

Predicting subjective stress using wearable-measured sleep and resting HRV

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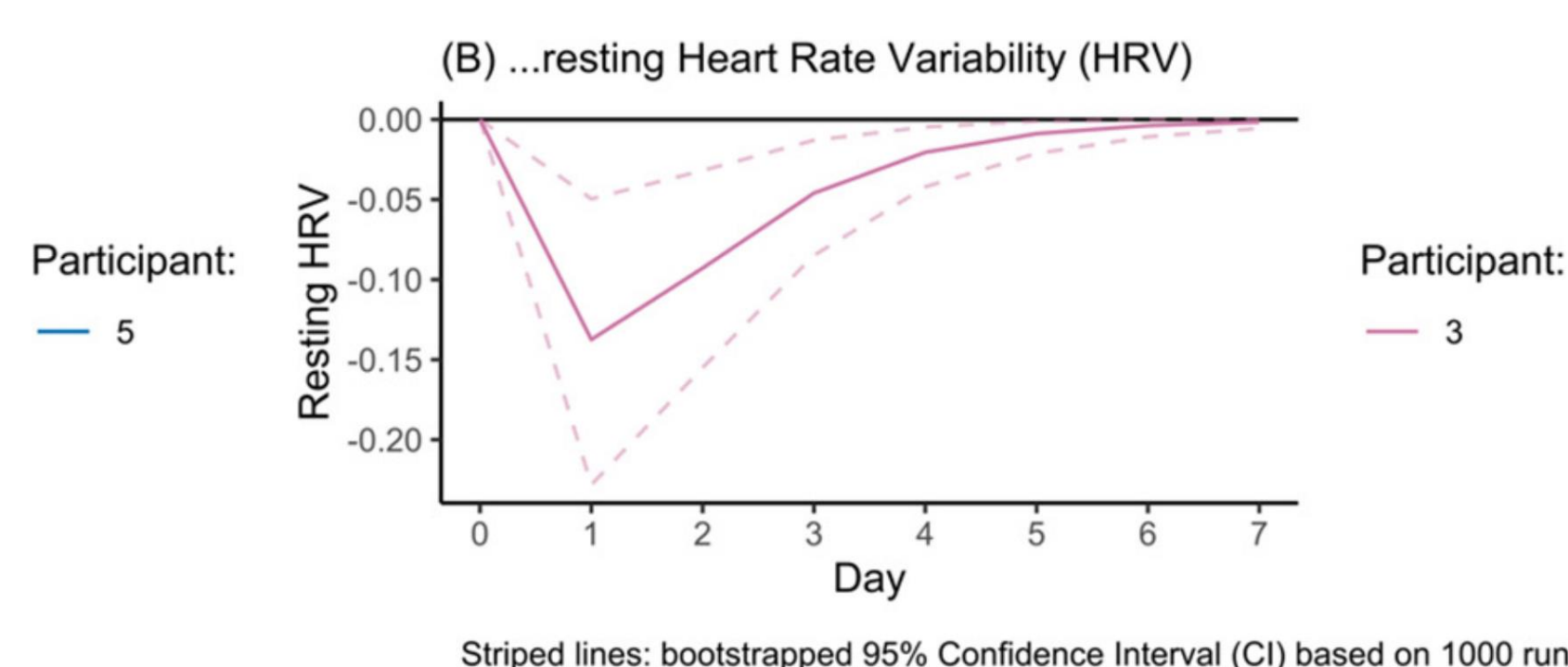
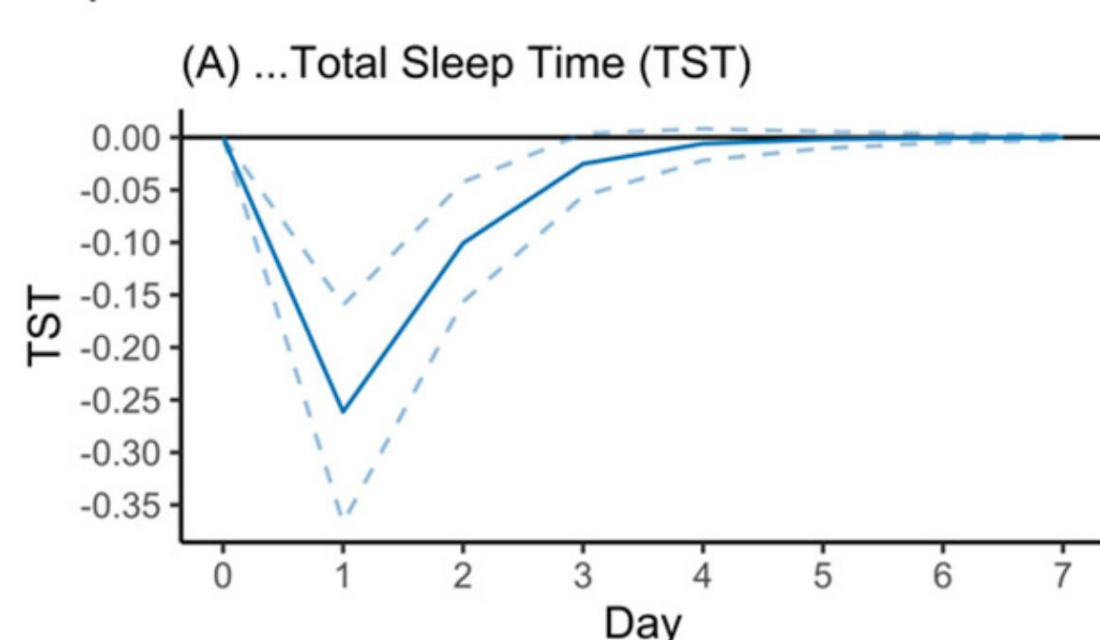
Background

