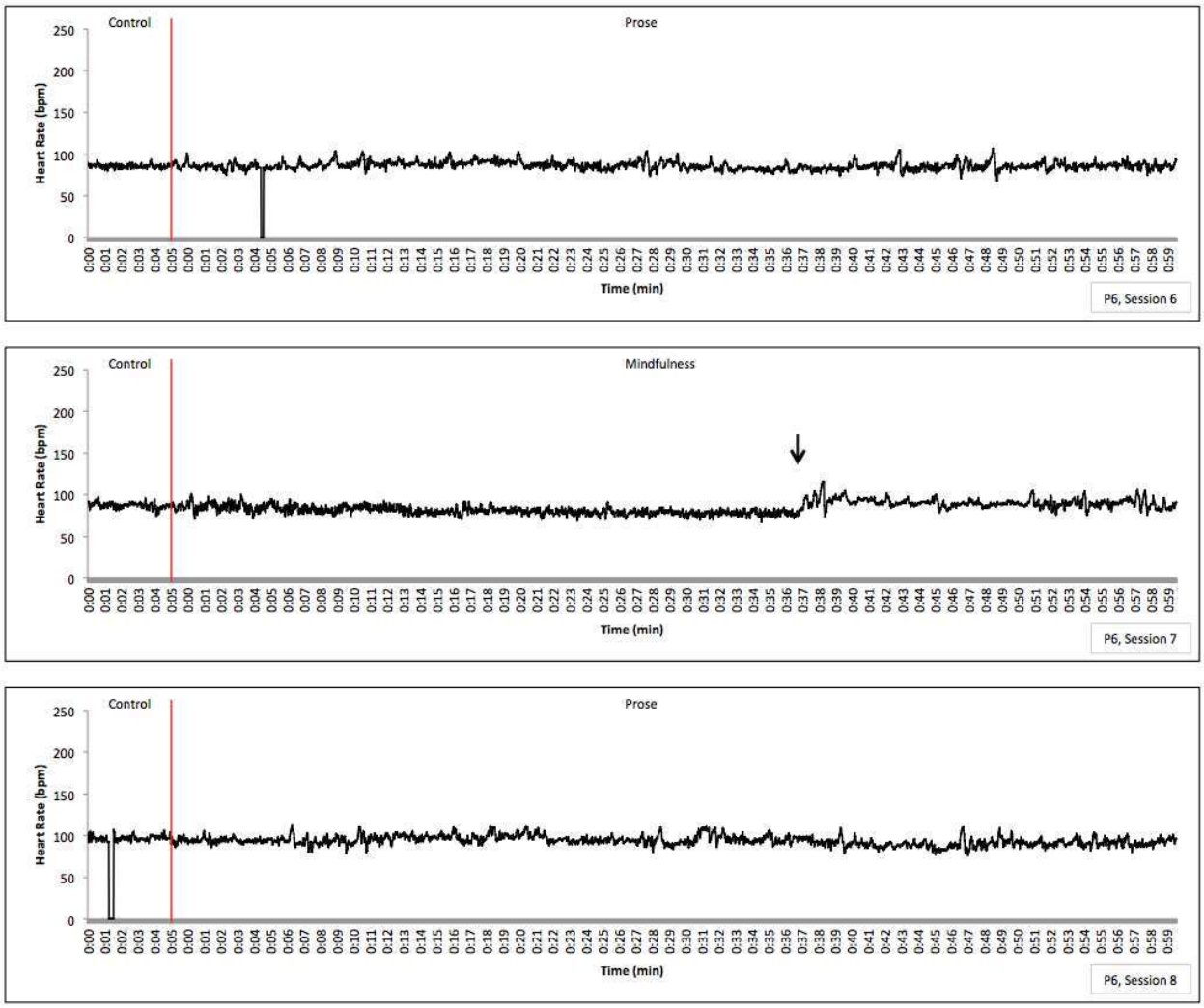
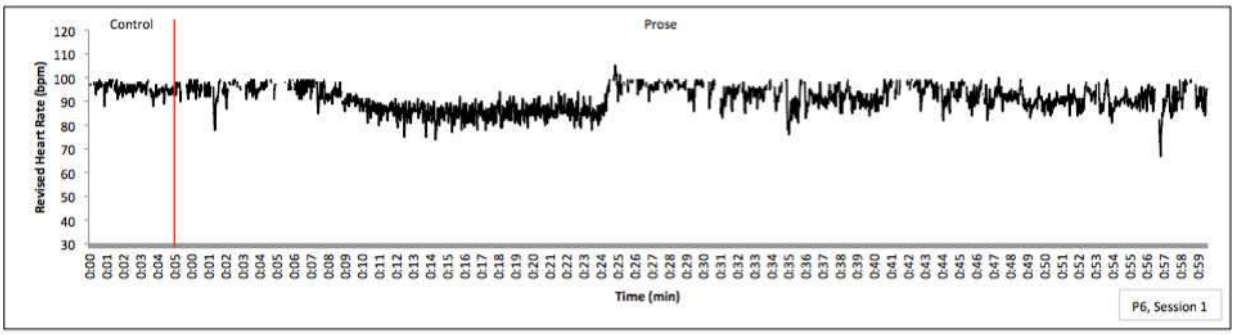
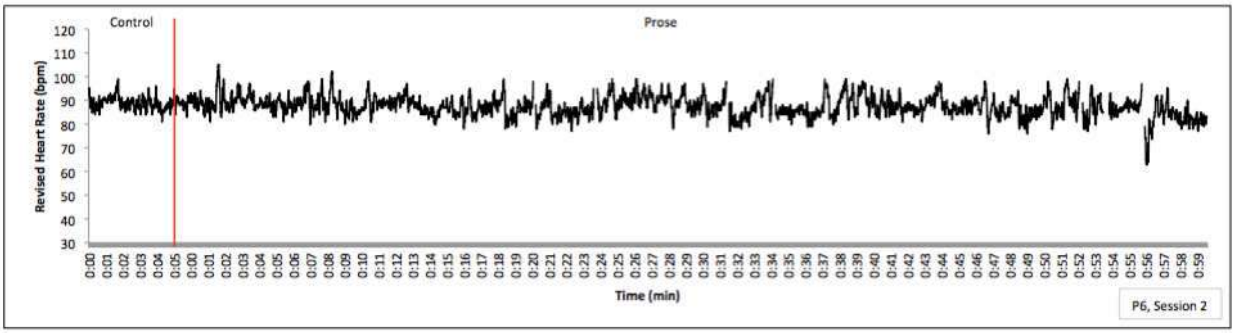
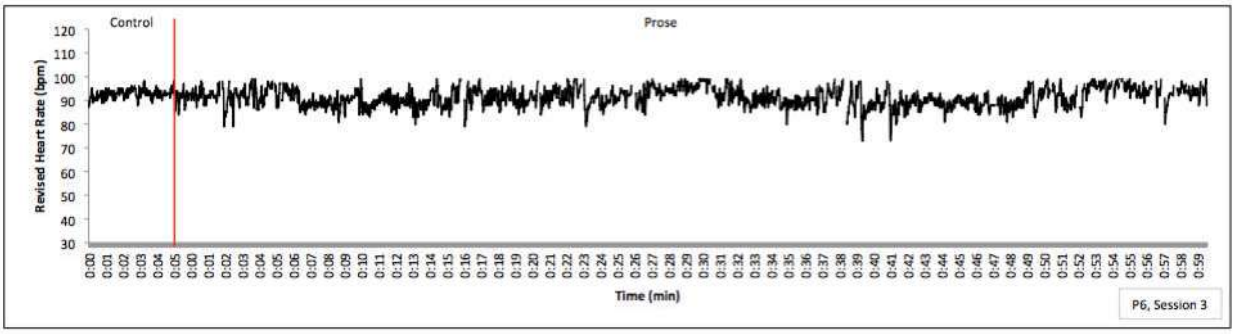
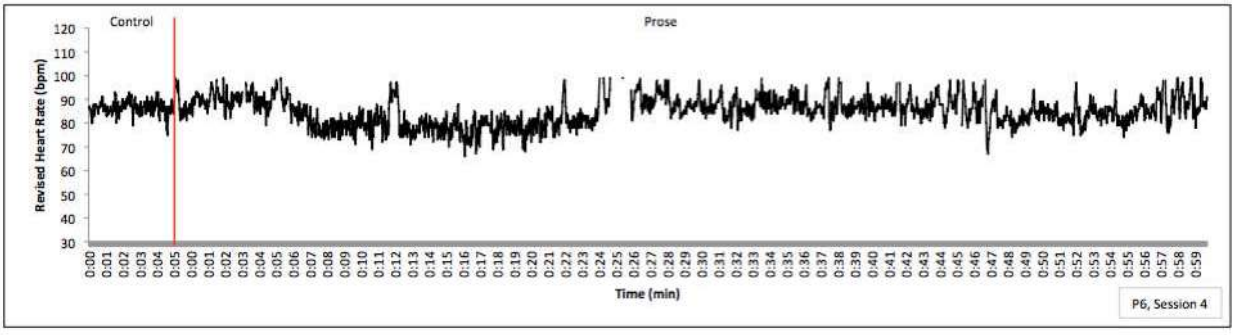


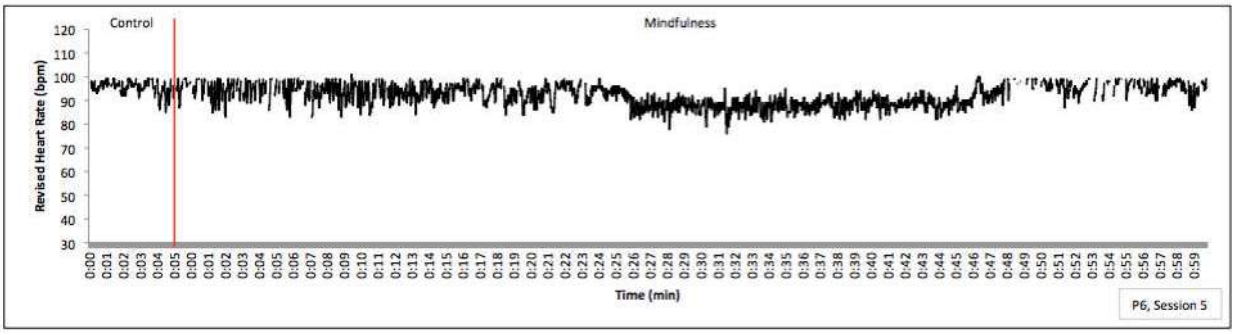
Figure N66. Heart rate for Sessions 1-8 for Participant 6. The asterisk in the graph for Session 7 indicates the point when noise interference from the hallway was audible in the video.


Control
Prose
Revised Heart Rate (bpm)
Time (min)
P6, Session 1


Control
Prose
Revised Heart Rate (bpm)
Time (min)
P6, Session 2


Control
Prose
Revised Heart Rate (bpm)
Time (min)
P6, Session 3


Control
Prose
Revised Heart Rate (bpm)
Time (min)
P6, Session 4


Control
Mindfulness
Revised Heart Rate (bpm)
Time (min)
P6, Session 5

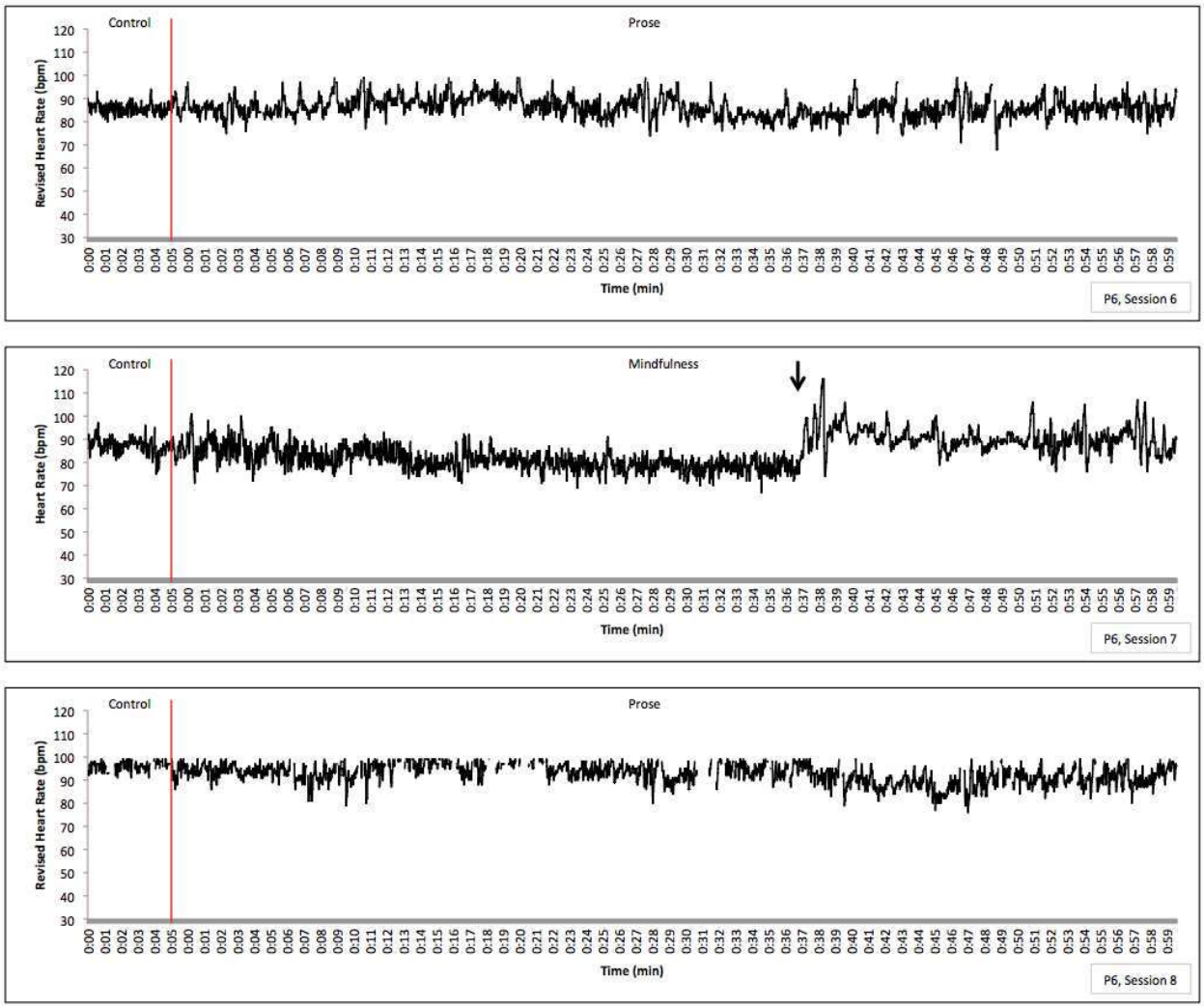


Figure N67. Revised heart rate for Sessions 1-8 for Participant 6. The asterisk in the graph for Session 7 indicates the point when noise interference from the hallway was audible in the video.

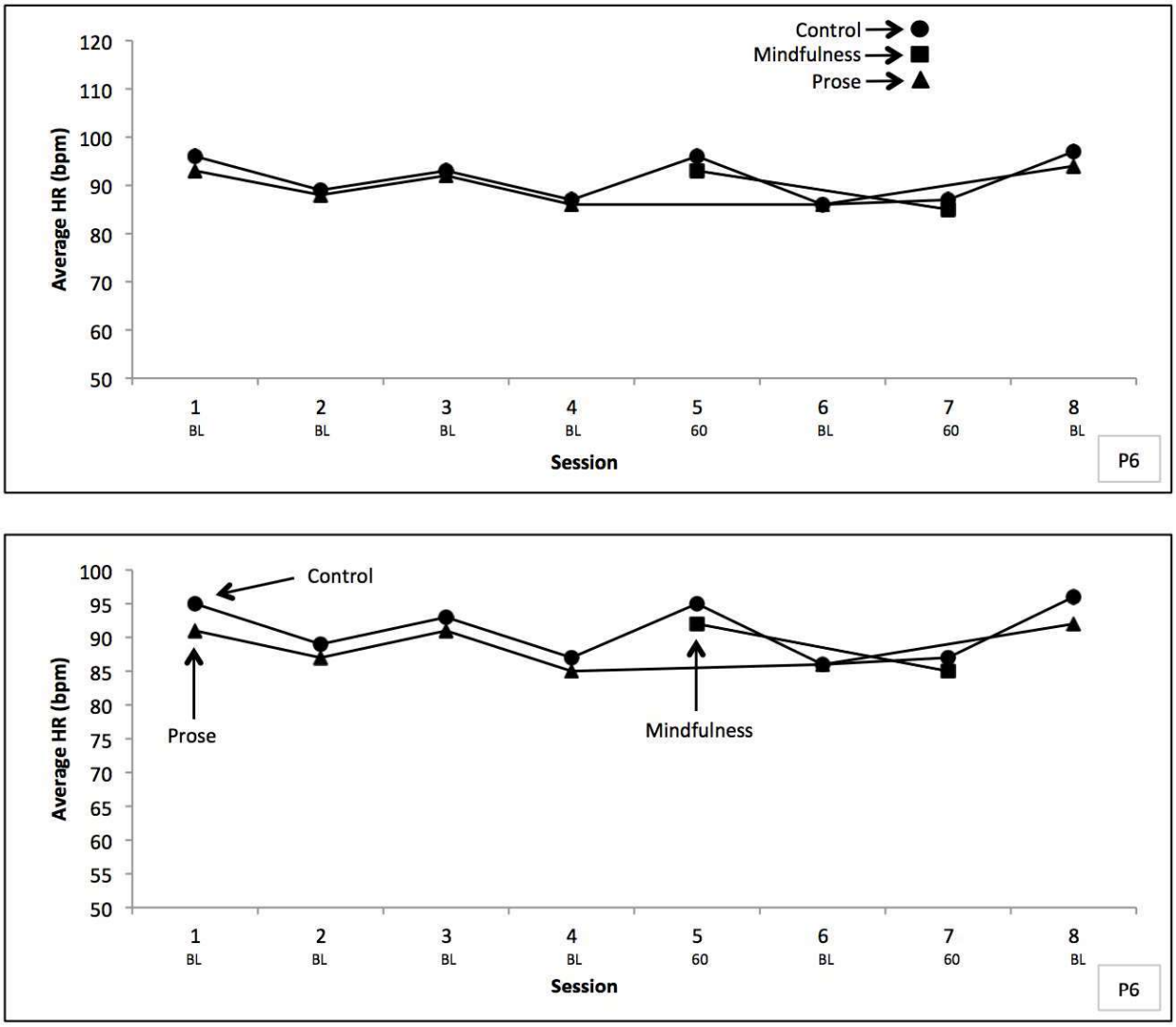


Figure N68. Average heart rate (top) and revised average heart rate (bottom) per condition for Sessions 1-8 for Participant 6.

