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Innate Immune, Neuroendocrine and Behavioral Responses to Psychosocial Stress do not Predict Subsequent Compassion Meditation Practice Time

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Meditation practices may impact physiological pathways that are modulated by stress and relevant to disease, and populations whose cultural traditions include regular meditation practice may be more resilient to chronic psychosocial stress challenge. Increasing evidence suggests that meditation may impact immune processes relevant to emotional and physical health. For example, our group has reported that the practice of a Tibetan Buddhist-based compassion meditation technique was associated with reduced innate immune responses to a standardized laboratory psychosocial stressor after meditation training. Specifically, although we found no effect of group assignment (compassion meditation vs. health discussion control group) on innate immune, neuroendocrine (plasma cortisol) or distress responses to the TSST, within the compassion meditation group total amount of practice time during the study was associated with reduced innate immune (plasma interleukin [IL]-6) and distress responses. While these results are consistent with the possibility that engagement with compassion meditation reduced inflammatory and distress responses to the TSST, the lack of a main effect of group assignment, combined with the fact that practice time cannot be randomized in advance, raises the specter of reverse causation. Thus, associations between practice time and TSST outcomes may have reflected the fact that participants with reduced stress responses were more able to practice compassion meditation during the study period, rather than that meditation practice reduced stress responses. To further clarify this important issue, in the current study we recruited an independent sample of medically healthy young adults and examined whether innate immune, neuroendocrine and behavioral responses to a TSST conducted **prior to** compassion meditation training predicted subsequent amount of meditation practice time.

Methods

Participants

Thirty individuals (12 women/18 men) signed consent and were enrolled in the study. All participants were recruited from an introductory health education class at Emory University. Inclusion and exclusion criteria were identical to our initial study (see companion poster in this session) and included being medically healthy, with no active psychiatric illness. Participants were excluded for active psychiatric treatment (including psychotherapy/counseling) or for a score ≥ 30 on the Inventory of Depressive Symptoms—Self Report (IDS-SR), consistent with moderate to severe depression. Participants were free of psychotropic medications or other medications that might impact physiological responses to the psychosocial stress test. All participants provided written informed consent, and all study procedures were a priori approved by the Emory IRB.

Overview of Study Procedures

The current study occurred during spring semester 2008. The Trier Social Stress Test (TSST) protocol for the current study was identical to the one employed in our initial study (see companion poster in this session), except that subjects spent the night in the Atlanta Clinical and Translational Science Institute (where all TSSTs were performed to stabilize sleep wake times). The TSST consists of a public speaking task followed by a mental arithmetic task. As before, TSSTs were conducted between 2 and 5 PM. When the entire study group had completed the TSST, participants entered a 6-week compassion meditation training protocol identical to the one employed in our initial compassion meditation study, including use of the same teacher (study investigator L.T.N.) and at-home practice CD. A-home practice time was recorded within 48 hours of its occurrence via a secure internet site. Details about the compassion meditation instruction protocol are show at right.

Dependent Variables

During the TSST blood (7 ml) was collected from an indwelling venous catheter prior to initiation of the public speaking stressor (T0) and 15, 30, 45, 60, 75 and 90 minutes after stressor initiation into chilled EDTA-coated monovettes and centrifuged immediately. Plasma was stored at -80 C until assay. Plasma IL-6 concentrations were measured by enzyme-linked immunosorbent assay (ELISA) (R&D Systems, Minneapolis, MN). Plasma cortisol concentrations were determined by radioimmunoassay (Diasorin, Stillwater, MN). The 30-item Profile of Mood States (POMS) was used to evaluate general distress levels prior to, and immediately following, the TSST stressor. Following standard procedure, general distress was calculated by summing scores on the tension-anxiety, depression-dejection, anger-hostility, fatigue-inertia, and confusion-bewilderment subscales and subtracting scores on the vigor-activity subscale.

Data gathered in the current study (ie "TSST prior to meditation training") are compared here directly to observations collected from our previous study ("TSST after meditation training").

Compassion meditation training protocol

Week 1: *Developing basic concentration and mental stability.* Participants are taught basic attentional meditation practice (i.e. shamatha) by using the breath as the object of focus.

