

INTRODUCTION

The coronavirus pandemic presents multiple psychological stressors. Interoception, the sense of the internal state, may influence emotional states. Psychological data on interoception may help develop evidence-driven strategies to reduce negative psychological effects. The aim of the present study was to investigate the relationship between dimensions of interoception and daily emotion in medical students during the coronavirus lockdown. We tested the hypothesis that interoceptive trait predictive error (ITPE) would be positively associated with daily negative affect.

METHOD

Nineteen participants (mean age 22.5, 53% male) completed heartbeat detection tasks prior to the coronavirus lockdown. Interoceptive accuracy was examined by a heartbeat counting task (HCT) and a heartbeat discrimination task (HDT).^{1,2} Interoceptive sensibility was gauged by the Body Perception Questionnaire (BPQ).³ ITPE was calculated as the discrepancy between interoceptive sensibility and interoceptive accuracy.⁴ During coronavirus lockdown, participants completed the Positive and Negative Affect Schedule (PANAS) for 14 days (Fig. 1).⁵ Spearman’s, r_s , was calculated to test for an association between ITPE and mean negative affect.

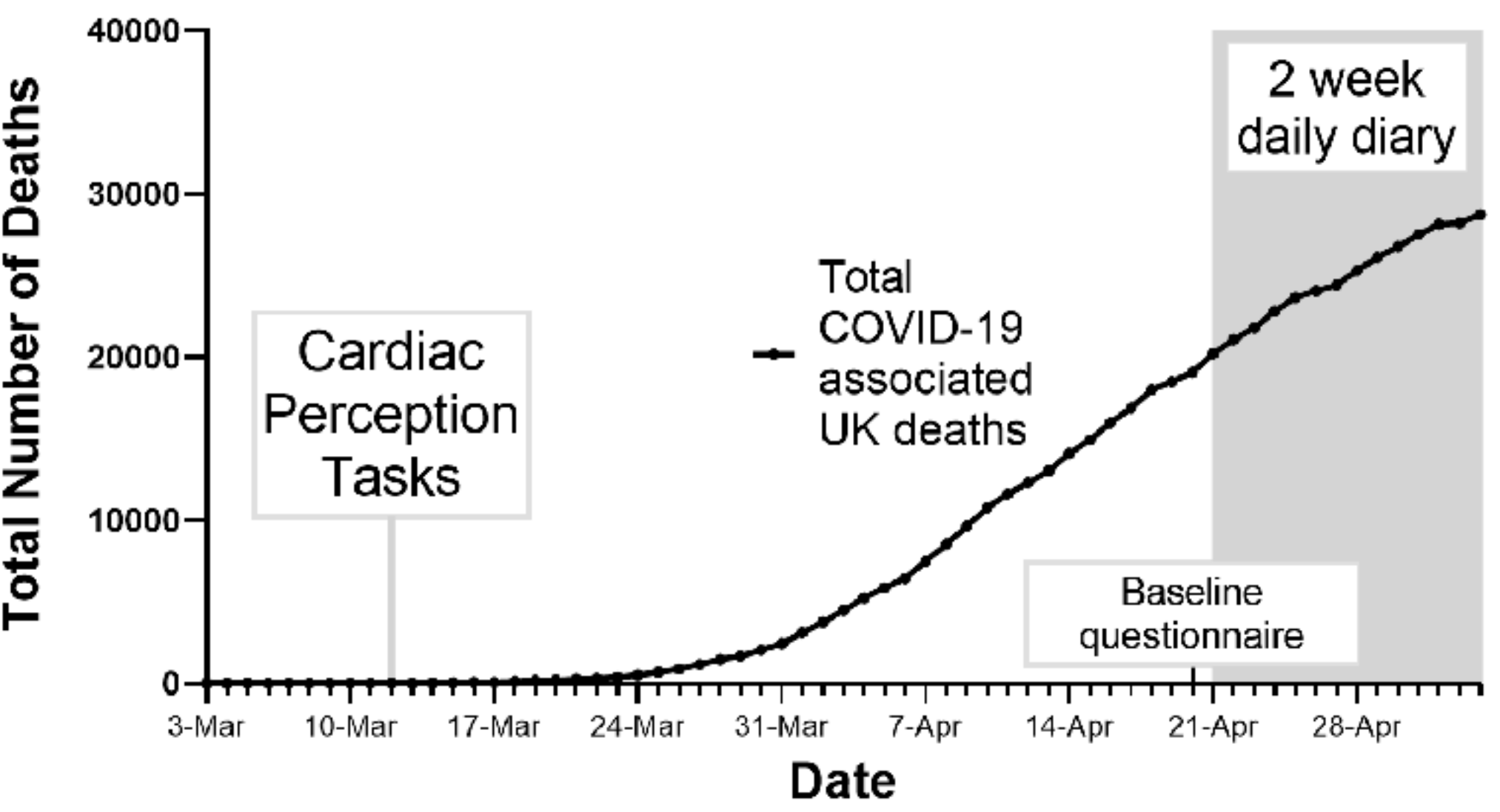


Figure 1: COVID and study timeline

MEASURES

Interoceptive accuracy

Interoceptive accuracy was gauged by a HCT and a two-interval HDT. Prior to the HDT, a six-interval HDT was performed to calibrate an appropriate synchronous interval for each participant.²

Interoceptive sensibility (IS)

The BPQ includes 45 bodily sensations (e.g. stomach and gut pains) and participants indicated their awareness of each sensation using a five-point scale ranging from ‘never’ to ‘always’.³

Positive and negative affect

The PANAS was used to examine affect. The PANAS has 20-items of two 10-item subscales, one covering positive emotions and one covering negative emotions.⁵

RESULTS

A median split of ITPE was undertaken which resulted in a group with high ITPE (n = 9) and a group with low ITPE (n = 9). For both groups, ‘Group Mean Daily Negative Affect’ was plotted to view temporal changes throughout the 14 days (Fig. 2).