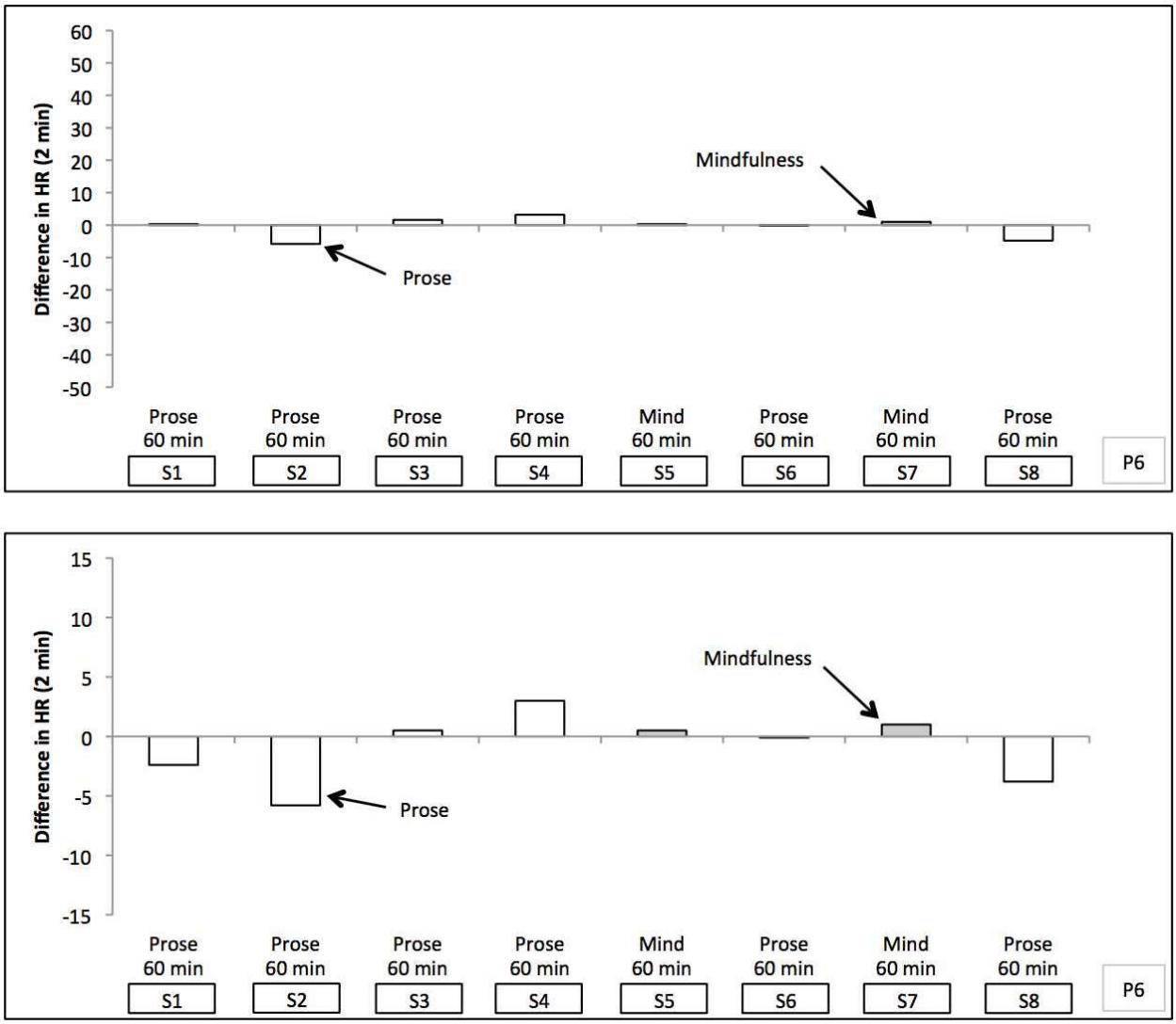


Figure N69. The difference (top) and revised difference (bottom) in average heart rate from the final 2 minutes of control to the final 2 minutes of each condition for Sessions 1-8 for Participant 6.

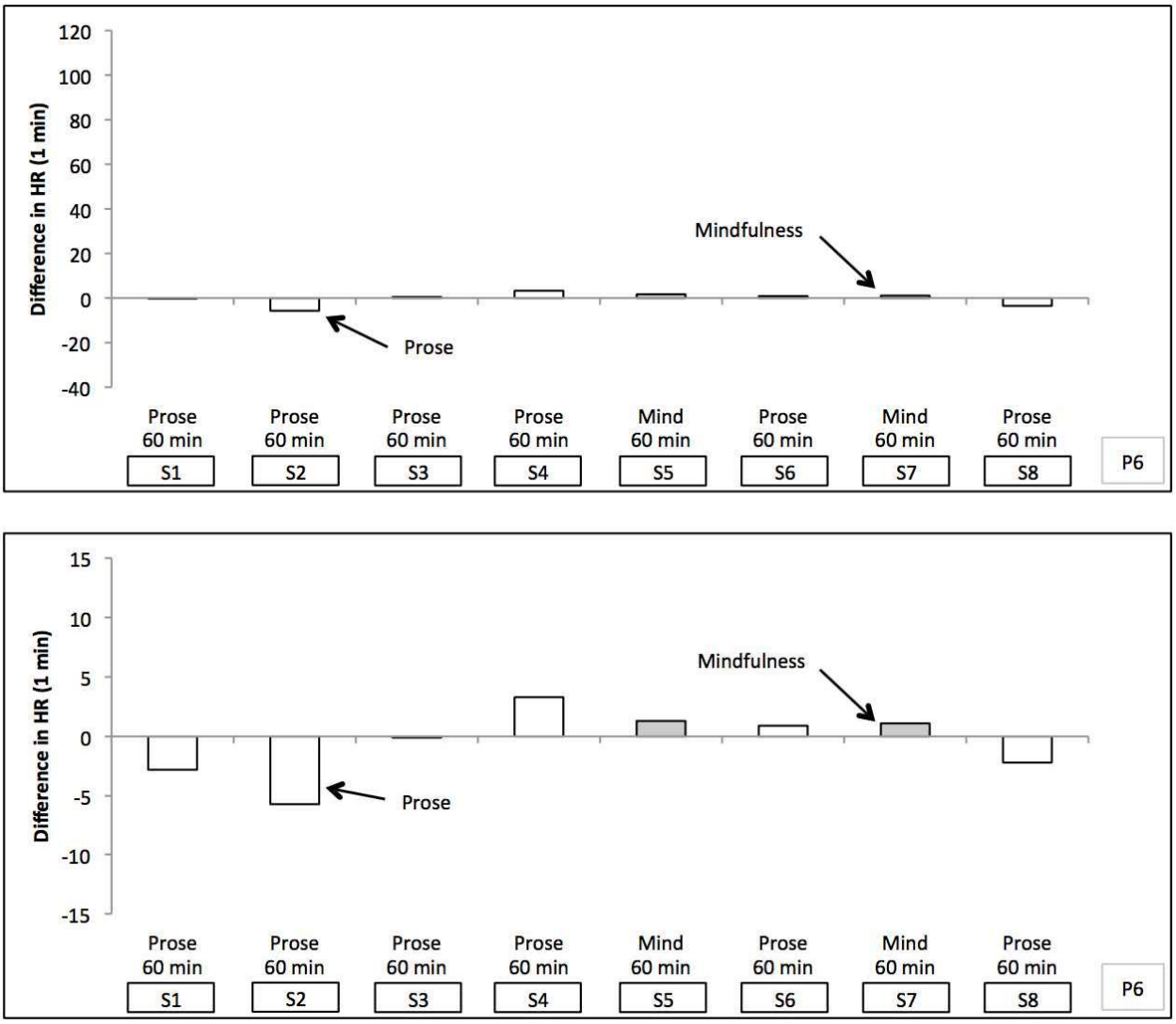


Figure N70. The difference (top) and revised difference (bottom) in average heart rate from the final 1 minute of control to the final 1 minute of each condition for Sessions 1-8 for Participant 6.

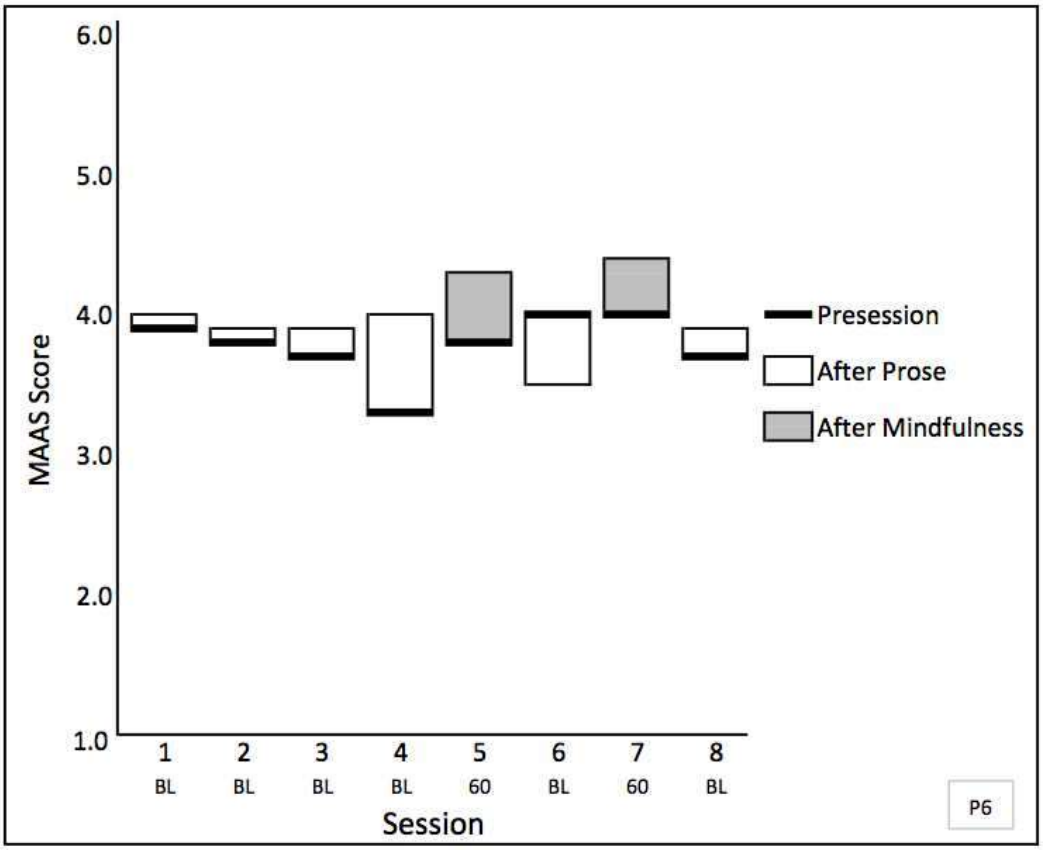


Figure N71. Pre-, mid- (when applicable), and post-session MAAS scores for Sessions 1-8 for Participant 6, where higher scores indicate a higher level of mindfulness.

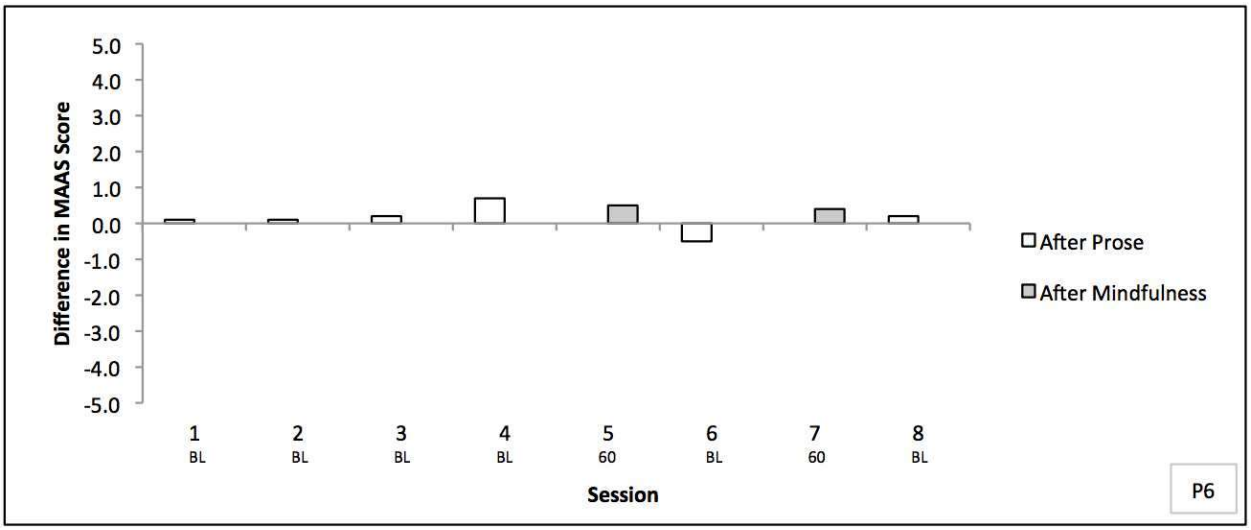


Figure N72. The difference in MAAS scores pre-session to post-prose and pre-session to post-mindfulness for Sessions 1-8 for Participant 6.

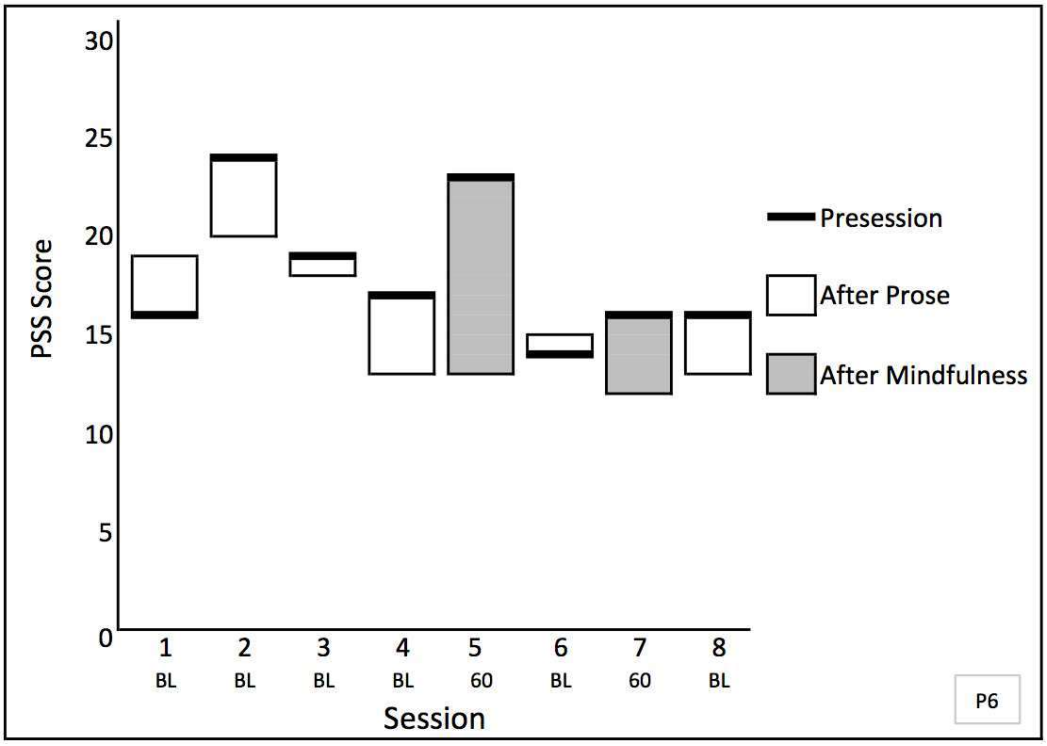


Figure N73. Pre-, mid- (when applicable), and post-session PSS scores for Sessions 1-8 for Participant 6, where higher scores indicate a higher level of stress.