Week 2: *Introduction of mindfulness practice* (i.e. vipassana). Participants are instructed in the techniques of non-judgmental observation of the processes of thought and bodily sensation.

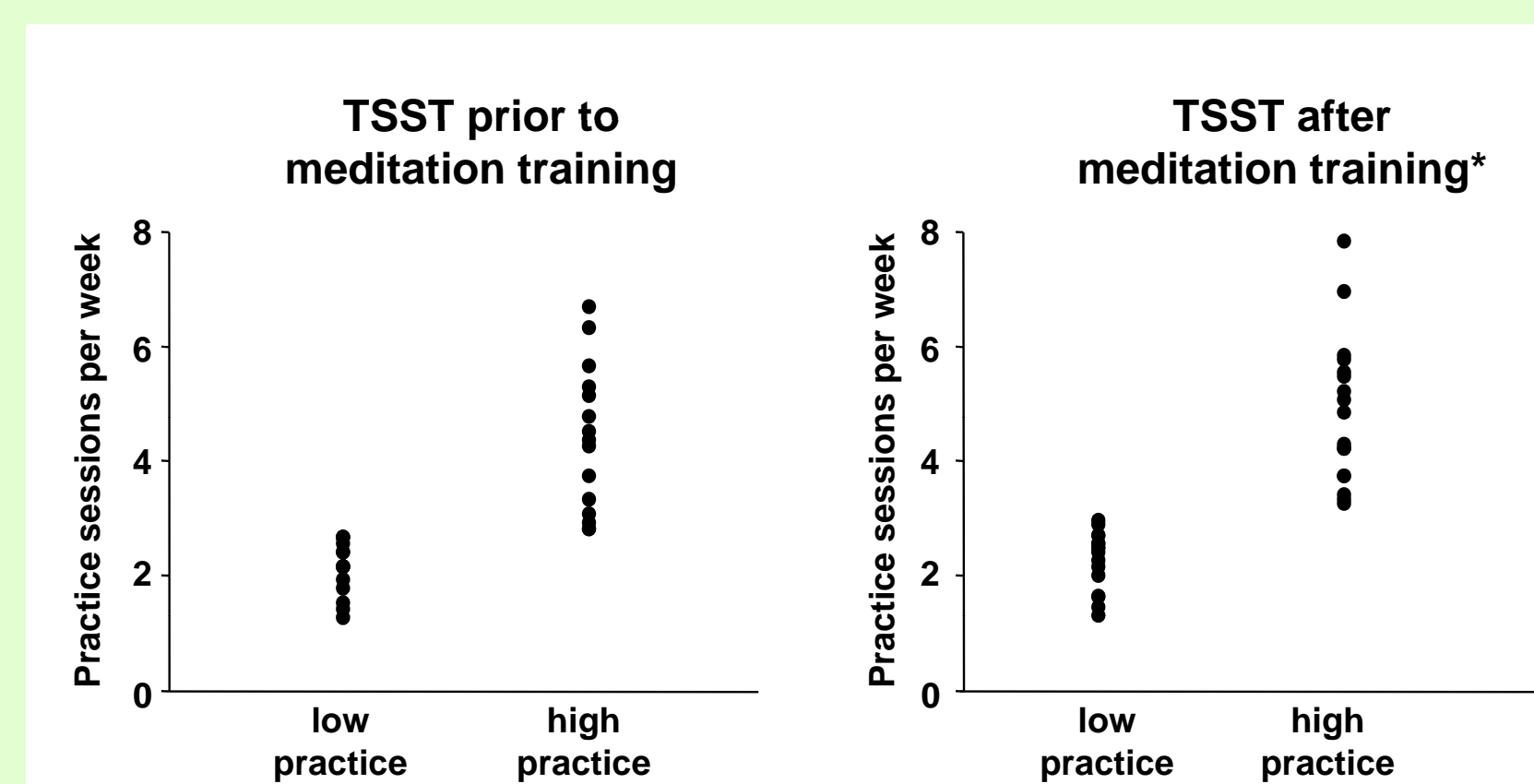
Week 3: Concentrative and mindfulness techniques are used to explore universal human desires for happiness and wishes to avoid suffering as a prelude toward the practice of developing compassion for the self.