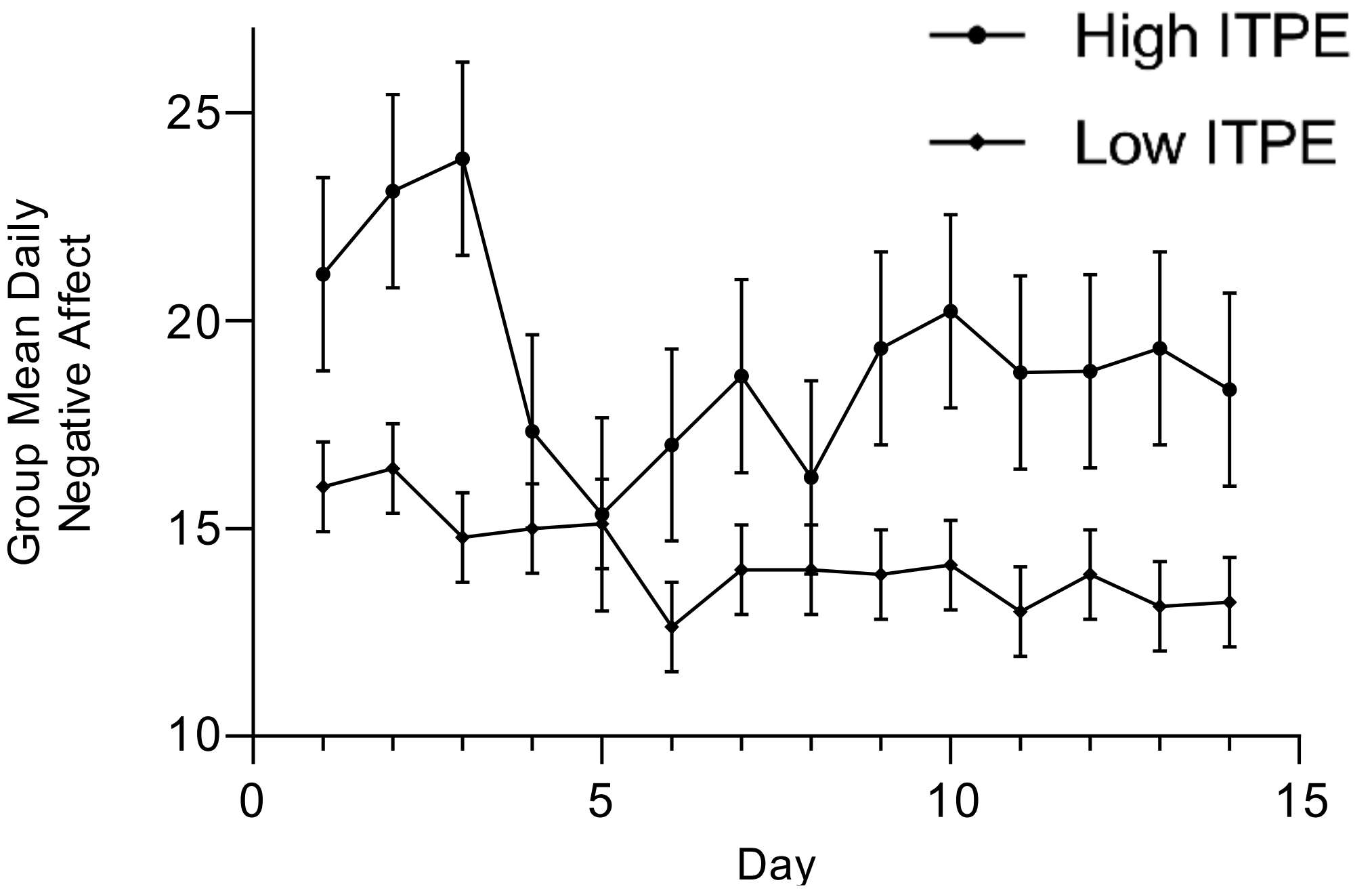


Figure 2: Mean negative affect for high ITPE and Low ITPE groups.

Addressing the central hypothesis, a Spearman’s correlation coefficient was calculated to test for an association between ITPE and Mean Daily Negative Affect. There was a positive relationship between ITPE_{CD} and mean negative affect ($r_s = 0.456$, $p = 0.025$, one-tailed) (Fig.3).

