

**The Mechanism of Mindfulness Meditation and Loving-kindness and
Compassion Meditation on Psychological Distress: The Perspective of
Reinforcement Sensitivity Theory**

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Study protocol

The current study conducted an interventional study to explore the effect of mindfulness meditation (MM) and loving-kindness and compassion meditation (LKCM) on psychological distress (i.e., anxiety, depression, stress) and the underlying mechanism. Based on reinforcement sensitivity theory, the current study used a randomized controlled trial with three groups: MM group, LKCM group, and waitlist group, to explore the mediating role of sensitivities to reward and punishment in the effects of MM and LKCM on psychological distress respectively.

Participants: Participants were recruited from online websites and apps. The exclude criteria are: (1) have attended structured meditation intervention; (2) have diagnosed psychiatric diseases; (3) receiving or have received psychological counseling; (4) taking or have taken psychotropic drugs; (5) age is more than 18. 194 participants registered to attend the research, and finally met the including criteria were 152, with 128 females, and 24 males. the participants were randomized to the MM group ($n = 51$), LKCM group ($n = 51$), and waitlist group ($n = 50$).

Measures: The Depression Anxiety Stress Scale (DASS-21, Lovibond et al., 1995) was used to measure depression, anxiety, and stress with 21 items. The Philadelphia Mindfulness Scale was used to measure the degree of mindfulness, with 10 items and two dimensions: awareness and avoidance. The Sensitivity to

Punishment and Sensitivity to Reward Questionnaire (Torrubia et al., 2001; Wang, 2012) included 34 items to test the sensitivity to punishment and sensitivity to reward. The Emotional Word Lists (EML, Lee et al., 2013) was used to measure emotions, to test the basic effect of interventions.

Data collection and analysis: The data collected was analysed by SPSS 26.0. The 2 (conditions)*2 (times) repeated measure analysis of variance was adopted to test the effect of the intervention. The mediation model was tested and explored using PROCESS v4.0 in SPSS.

Expected results: (1) Compared with waitlist group, MM and LCKM could significantly decrease psychological distress and sensitivity to punishment; (2) compared with waitlist group, LCKM could significantly decrease psychological distress, and enhance sensitivity to reward; (3) sensitivity to punishment serves as the mediating role between groups (i.e., MM group and waitlist group) and psychological distress; (4) sensitivity to rewards serves as the mediating role between groups (i.e., LKCM group and waitlist group) and psychological distress.

Time plan:

Recruiting: July 3, 2022 to July 17, 2022

Pretest: July 18, 2022 to August 4, 2022

Intervention conducted: August 5, 2022 to August 28, 2022

Posttest: August 29, 2022 to September 11, 2022

Follow up test: September 26, 2022 to October 9, 2022