Week 4: Meditation is continued on the thought that the self shares with all people a desire for happiness and a wish to avoid suffering, as well as the struggle to attain these goals. Participants are instructed to expand upon this awareness to examine the contingent and changeable nature of the distinctions between "friends" and "enemies", with the goal of generating a felt sense that instinctive emotional responses to others do not reflect reality.

Week 5: Meditative reflection is conducted on the disadvantages of selfishness and a self-centered attitude and the advantages of considering the welfare of others. Participants are guided through meditative techniques aimed at generating compassionate emotions and cognitions for those emotionally close to them.

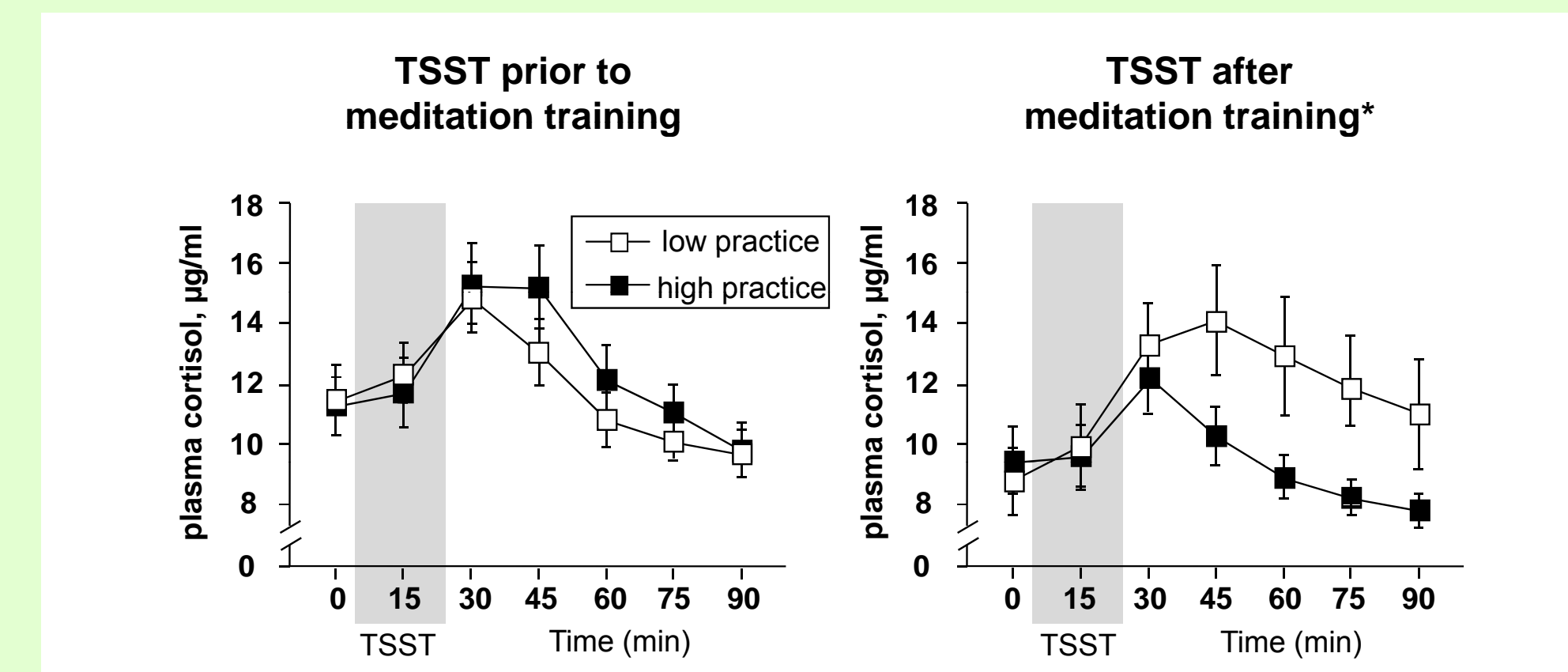
Week 6: Meditation aimed at attempting to generate compassionate emotions not only for friends, but also for strangers and people participants do not like is practiced. Instructions are given for how to continue this practice "at home" following the completion of the class.

1. Meditation practice time was not different between participants who underwent compassion meditation training before or after psychosocial stressor challenge.