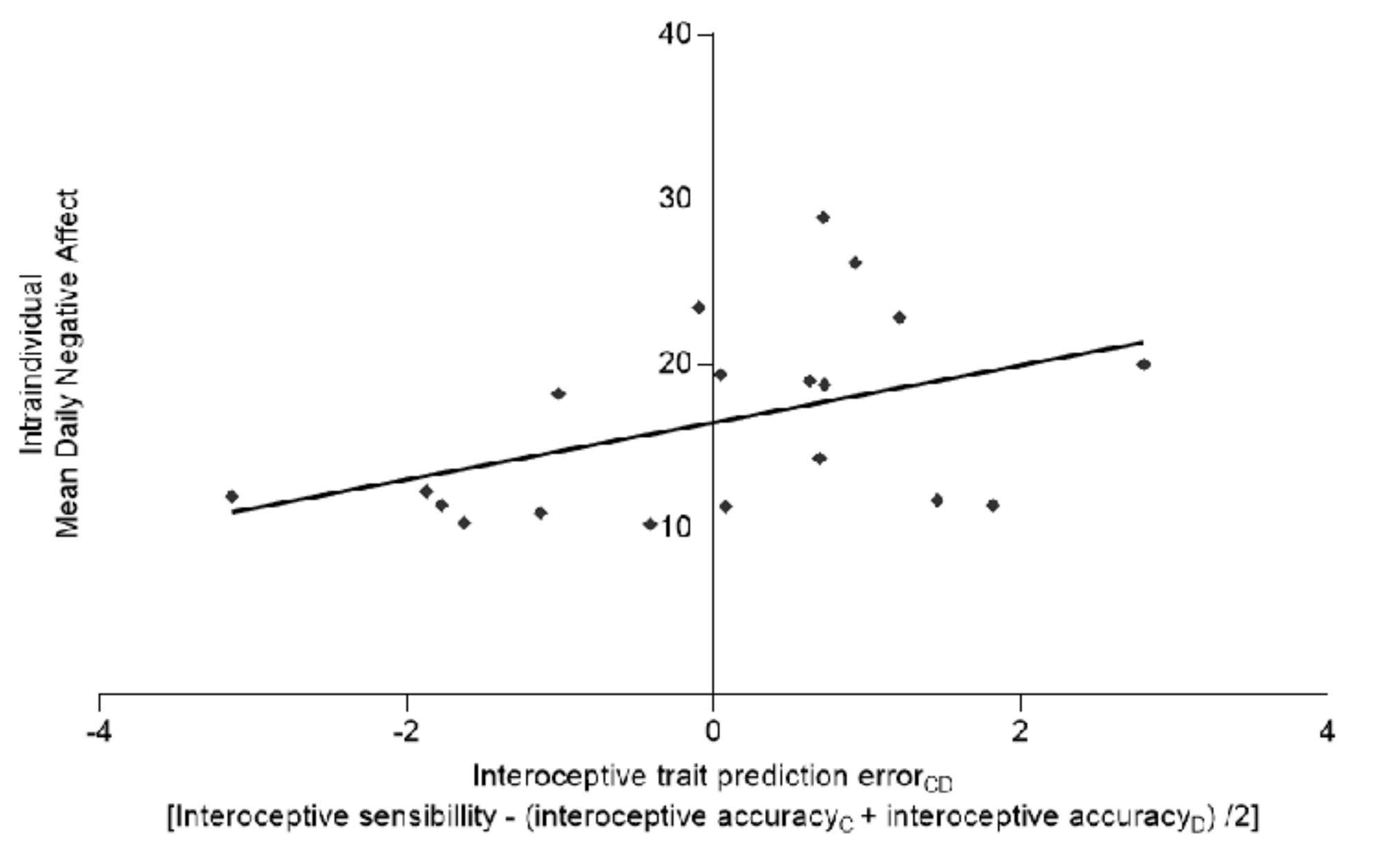


Figure 3: Correlation between ITPE and mean negative affect

DISCUSSION

The experience of the internal state has been found to contribute to an individual’s emotional state.⁶ This study was motivated by the increasing understanding of dimensions of interoception in relation to emotional experience and the potential for application in psychological well-being during a pandemic. We explored whether dimensions of interoception are associated with daily negative affect under conditions of increased isolation due to COVID-19.

Key findings in this exploratory study were that:

- 1 ITPE was positively associated with daily negative affect;
- 2 Interoceptive awareness was negatively associated with negative affect on the HDT
- 3 IS was positively associated with negative affect.

LIMITATIONS

1. Limited sample size

The initial expedition context of the study resulted in a small sample size, meaning results are exploratory. To maximise statistical power where possible, the daily diary methodology was used to yield a greater number of data points.

2. Subjective nature of psychometrics

Online questionnaires were used, which are logistically appropriate in the context of lockdown but are subjective.

3. Interoceptive tasks

The HCT is widely used to assess interoceptive accuracy as it is relatively easy to implement. However, there are some disagreements over the use of the heartbeat counting task as a measure of interoceptive accuracy. As HCT scores may be influenced by beliefs about heart rate, the present study also included a time estimation task to test for whether time estimation accuracy was associated with accuracy on the HCT. With regards to the HDT, the present study used the multi-interval approach, allowing the calibration of an interval delay suitable for each participant.

With regards to the primary hypothesis, the findings of the present study are congruent with models suggesting reduced interoceptive accuracy with heightened interoceptive sensibility may disrupt emotional processing.⁷ This association had been found experimentally in studies with autistic spectrum and control groups in both adults⁴ and children.⁸ Moreover, Young *et al.* found that interoceptive prediction error may contribute to disordered eating.⁹ The congruency of the findings of the present study with previous studies is perhaps surprising given how the small sample size of the present study may predispose to type II error.¹⁰

The COVID-19 pandemic presents complex context presenting multifactorial consequences for psychological wellbeing. Scalabrini *et al.* argue that the pandemic may result in a loss of subjectivity due to threats and loss on intersubjectivity due to isolation.¹¹ Scalabrini *et al.* propose that the pandemic affects the sense of self and relations to others and the world may manifest as existential fear and anxiety, mediated by interoceptive processing.¹¹

CONCLUSION

These preliminary findings suggest that the degree of interoceptive error may be a predictive factor when determining individuals at greater risk of negative effects on psychological well-being in isolation. Equally, results may indicate a role for interoception related interventions to be implemented in tools developed to mitigate negative responses to heightened isolation.

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