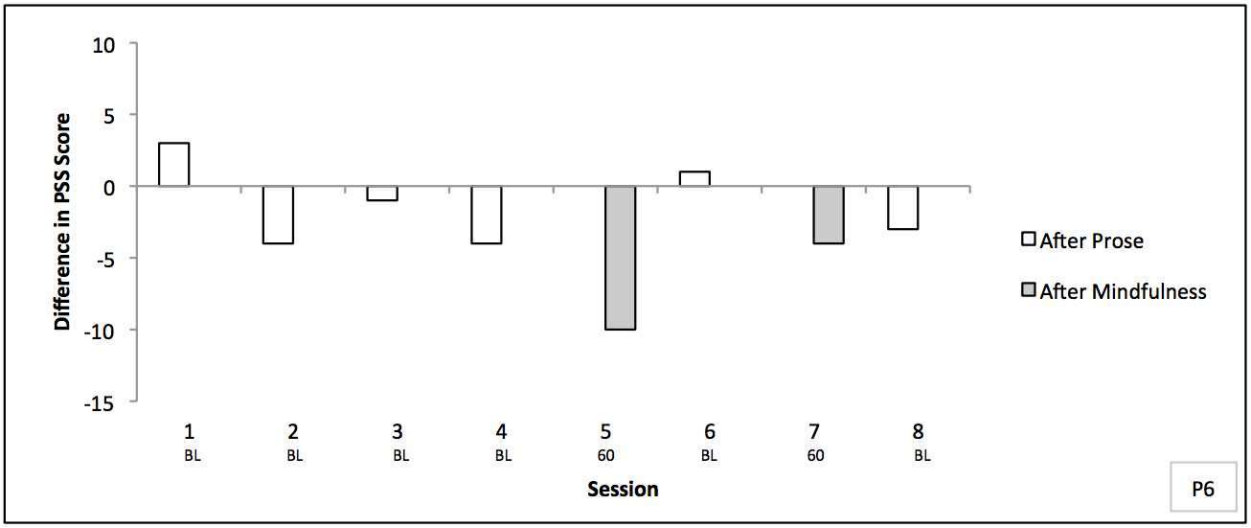
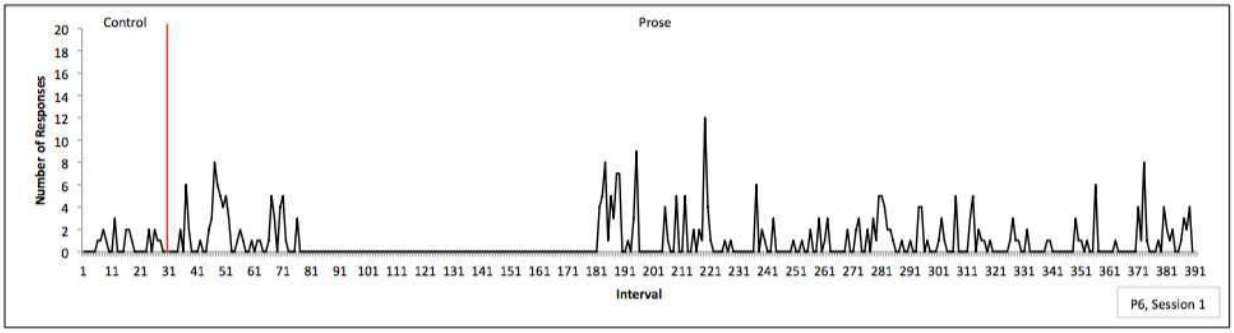
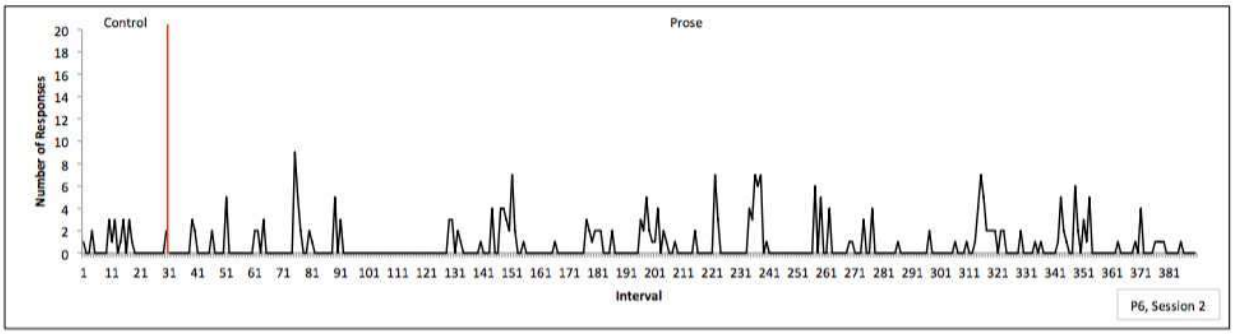
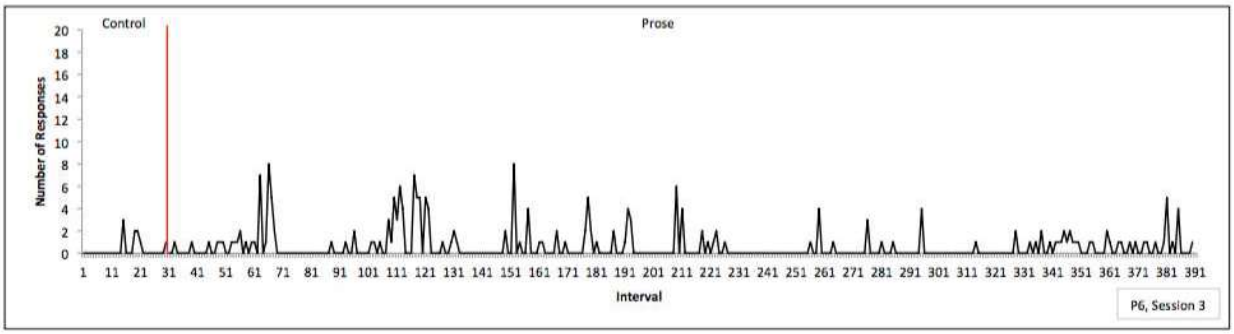
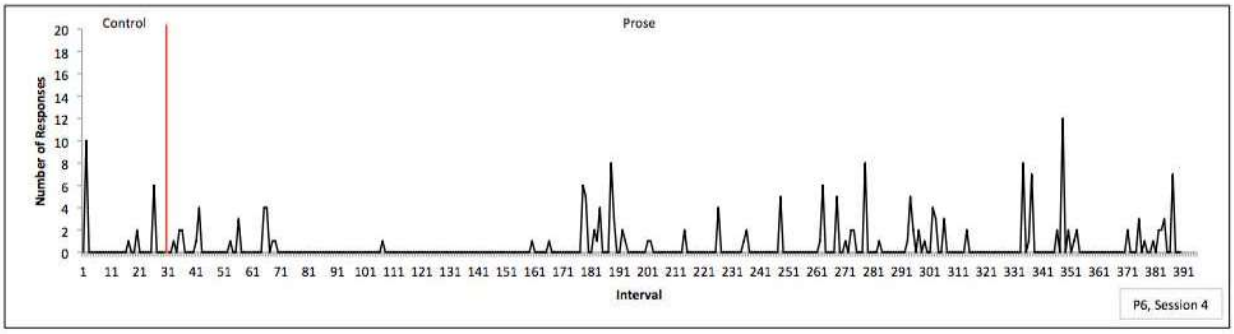


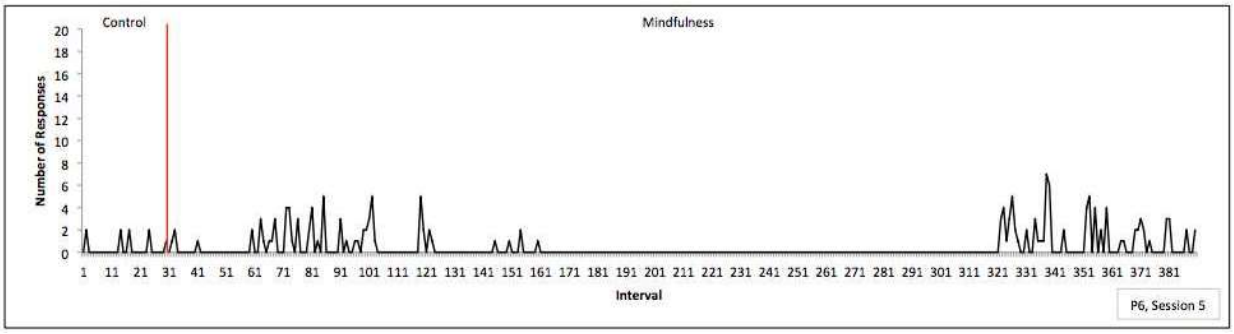
Figure N74. The difference in PSS scores pre-session to post-prose and pre-session to post-mindfulness for Sessions 1-8 for Participant 6.


Control
Prose
Number of Responses
Interval
P6, Session 1


Control
Prose
Number of Responses
Interval
P6, Session 2


Control
Prose
Number of Responses
Interval
P6, Session 3


Control
Prose
Number of Responses
Interval
P6, Session 4


Control
Mindfulness
Number of Responses
Interval
P6, Session 5

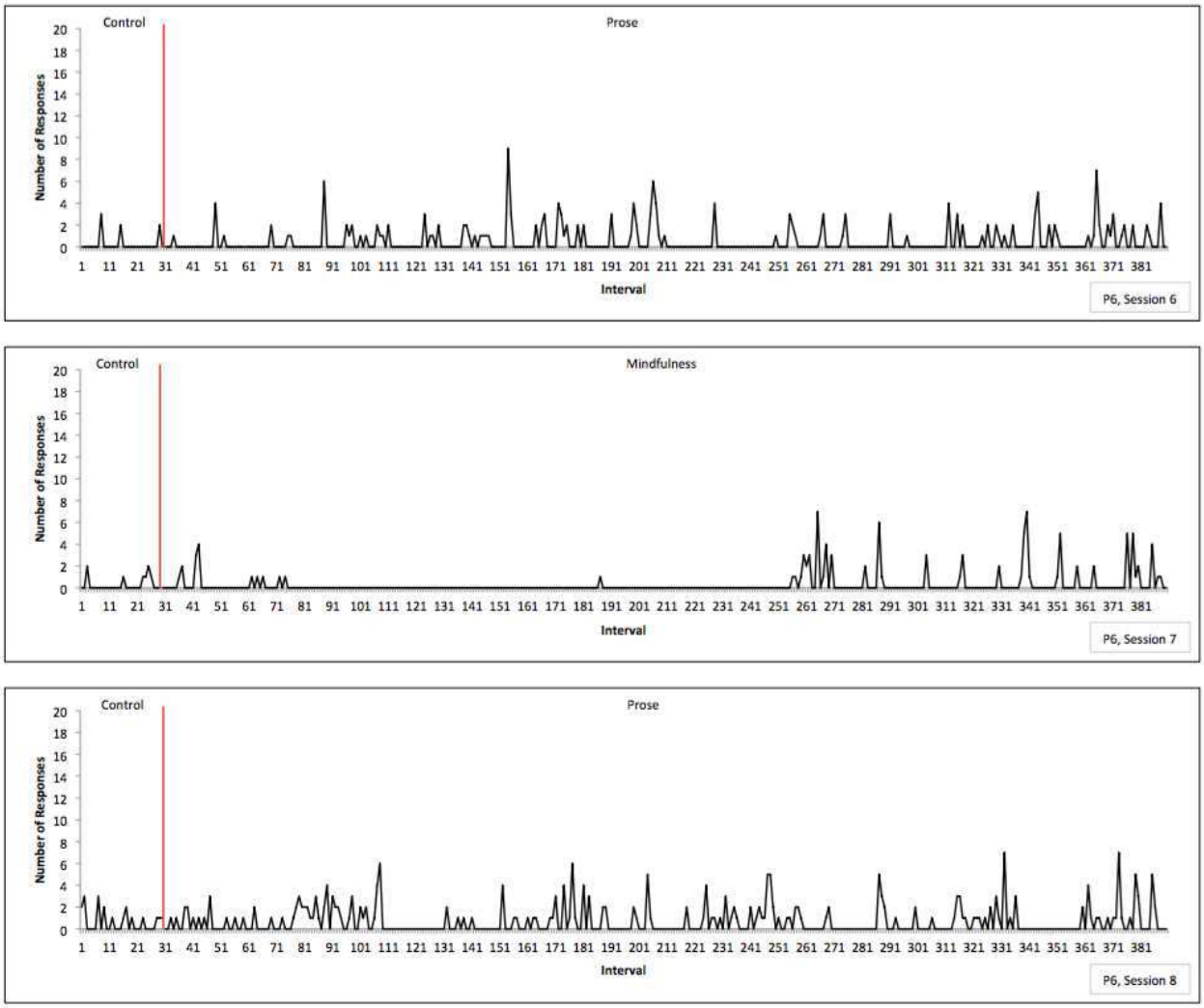
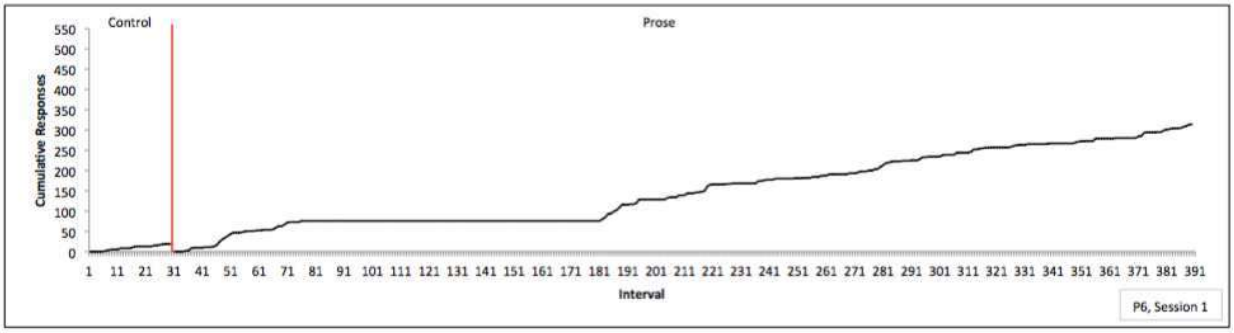
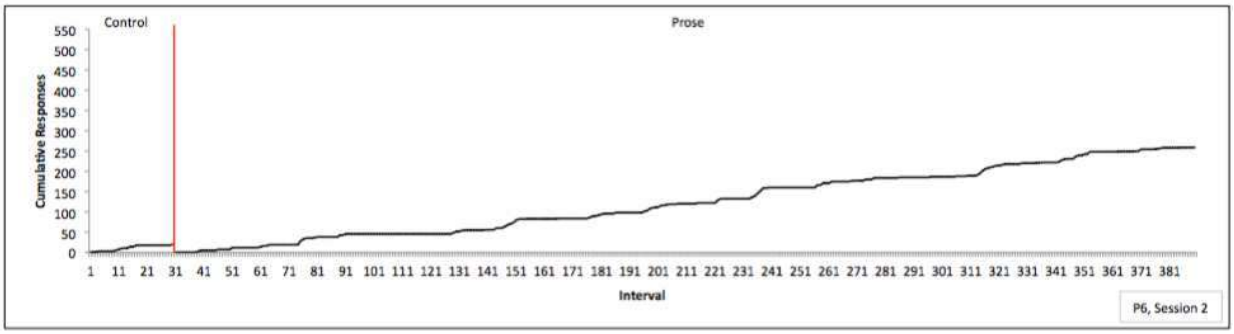
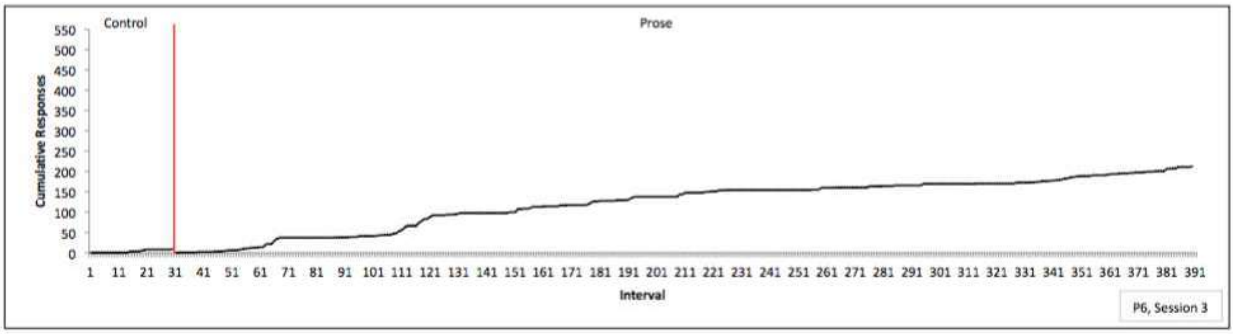
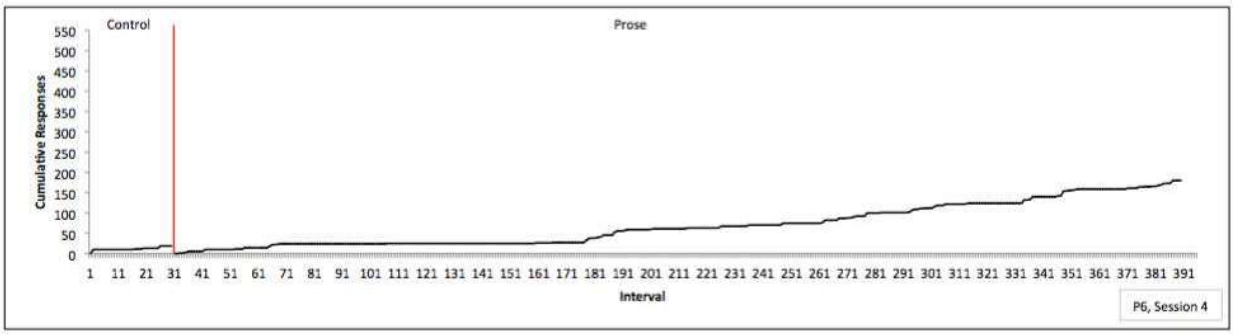


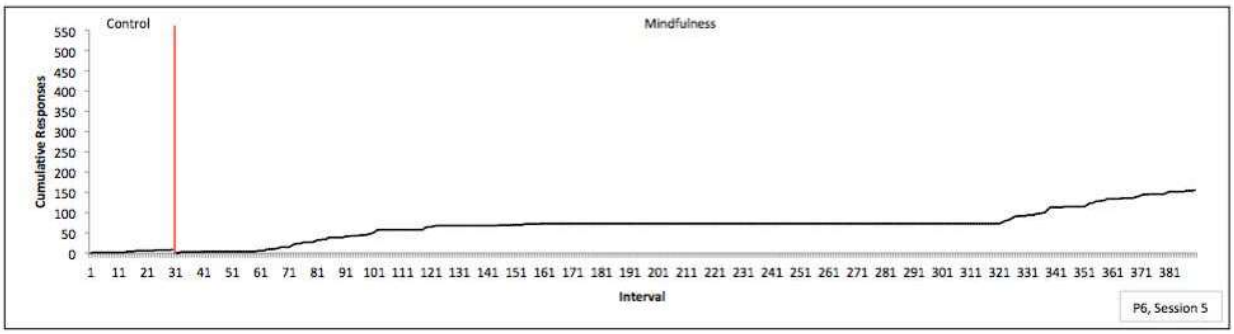
Figure N75. The number of displacement behaviors emitted per 10-second interval for Sessions 1-8 for Participant 6.