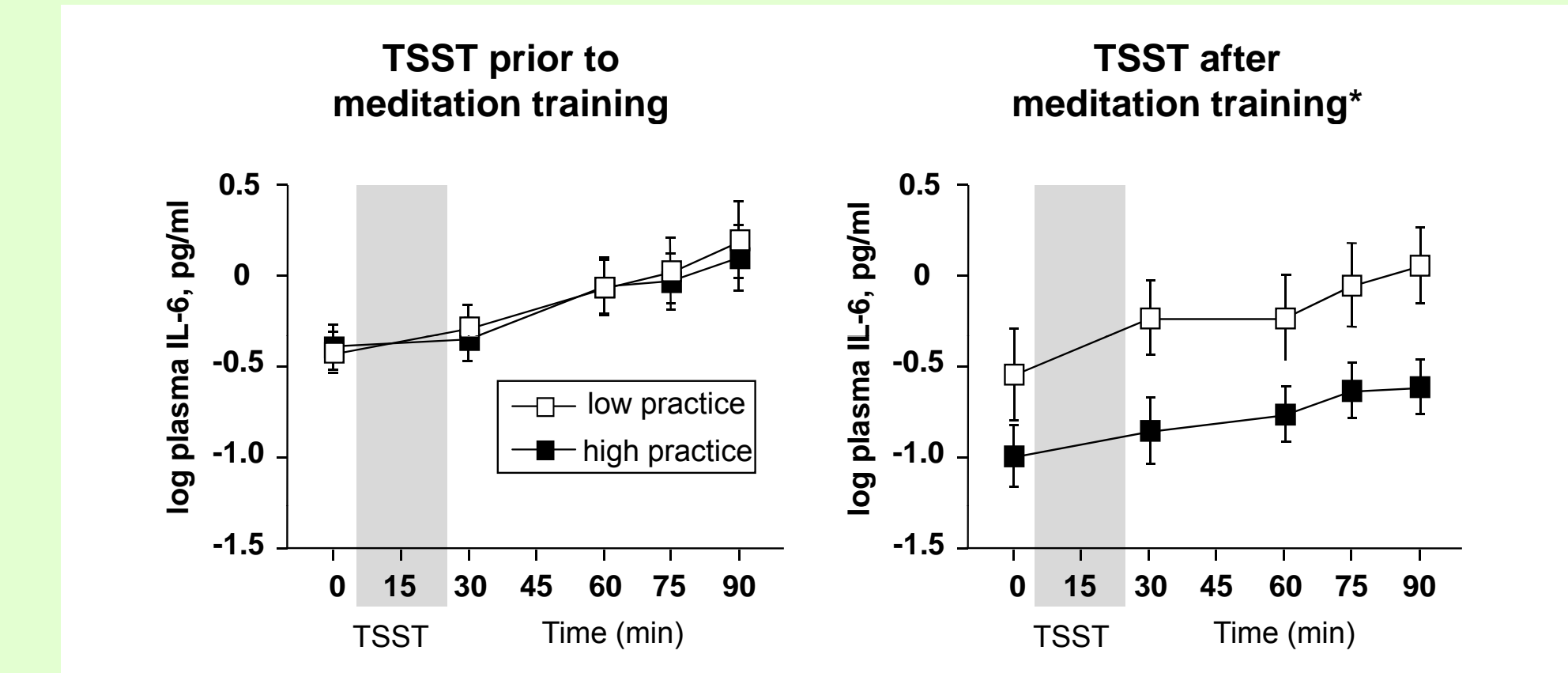


* Data in this panel are from a prior study by our group (see companion poster in this session)

