Cardiac Vagal Tone and Cultural Background Contribute to Emotion Behavior during Compassion for Physical Pain

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INTRODUCTION
Both cardiac vagal tone and cultural background are known to modulate emotion behavior. For example, higher vagal tone has been linked with less negative emotion expression; and members of the Chinese culture have been described to value emotion moderation; and to experience emotions with lower frequency, intensity and duration comparing to those of the Western culture. However, it is unclear how these two factors together influence emotion responses.

Here we explore this by investigating participants’ emotion behavior, including behavioral expressivity and heart rate response, during compassion for physical pain in three ethnic groups: Chinese, East Asian American and non-Asian American.

PARTICIPANTS
15 monolingual Mandarin-speaking Chinese participants recruited in Beijing (7 females, average age 22.9 years)
16 English-speaking first generation East-Asian Americans recruited in Los Angeles (8 females, average age 20.8 years)
16 monolingual English-speaking non-Asian Americans recruited in Los Angeles (8 females, average age 22.4 years)

EXPERIMENT PROCEDURES

Emotion-induction interview 10 true narratives depicting painful physical injuries with no long-term implications
Video-taped for behavioral expressivity coding

Baseline ECG recording 5-minute eye-closed paced breathing
To calculate baseline cardiac vagal tone

ECG recording 5-second reminder versions of the same narratives shown in the interview (stimuli), followed by a dark screen “Reflect on the narrative and become as emotional as possible” To calculate heart rate response

RESULTS
A. Behavioral expressivity correlated with average heart rate change during stimulus processing phase, r(45) = .298, p < .046.

B. Both cardiac vagal tone and cultural background had significant effects on behavioral expressivity.

C. Ethnic group had a significant effect on highest heart rate acceleration during reflection/deliberation phase, F(2,43) = 4.79, p < .013. No such effect was found during stimulus processing phase.

D. Cardiac vagal tone correlated with bias towards American or East Asian culture in first generation East Asian American participants, r(16) = .673, p < .004.

SUMMARY
Our results demonstrated the consistency between participants’ behavioral expressivity and their heart rate response measured during two different tasks of compassion for physical pain.

Consistent with previous findings and theoretical account, we found that both cardiac vagal tone and cultural background contributed to behavioral expressivity. Further, by testing within in the same model, we were able to show that these two effects are independent from each other.

Cultural background had a significant effect on heart rate response related to the reflection and deliberation of emotional stimuli, but not the initial processing of such stimuli. No effects of cardiac vagal tone on heart rate response were found at group level. These findings also suggest that cardiac vagal tone and cultural background may influence emotion responses through different mechanisms.

Interestingly, our results suggest that there might be an interplay between cardiac vagal tone and adopted cultural value in bicultural East Asian American participants. Individuals with biological predisposition towards calmness (higher vagal tone) are more likely to adopt cultural values that favor calmness (“more Asian”), and vice versa.

REFERENCES

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