Control
Prose
Cumulative Responses
Interval
P6, Session 1


Control
Prose
Cumulative Responses
Interval
P6, Session 2


Control
Prose
Cumulative Responses
Interval
P6, Session 3


Control
Prose
Cumulative Responses
Interval
P6, Session 4


Control
Mindfulness
Cumulative Responses
Interval
P6, Session 5

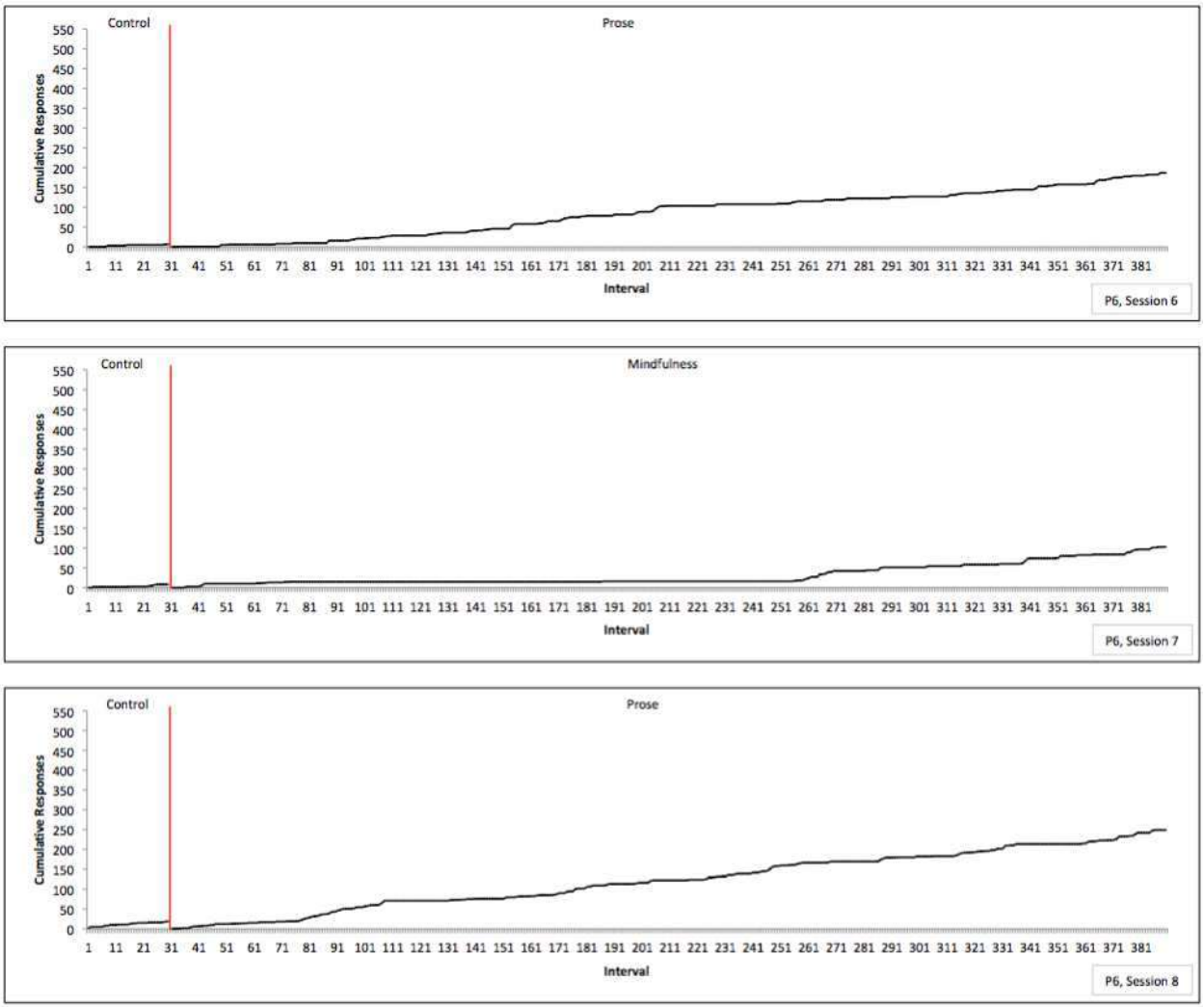
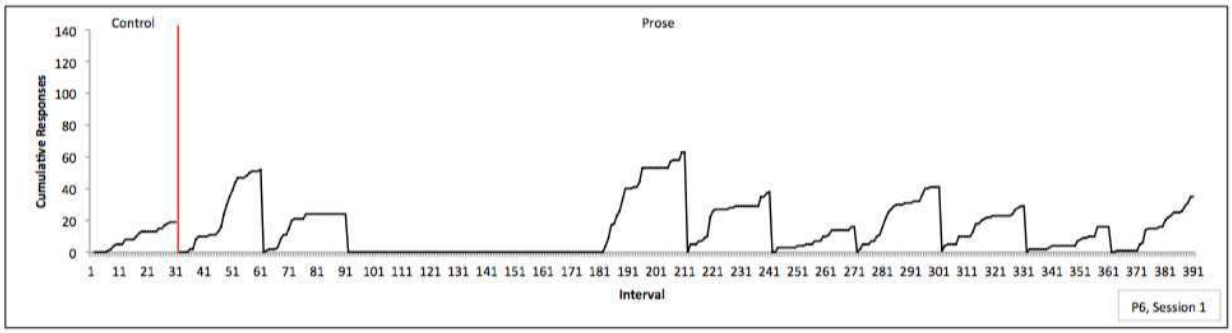
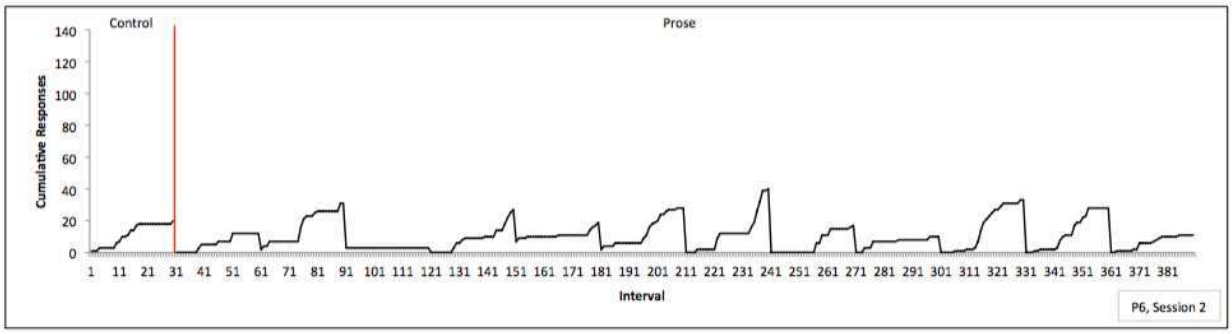
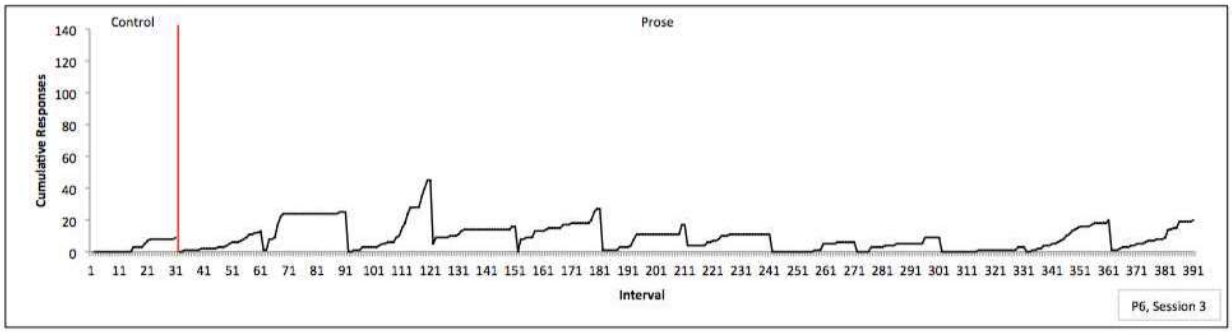
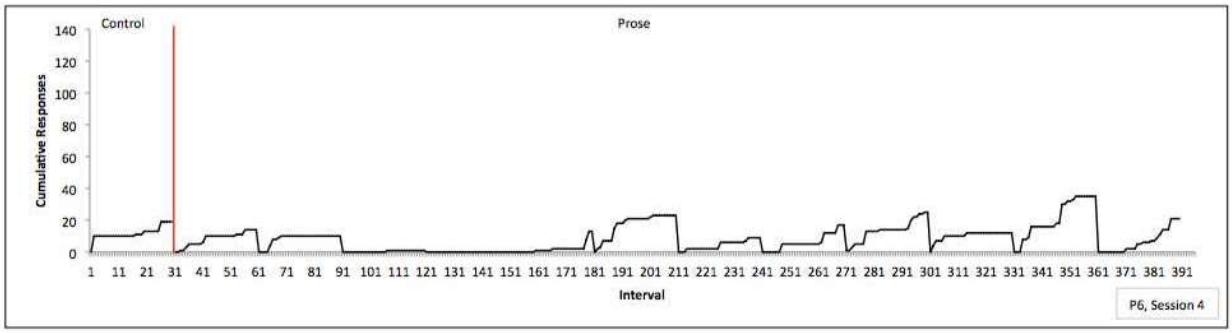


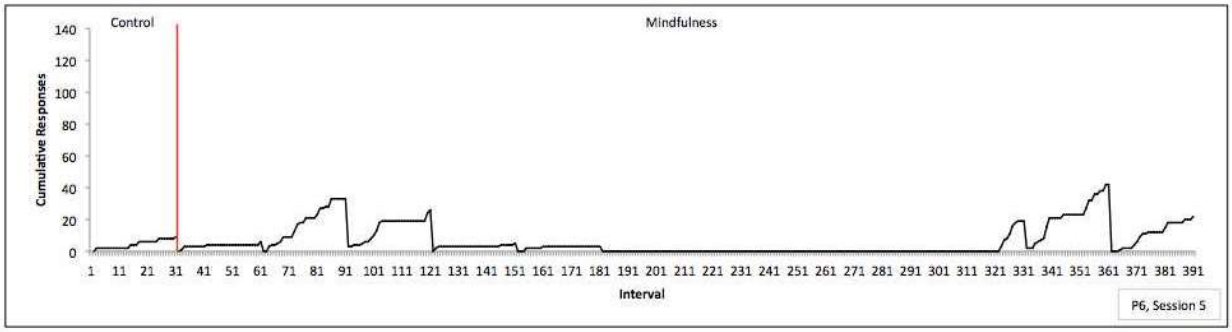
Figure N76. Cumulative displacement behaviors per 10-second interval for Sessions 1-8 for Participant 6.


Control
Prose
Cumulative Responses
Interval
P6, Session 1


Control
Prose
Cumulative Responses
Interval
P6, Session 2


Control
Prose
Cumulative Responses
Interval
P6, Session 3


Control
Prose
Cumulative Responses
Interval
P6, Session 4


Control
Mindfulness
Cumulative Responses
Interval
P6, Session 5

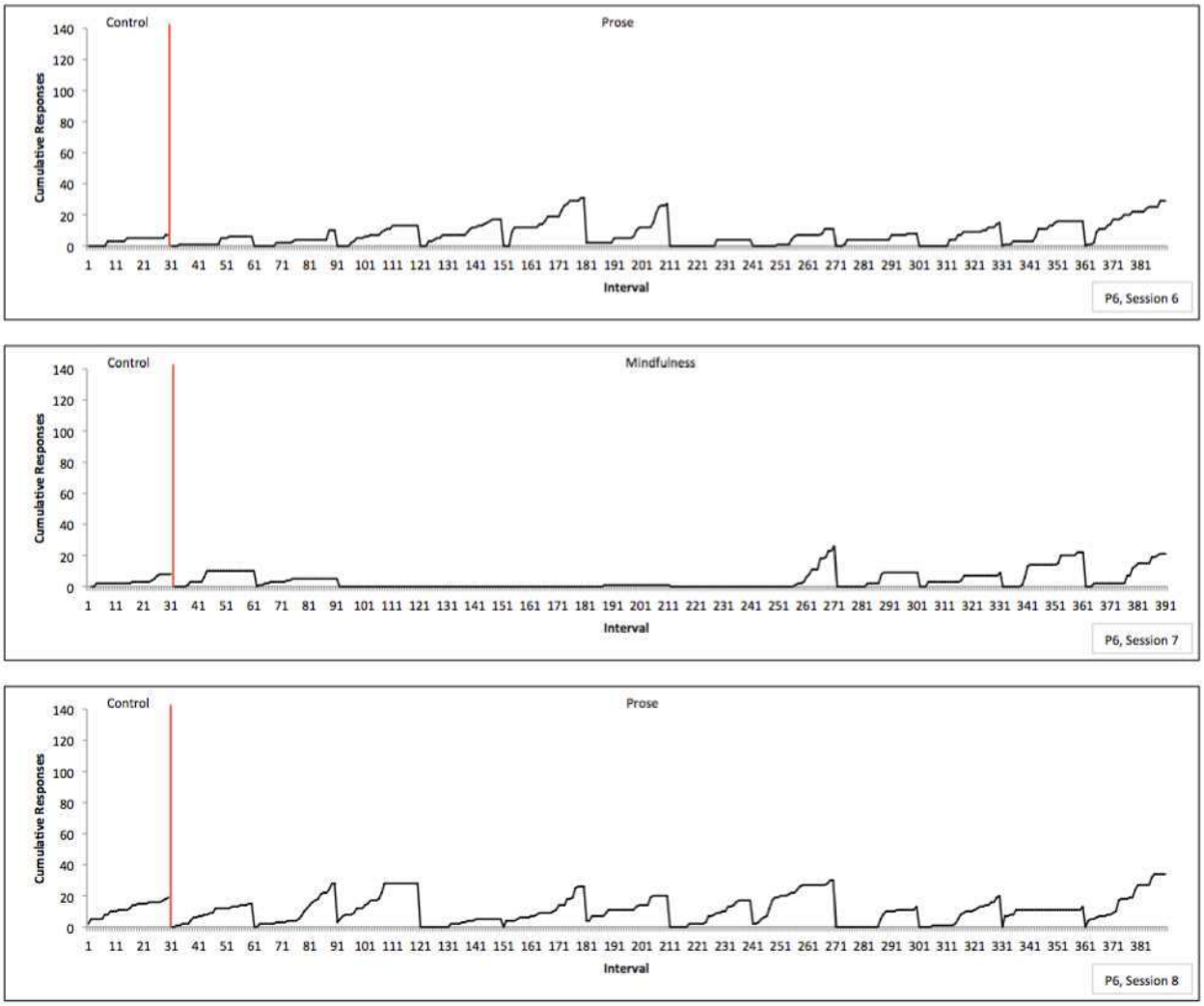


Figure N77. Cumulative displacement behaviors per 10-second interval with pen reset every 5 minutes for Sessions 1-8 for Participant 6.

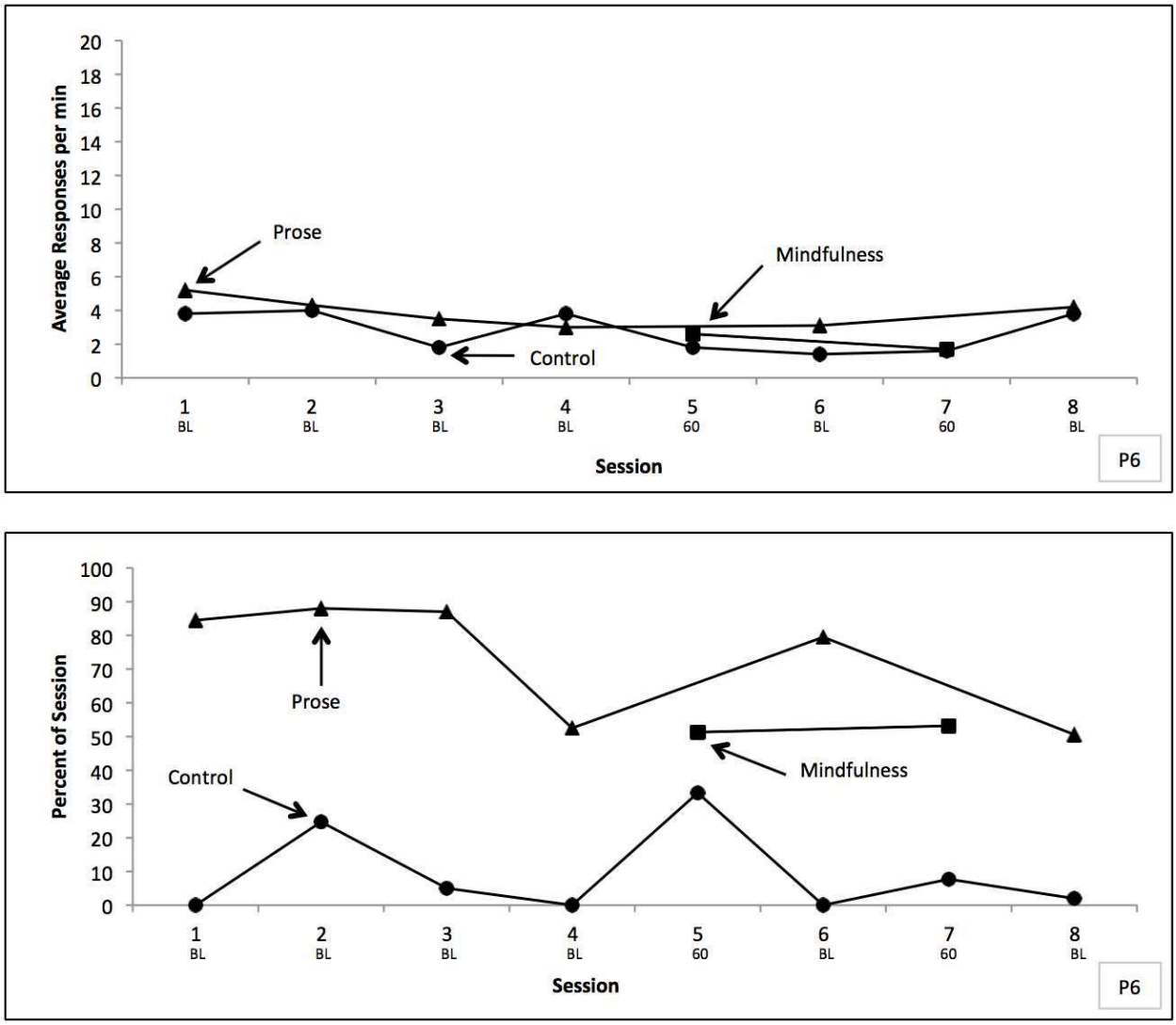
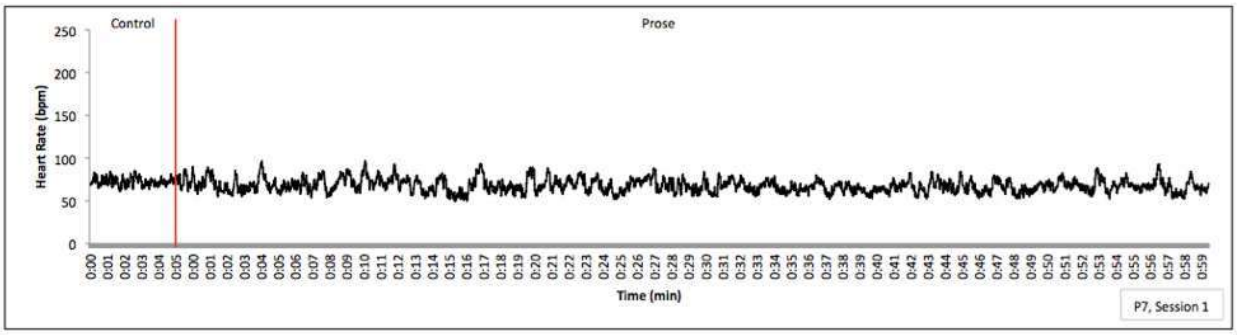
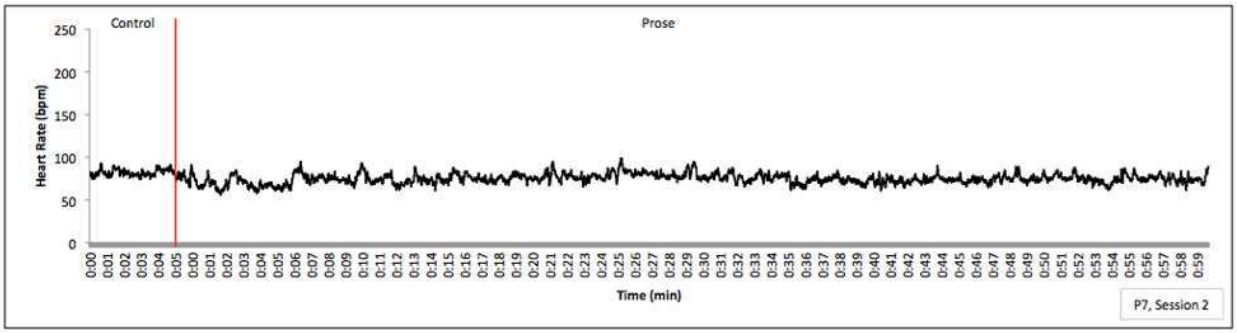
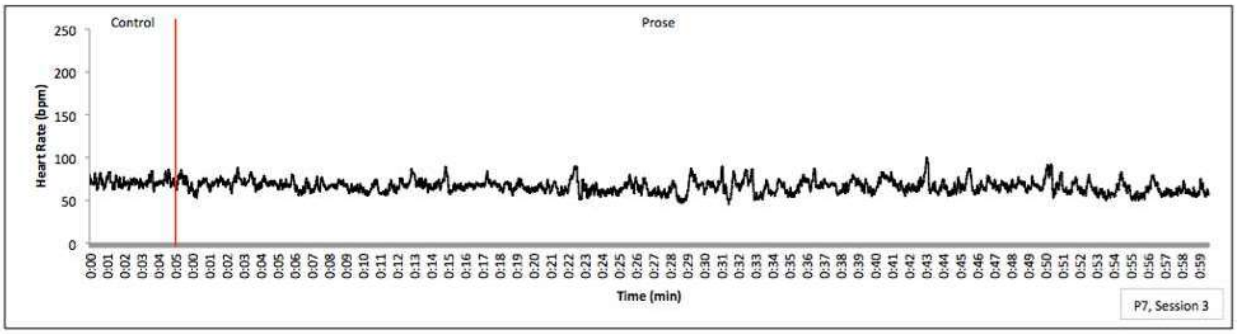
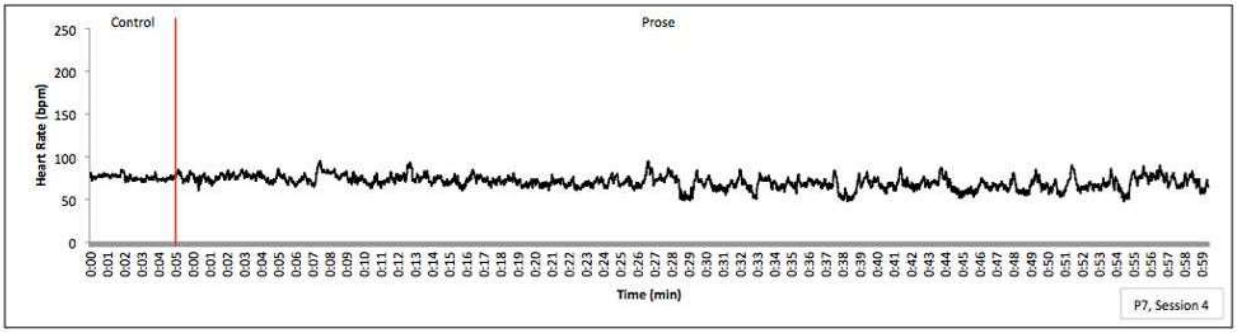