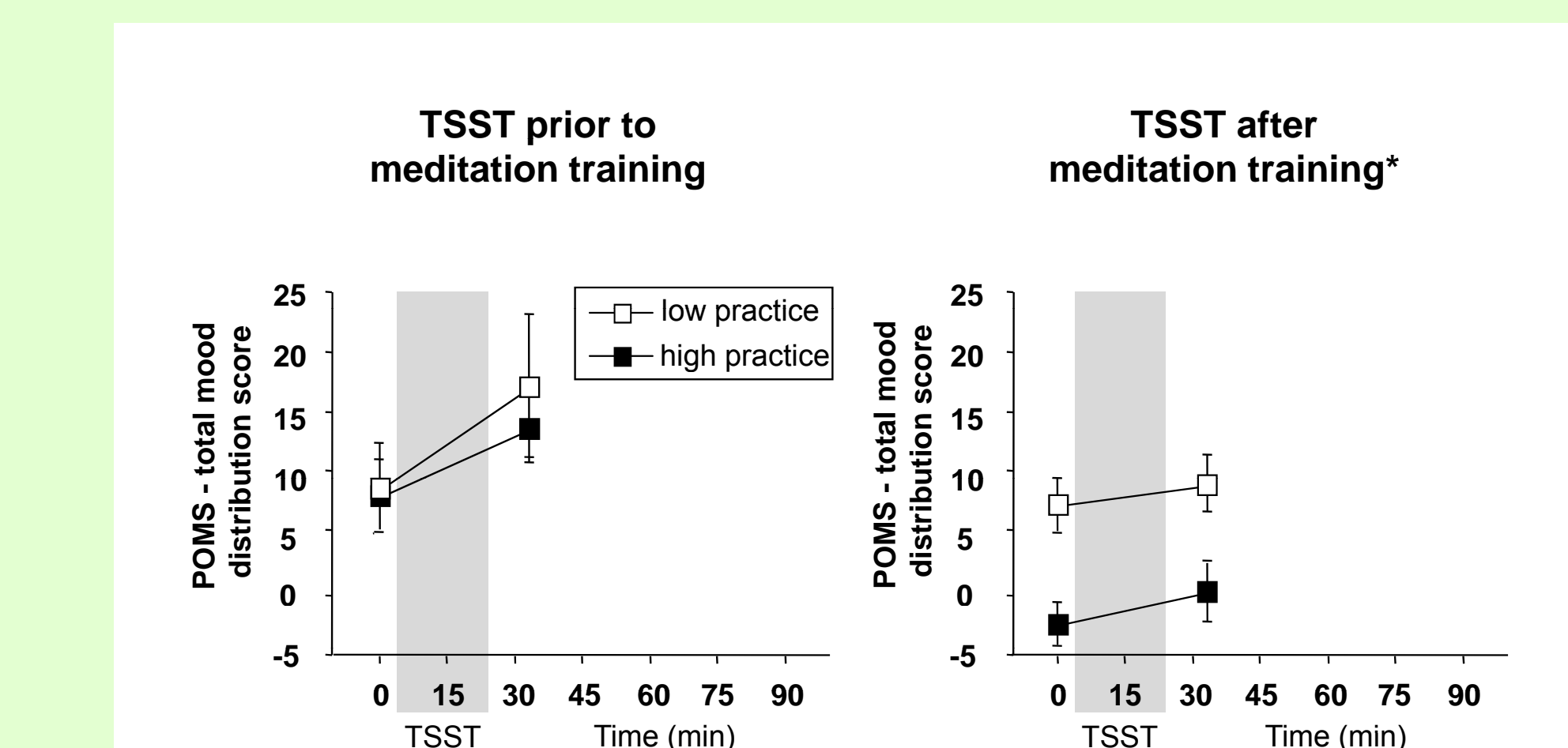
2. Cortisol responses to psychosocial stress were not different between participants who went on to practice compassion meditation above the median practice time (high practice group) vs. participants who went on to practice below the median (low practice group) (left panel).



3. Interleukin (IL)-6 responses to psychosocial stress challenge were not different between high practice and low practice groups when meditation training was completed after stress testing (left panel).



4. Emotional responses to psychosocial stress challenge did not differ between high practice and low practice groups when meditation training was completed after stress testing (left panel).



Results and Conclusions

1. Innate immune, cortisol, and behavioral responses to the TSST do not predict subsequent compassion meditation practice time.
2. These results strengthen the hypothesis that the association observed in our initial study between practice time and TSST responses after meditation training reflects an ability of compassion meditation to downregulate innate immune and distress responses to psychosocial stress.
3. The current study strengthens findings from our initial work by supporting the conclusion that compassion meditation may represent a viable strategy for reducing deleterious responses in populations at risk for stress-related illness.
4. Future studies are required to determine whether populations with widespread practice of compassion meditation are more likely on the whole to exhibit reduced stress reactivity compared to groups without meditation traditions.

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