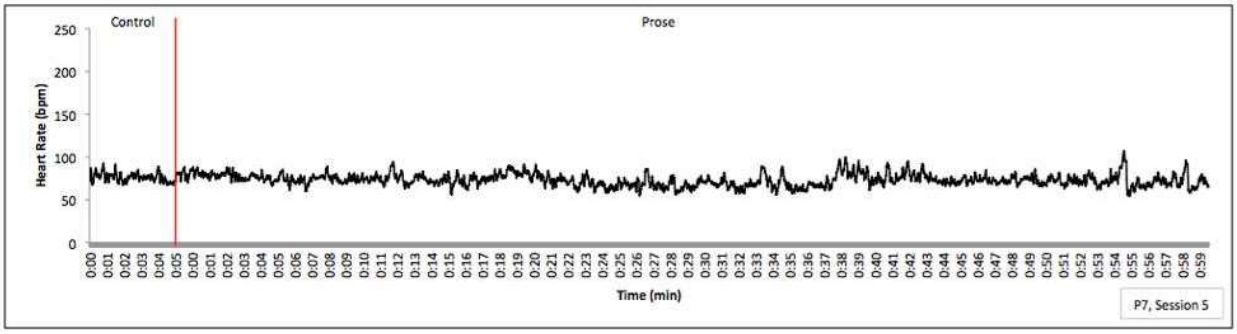
Figure N78. Average frequency of discrete displacement behaviors (top) and percent of engagement in continuous displacement behaviors (bottom) per condition for Sessions 1-8 for Participant 6.


Control
Prose
Heart Rate (bpm)
Time (min)
P7, Session 1


Control
Prose
Heart Rate (bpm)
Time (min)
P7, Session 2


Control
Prose
Heart Rate (bpm)
Time (min)
P7, Session 3


Control
Prose
Heart Rate (bpm)
Time (min)
P7, Session 4


Control
Prose
Heart Rate (bpm)
Time (min)
P7, Session 5

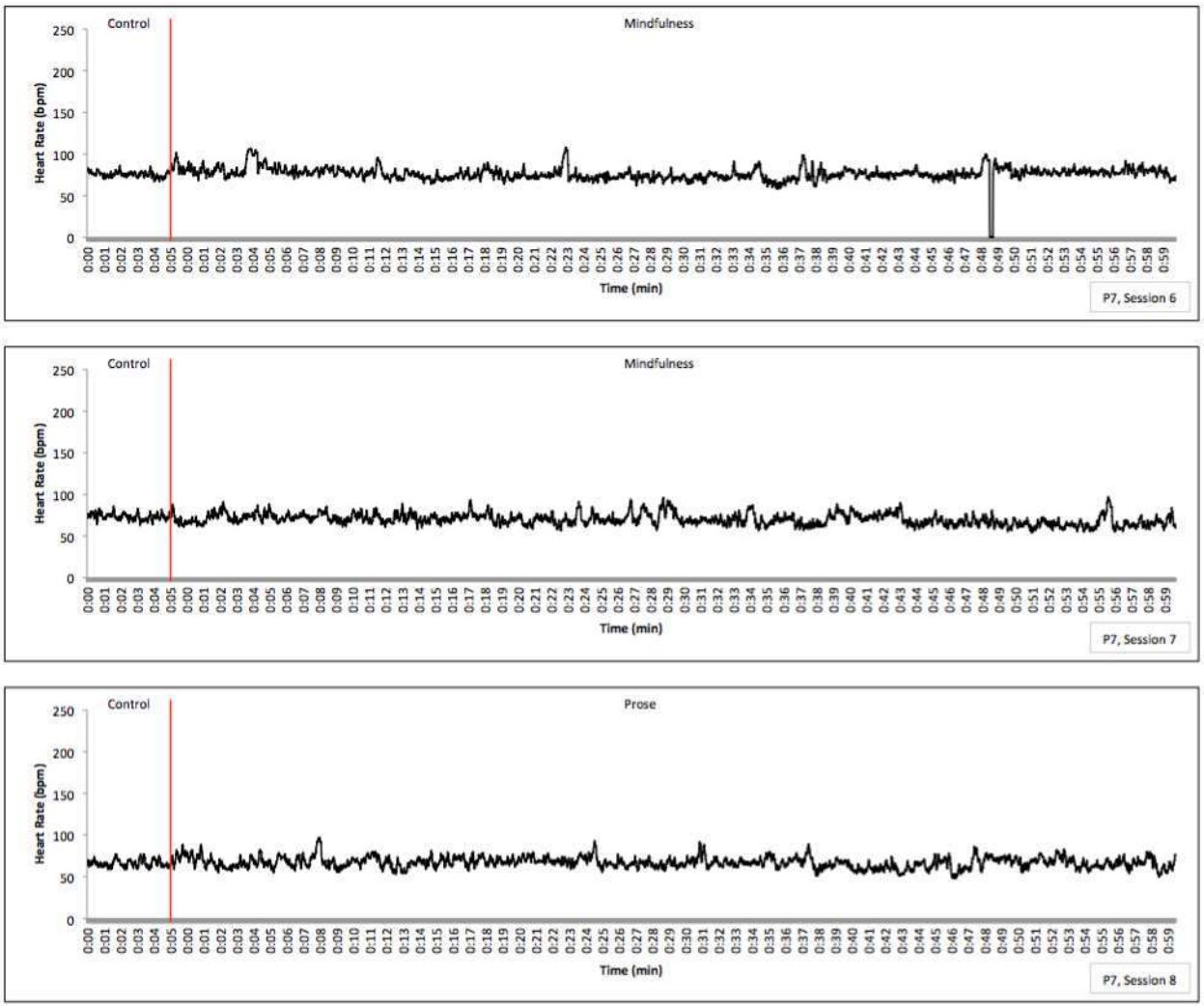
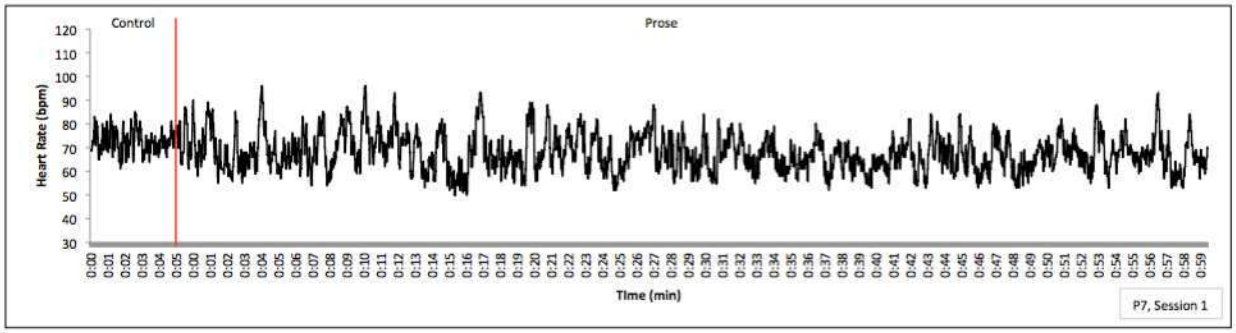
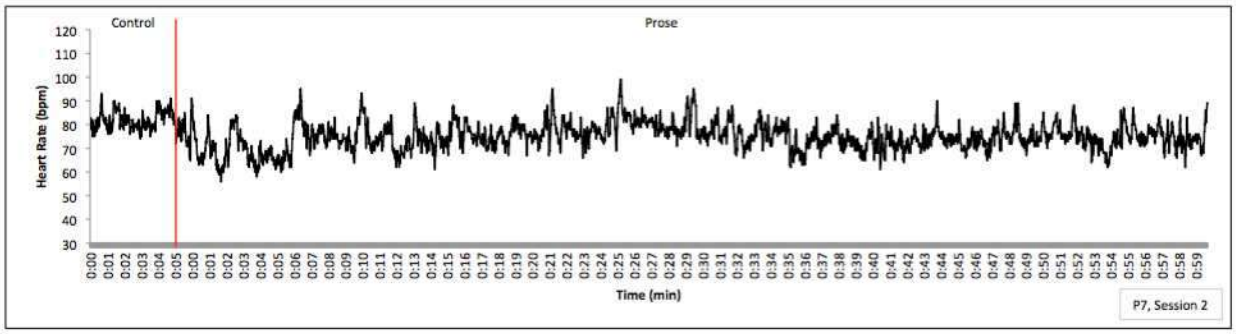
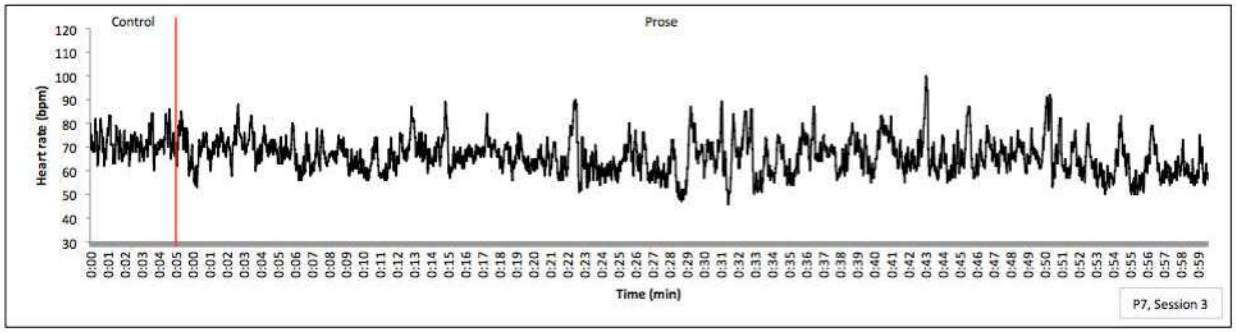
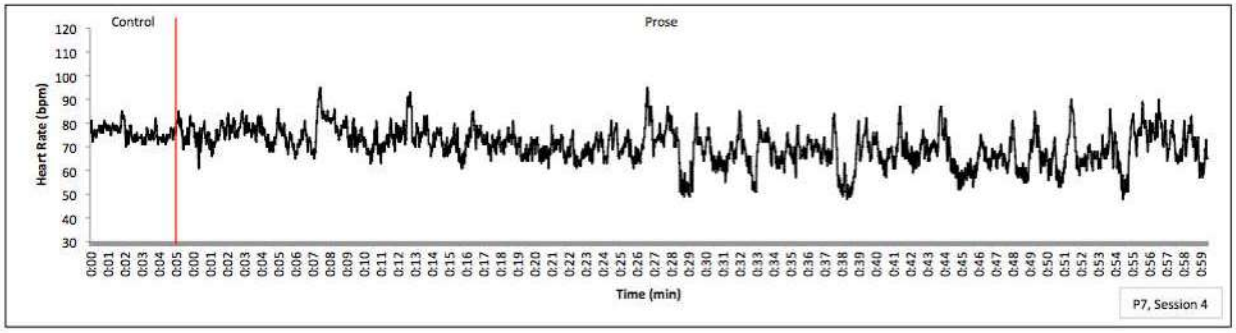


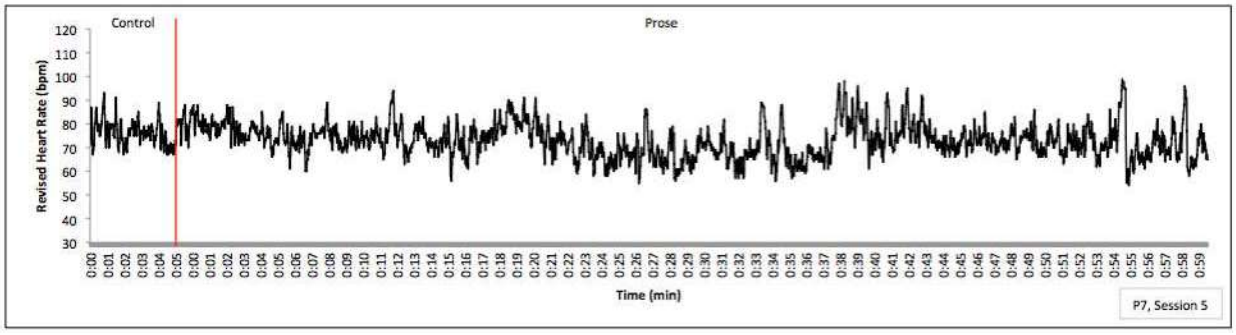
Figure N79. Heart rate for Sessions 1-8 for Participant 7.


Control
Prose
Heart Rate (bpm)
Time (min)
P7, Session 1


Control
Prose
Heart Rate (bpm)
Time (min)
P7, Session 2


Control
Prose
Heart rate (bpm)
Time (min)
P7, Session 3


Control
Prose
Heart Rate (bpm)
Time (min)
P7, Session 4


Control
Prose
Revised Heart Rate (bpm)
Time (min)
P7, Session 5

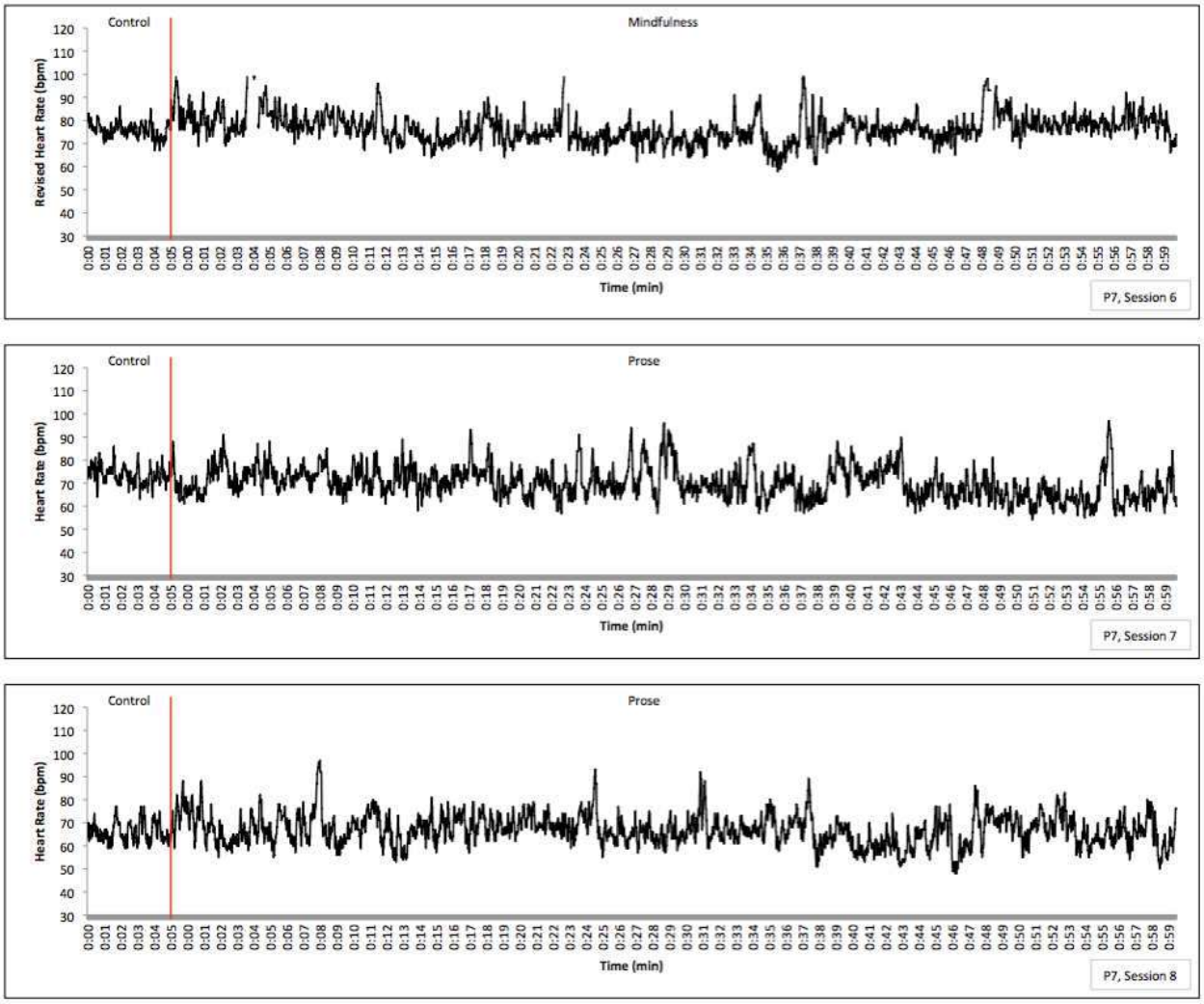


Figure N80. Revised heart rate for Sessions 1-8 for Participant 7.

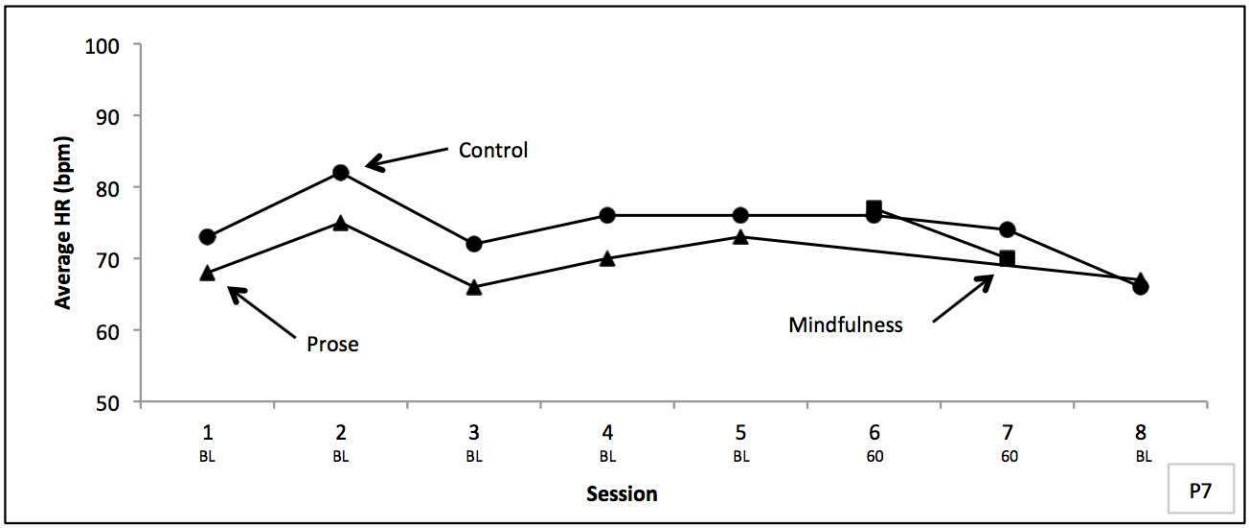


Figure N81. Average heart rate per condition for Sessions 1-8 for Participant 7.

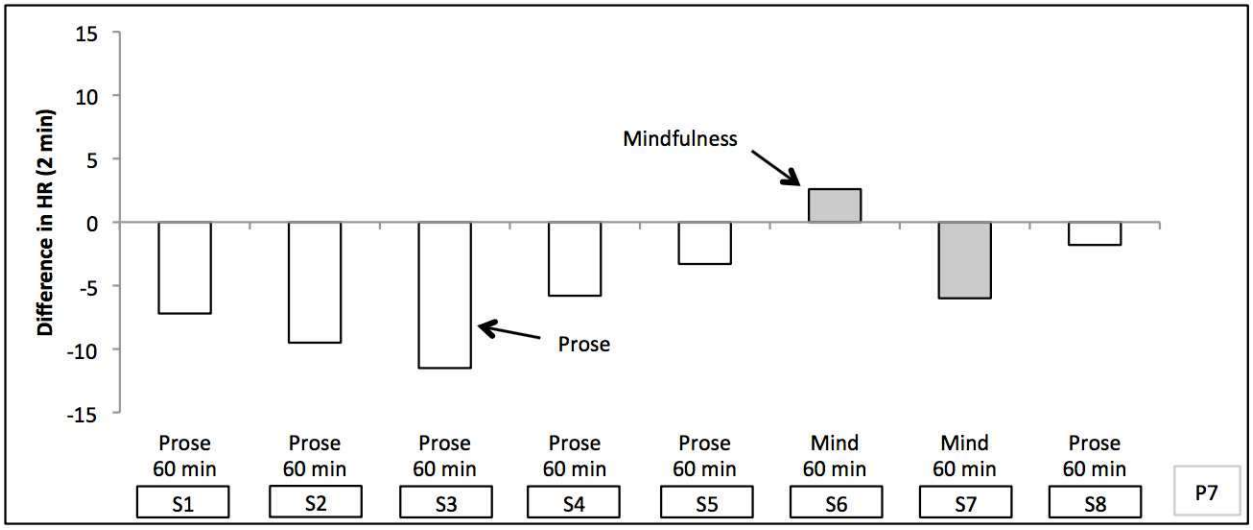


Figure N82. The difference (top) and revised difference (bottom) in average heart rate from the final 2 minutes of control to the final 2 minutes of each condition for Sessions 1-8 for Participant 7.

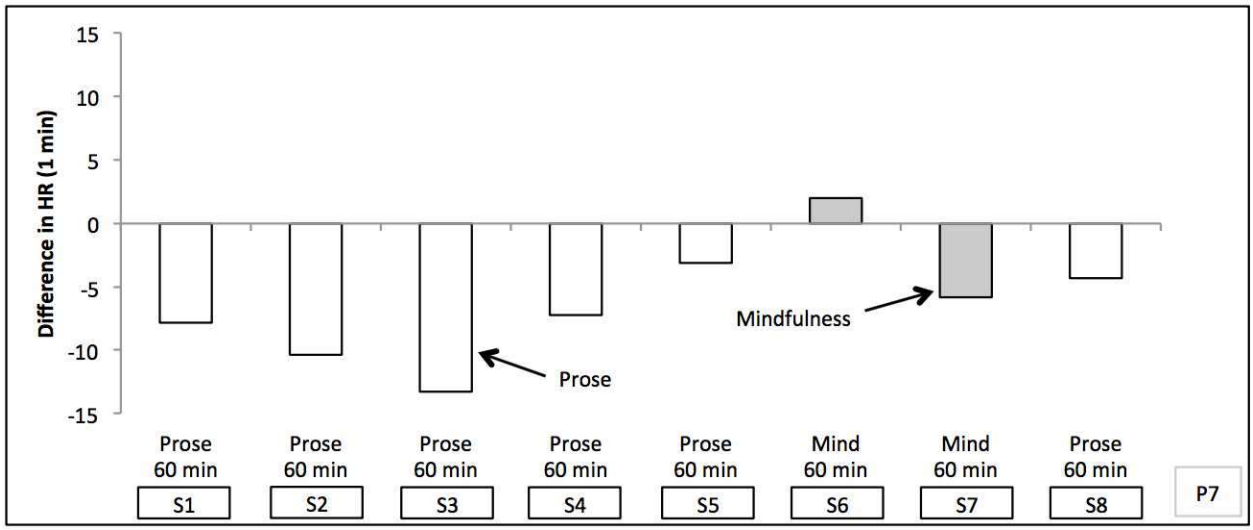


Figure N83. The difference (top) and revised difference (bottom) in average heart rate from the final 1 minute of control to the final 1 minute of each condition for Sessions 1-8 for Participant 7.

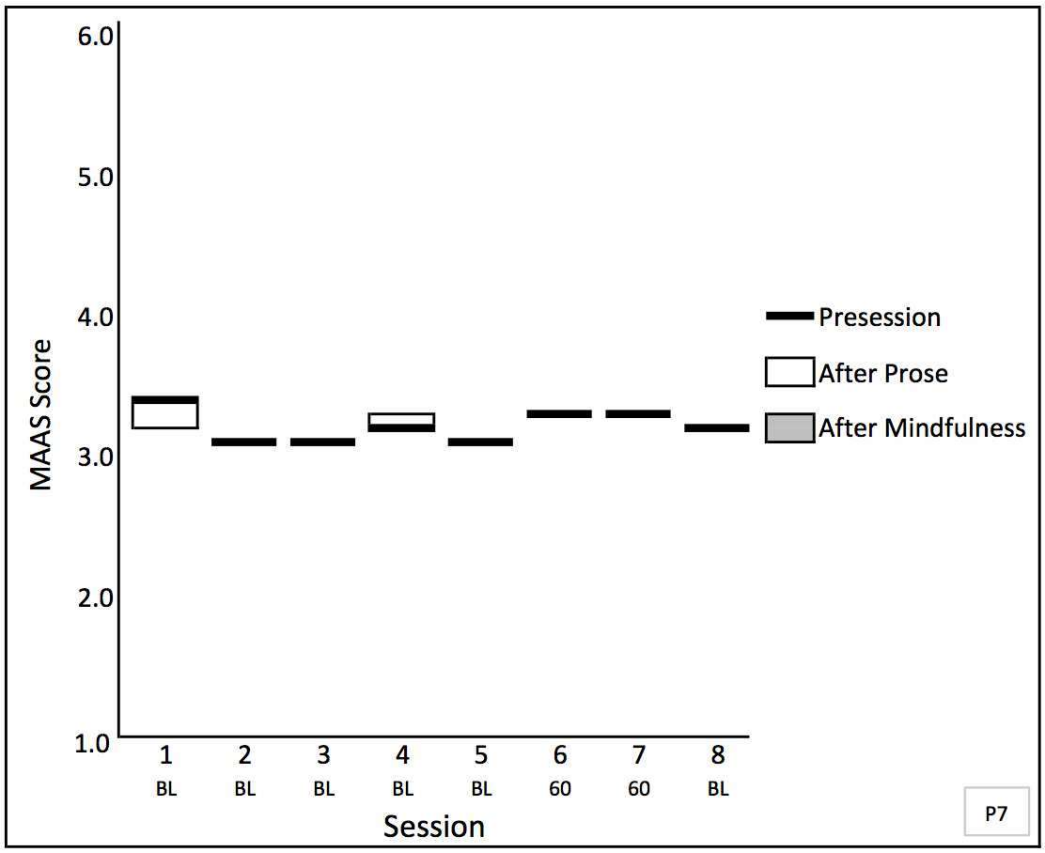


Figure N84. Pre-, mid- (when applicable), and post-session MAAS scores for Sessions 1-8 for Participant 7, where higher scores indicate a higher level of mindfulness.

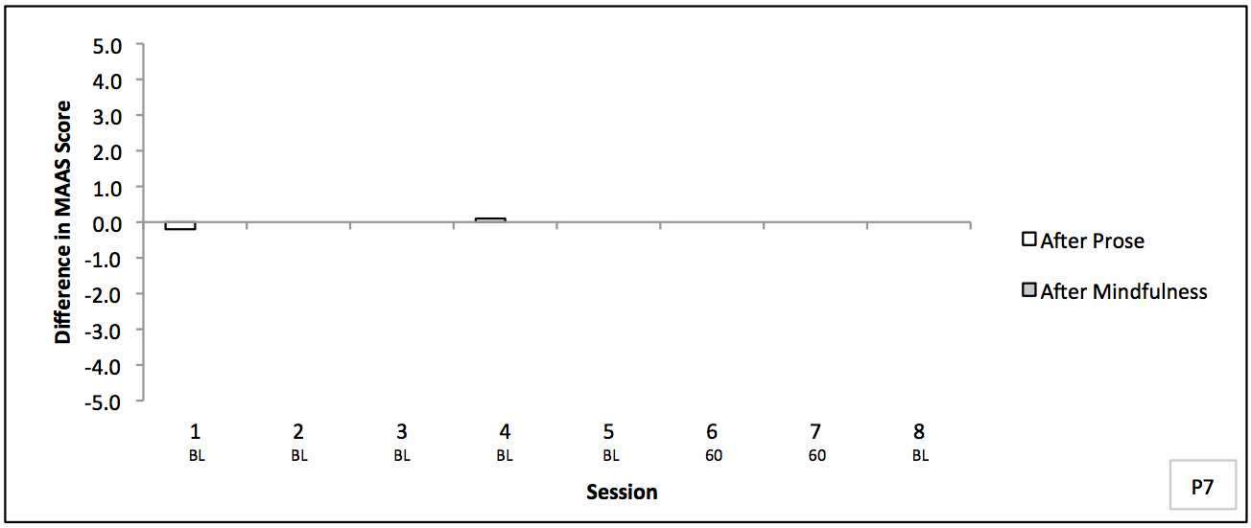


Figure N85. The difference in MAAS scores pre-session to post-prose and pre-session to post-mindfulness for Sessions 1-8 for Participant 7.

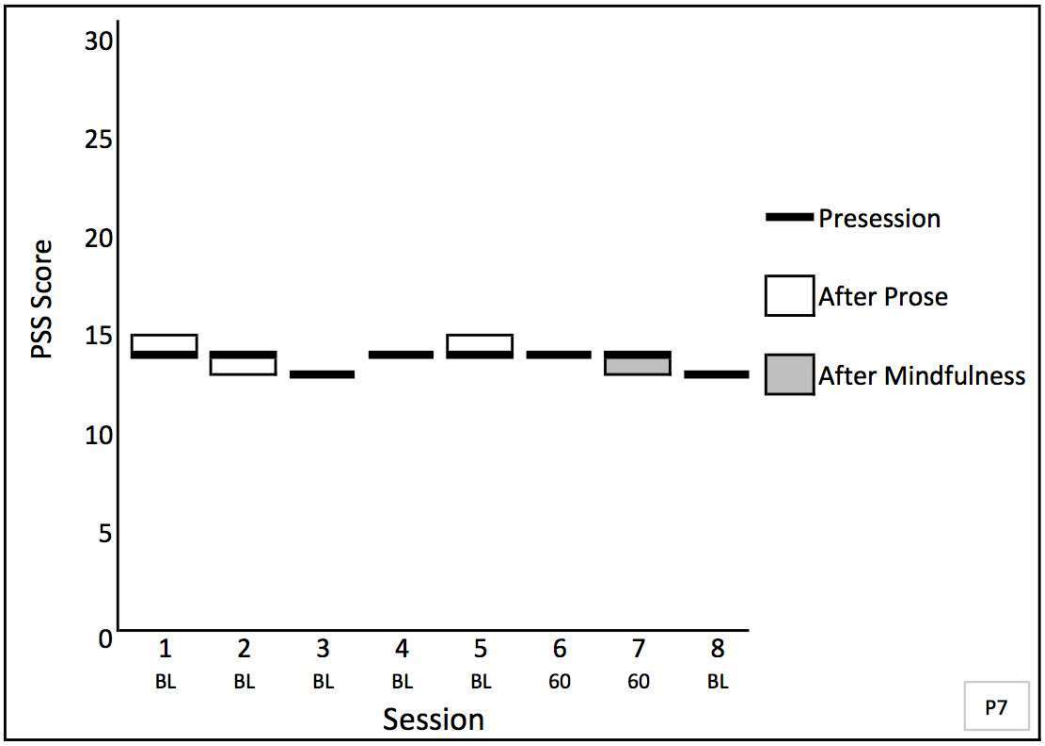


Figure N86. Pre-, mid- (when applicable), and post-session PSS scores for Sessions 1-8 for Participant 7, where higher scores indicate a higher level of stress.

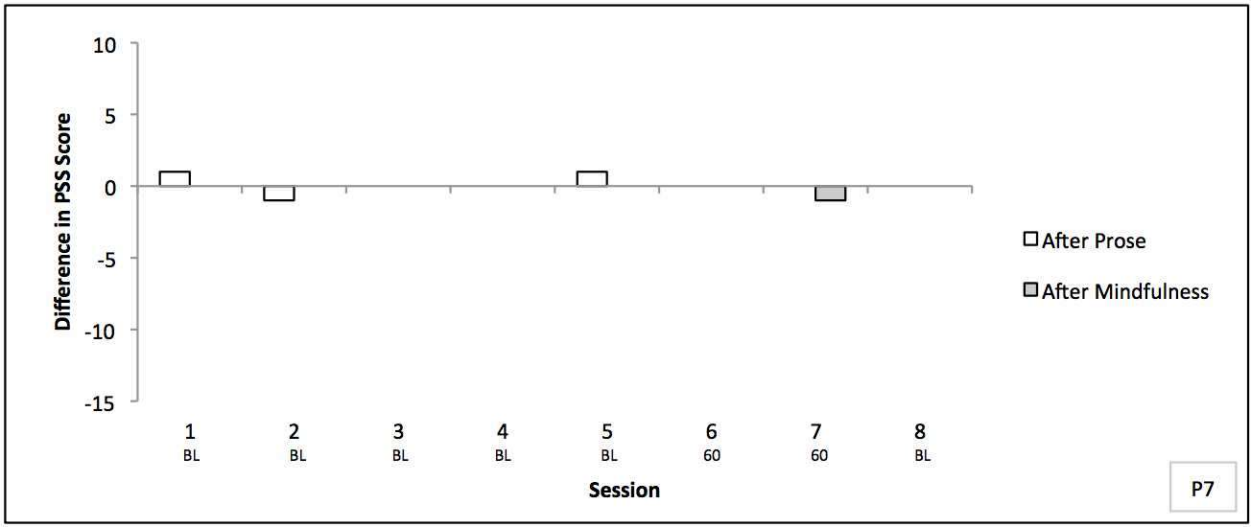
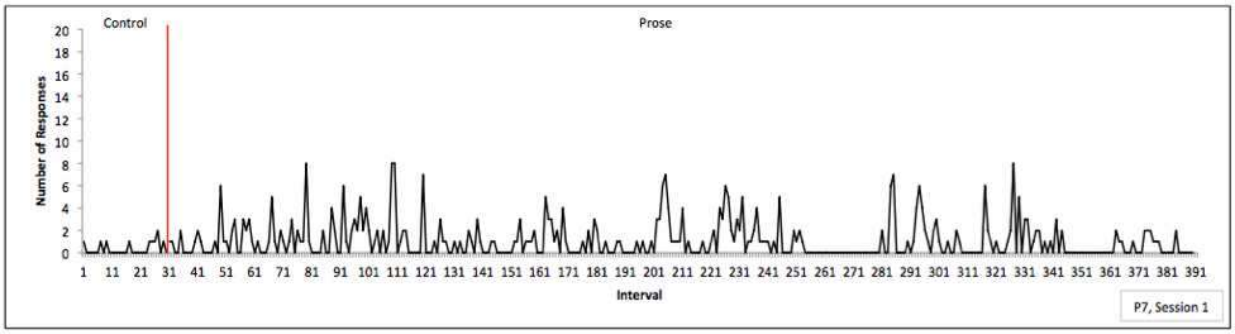
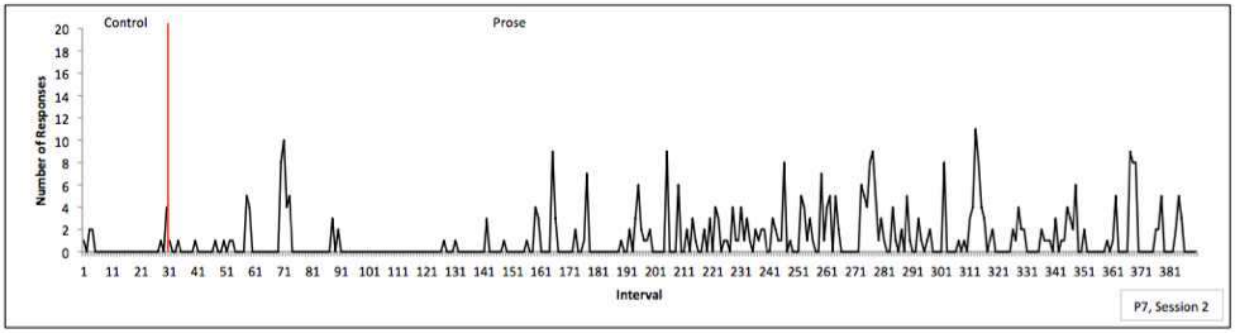
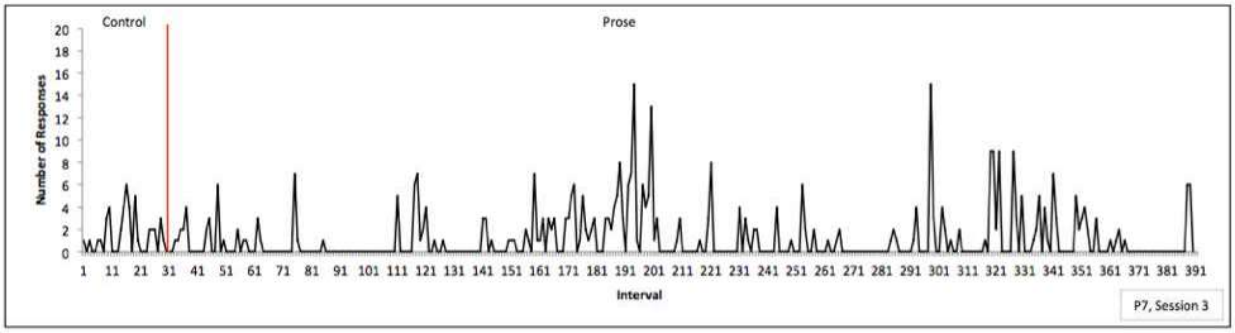
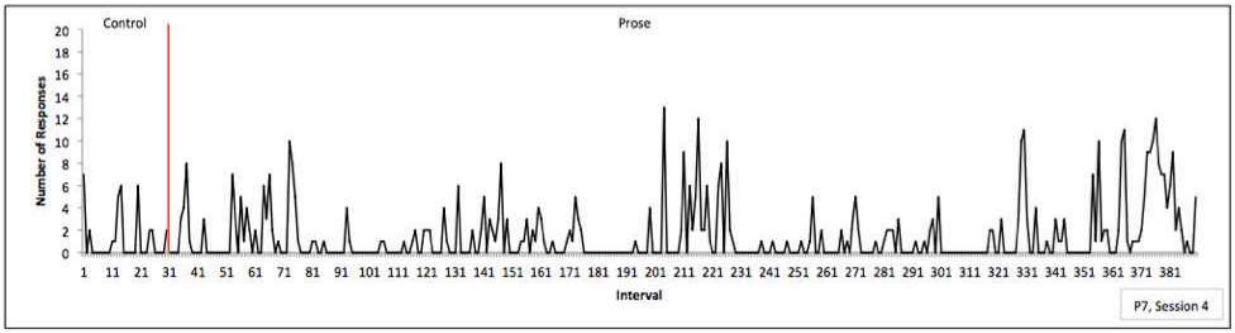


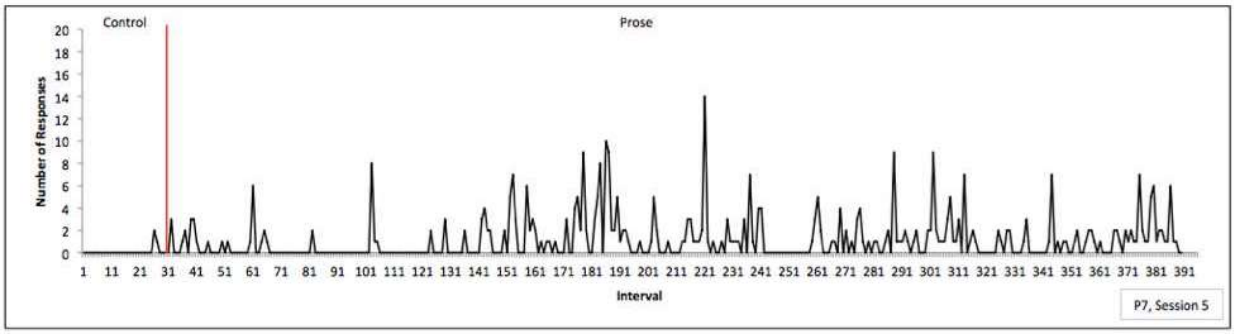
Figure N87. The difference in PSSS scores pre-session to post-mindfulness, pre-session to post-prose, and post-mindfulness to post-prose for Sessions 1-8 for Participant 7.


Control
Prose
Number of Responses
Interval
P7, Session 1


Control
Prose
Number of Responses
Interval
P7, Session 2


Control
Prose
Number of Responses
Interval
P7, Session 3


Control
Prose
Number of Responses
Interval
P7, Session 4


Control
Prose
Number of Responses
Interval
P7, Session 5

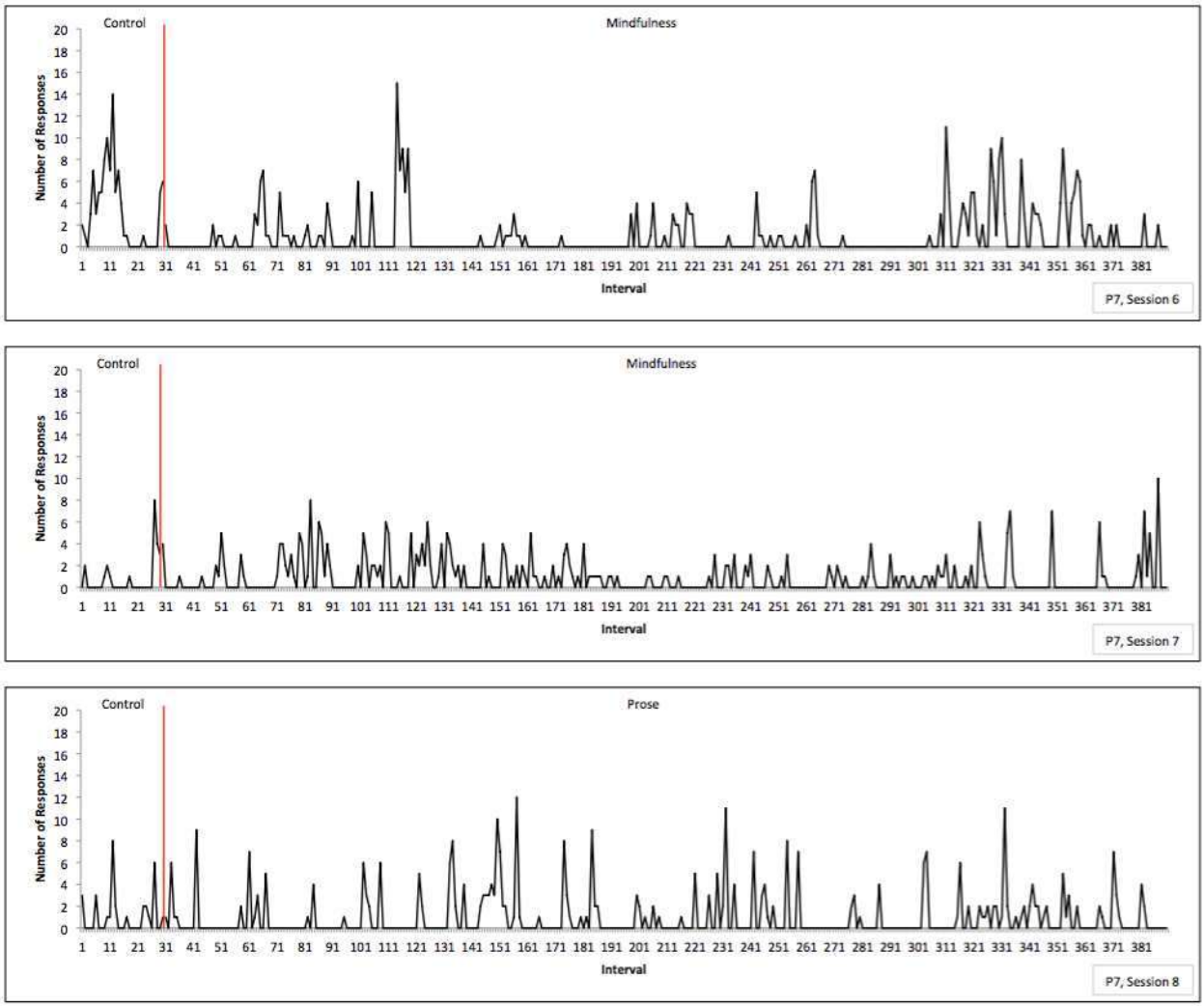
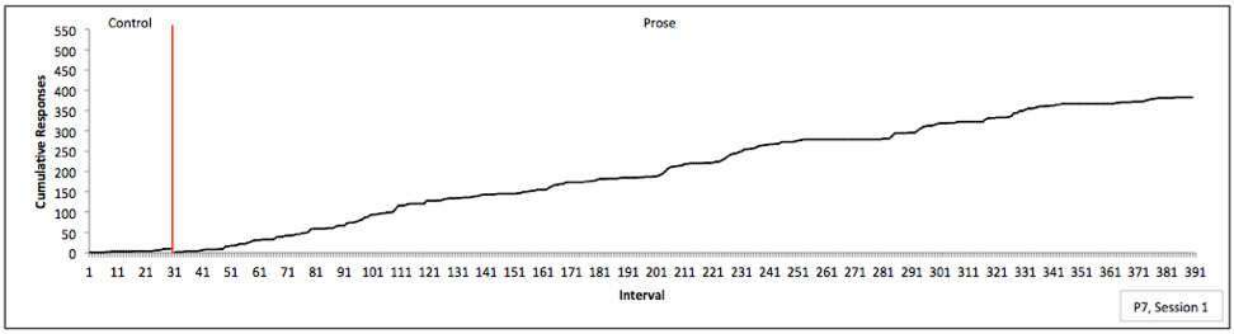
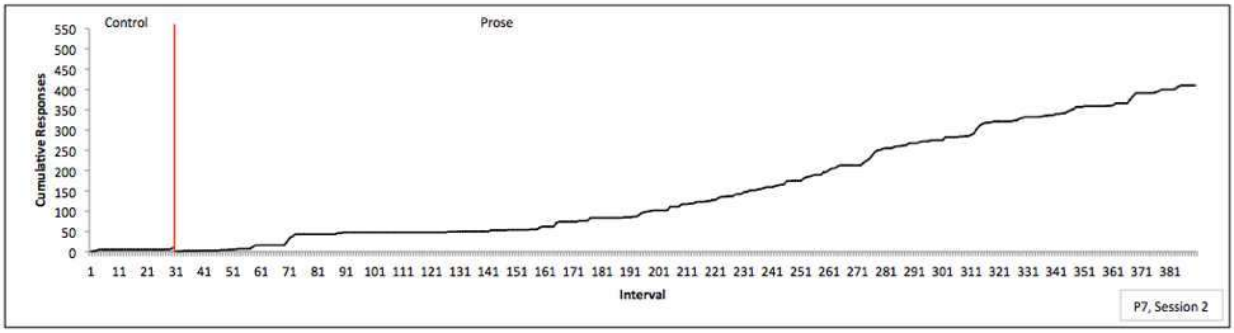
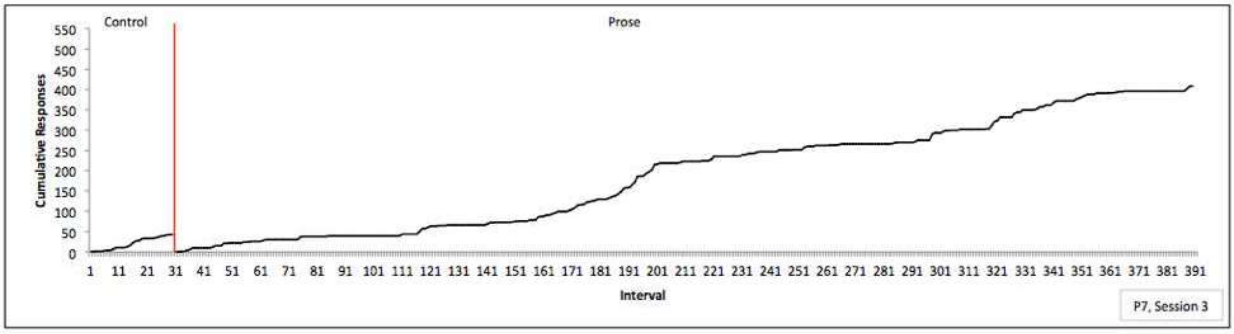
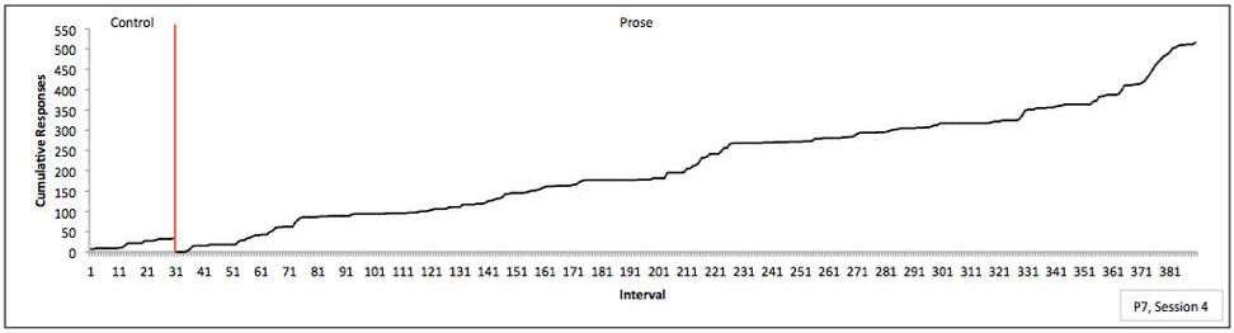


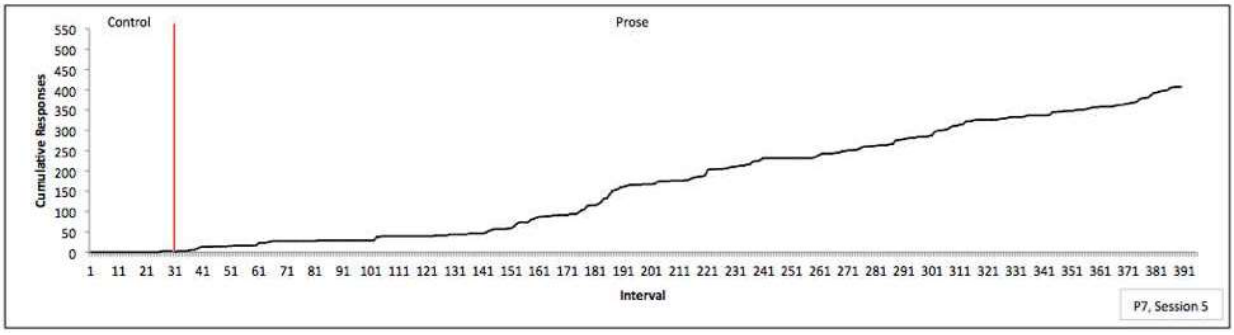
Figure N88. The number of displacement behaviors emitted per 10-second interval for Sessions 1-8 for Participant 7.


Control
Prose
Cumulative Responses
Interval
P7, Session 1


Control
Prose
Cumulative Responses
Interval
P7, Session 2


Control
Prose
Cumulative Responses
Interval
P7, Session 3


Control
Prose
Cumulative Responses
Interval
P7, Session 4


Control
Prose
Cumulative Responses
Interval
P7, Session 5

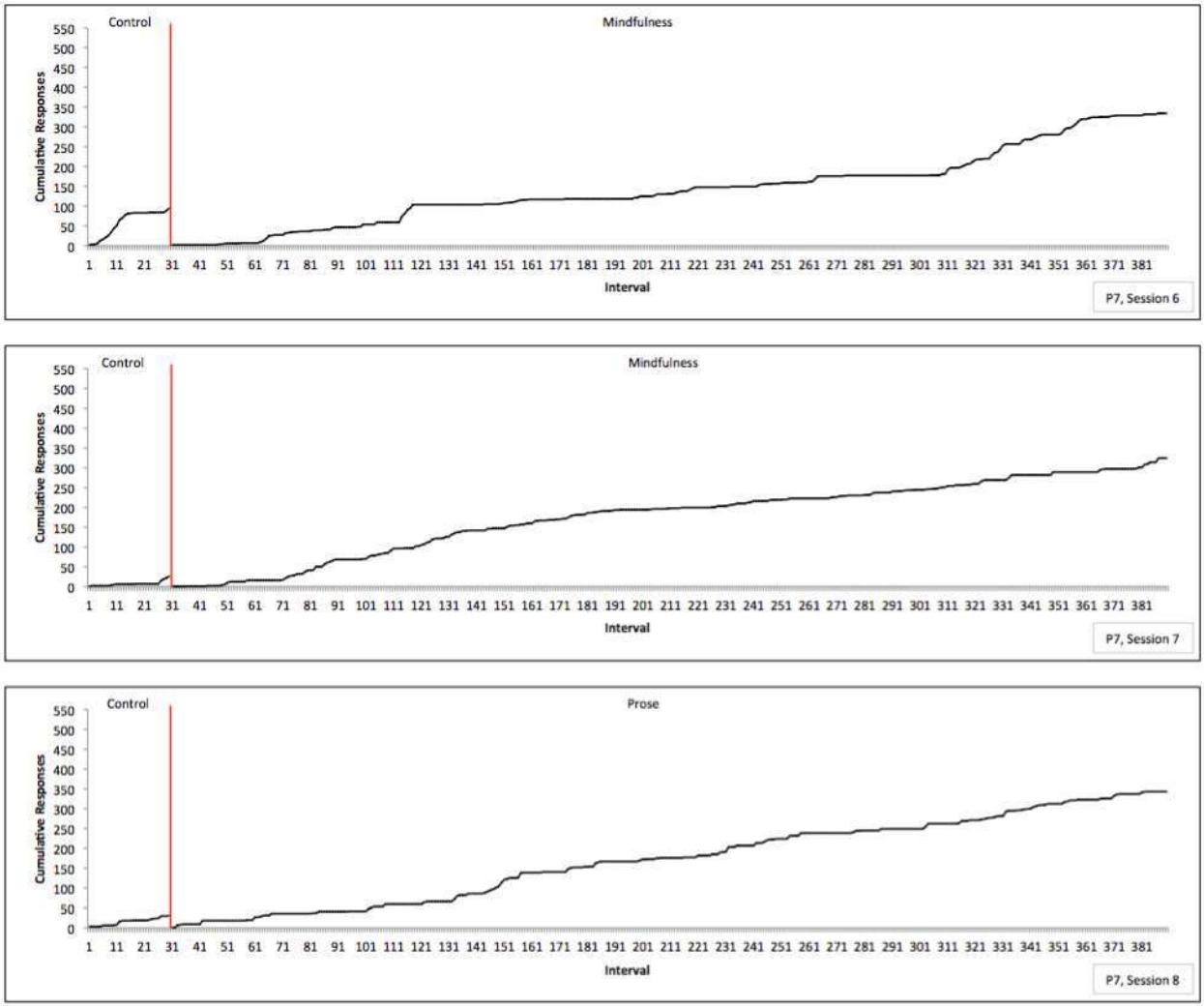
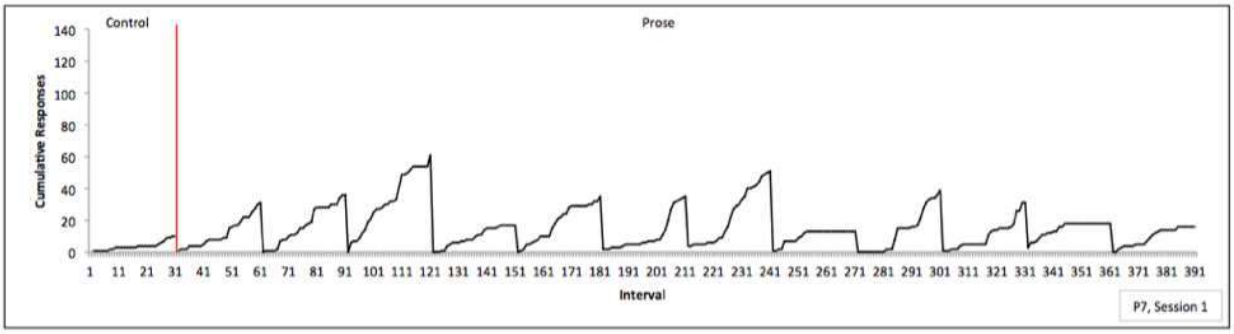
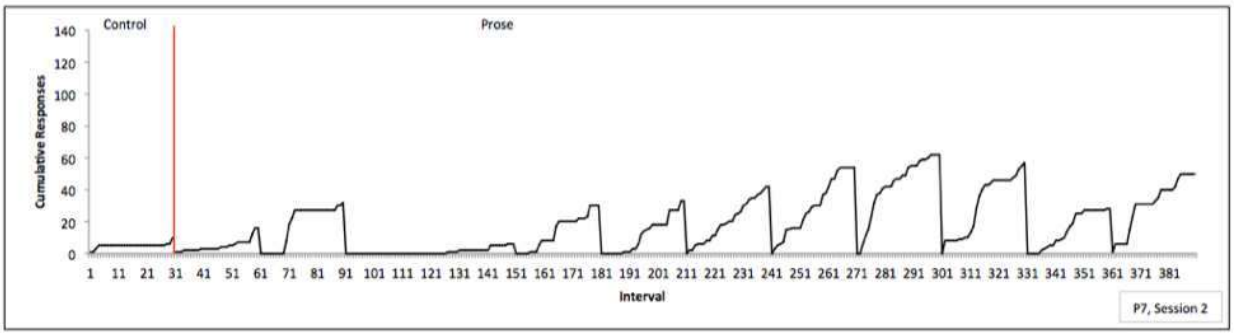
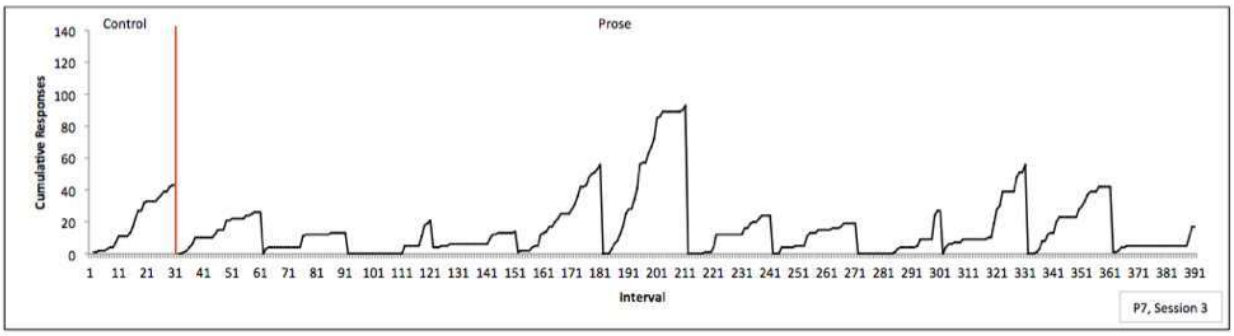
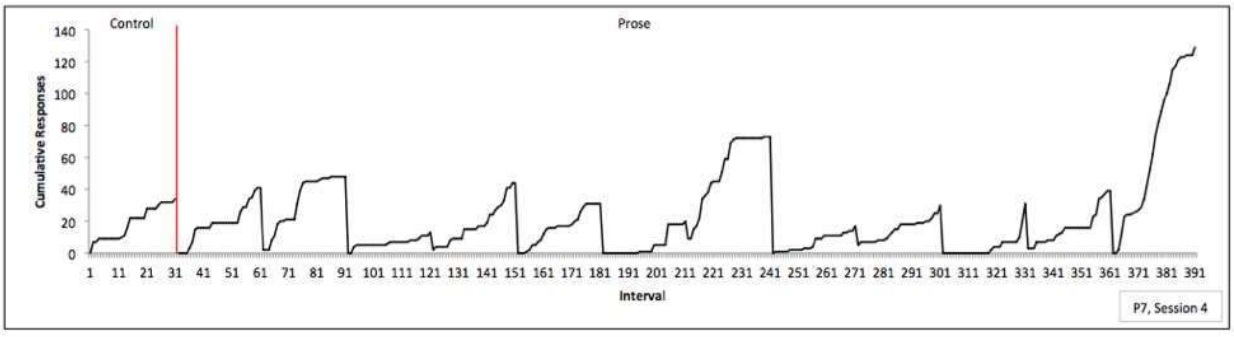


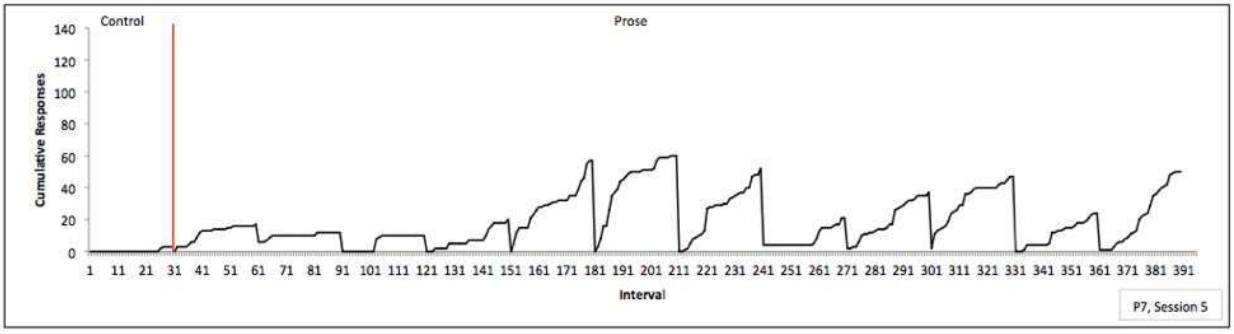
Figure N89. Cumulative displacement behaviors per 10-second interval for Sessions 1-8 for Participant 7.


Control
Prose
Cumulative Responses
Interval
P7, Session 1


Control
Prose
Cumulative Responses
Interval
P7, Session 2


Control
Prose
Cumulative Responses
Interval
P7, Session 3


Control
Prose
Cumulative Responses
Interval
P7, Session 4


Control
Prose
Cumulative Responses
Interval
P7, Session 5

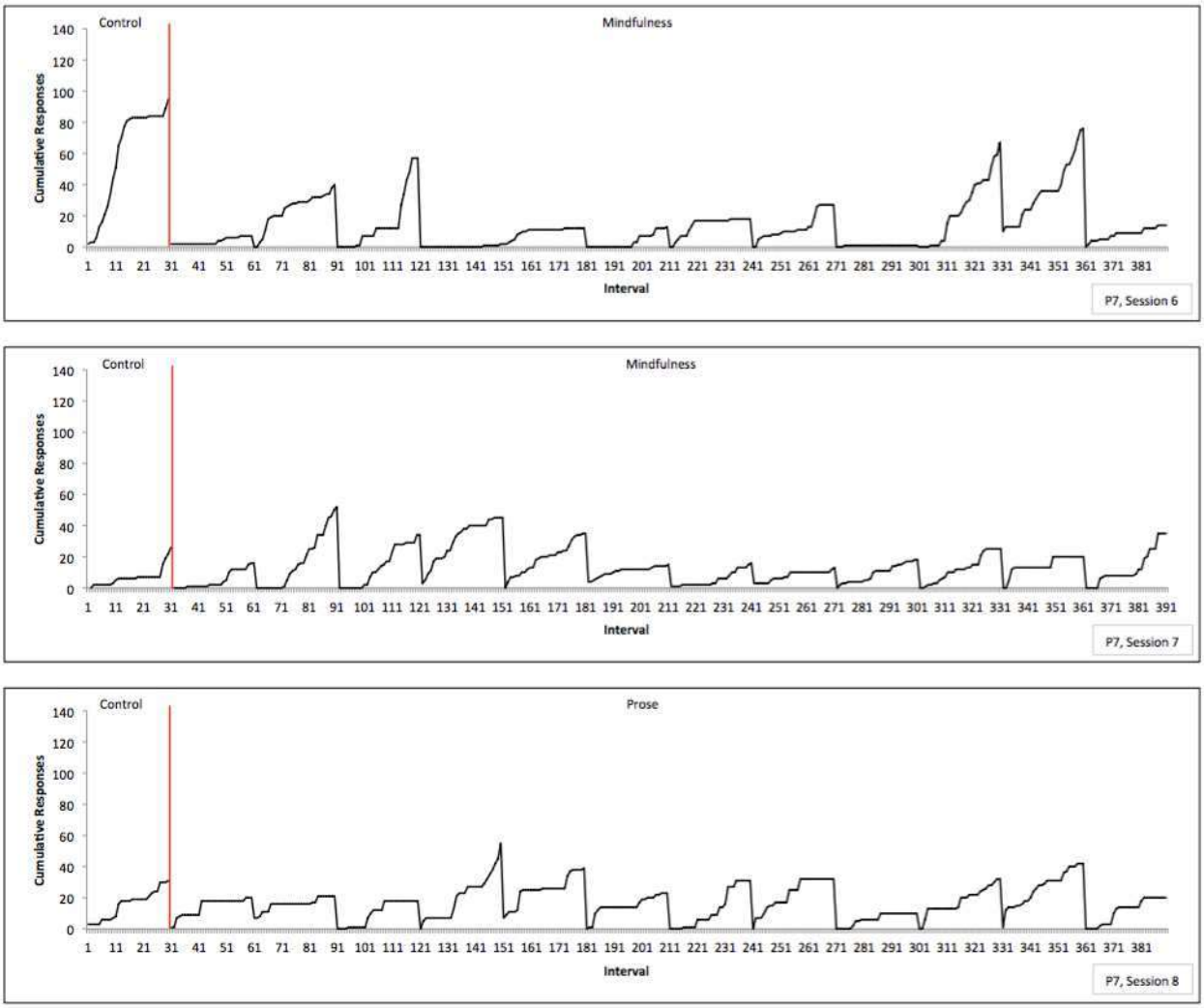


Figure N90. Cumulative displacement behaviors per 10-second interval with pen reset every 5 minutes for Sessions 1-8 for Participant 7.

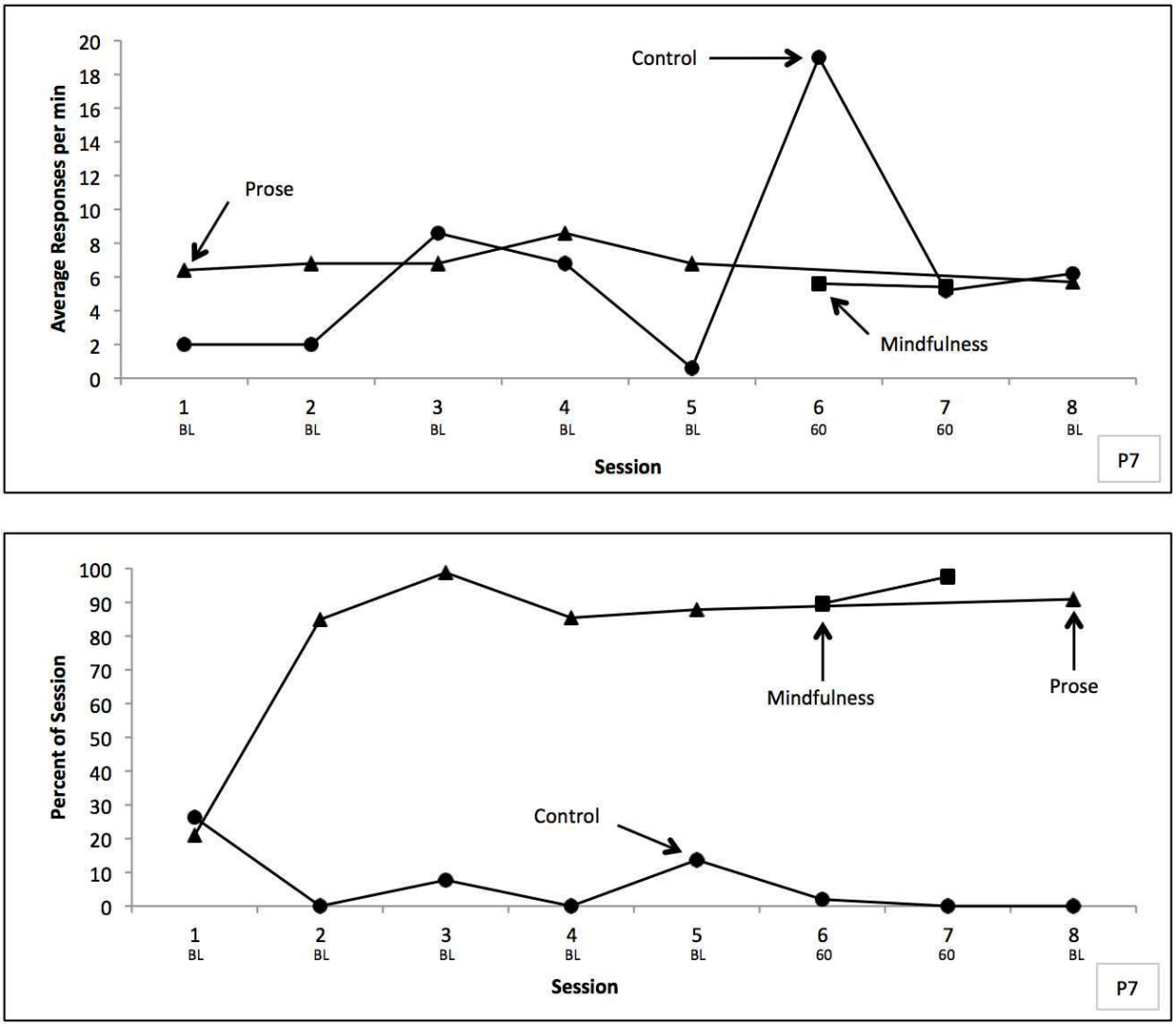


Figure N91. Average frequency of discrete displacement behaviors (top) and percent of engagement in continuous displacement behaviors (bottom) per condition for Sessions 1-8 for Participant 7.