- Stress impacts the health and well-being of workers.
- Monitoring via wearable sensors and smartphone applications may allow for early recognition of the detrimental impact of stress or a reduced resilience.
- Such signals could be used to trigger timely feedback in Just-In-Time Adaptive Interventions (JITAI), and thus benefit prevention of stress-related problems
- Previously, we created within-day and multi-week models, but multi-day models are still unexplored.

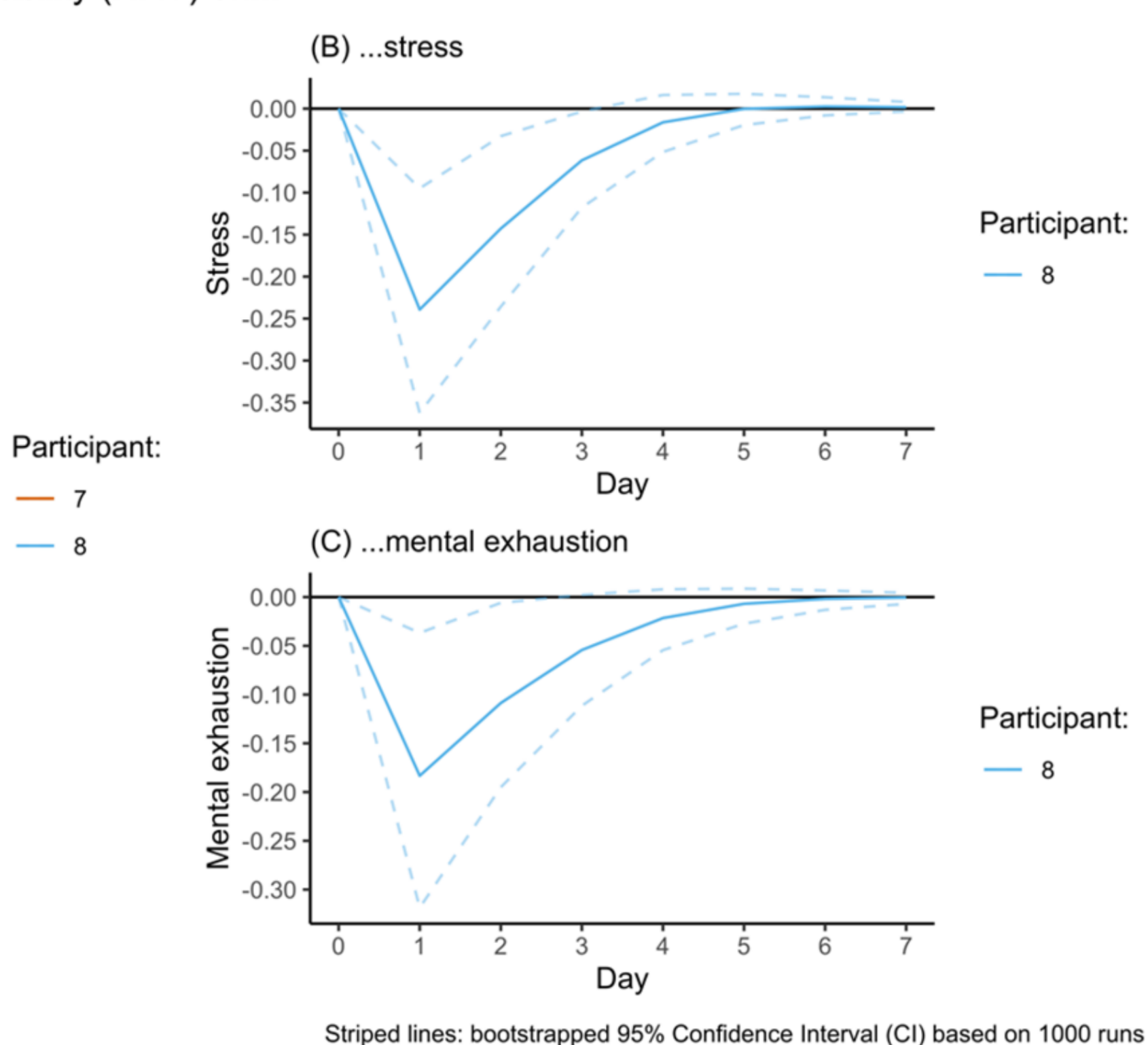
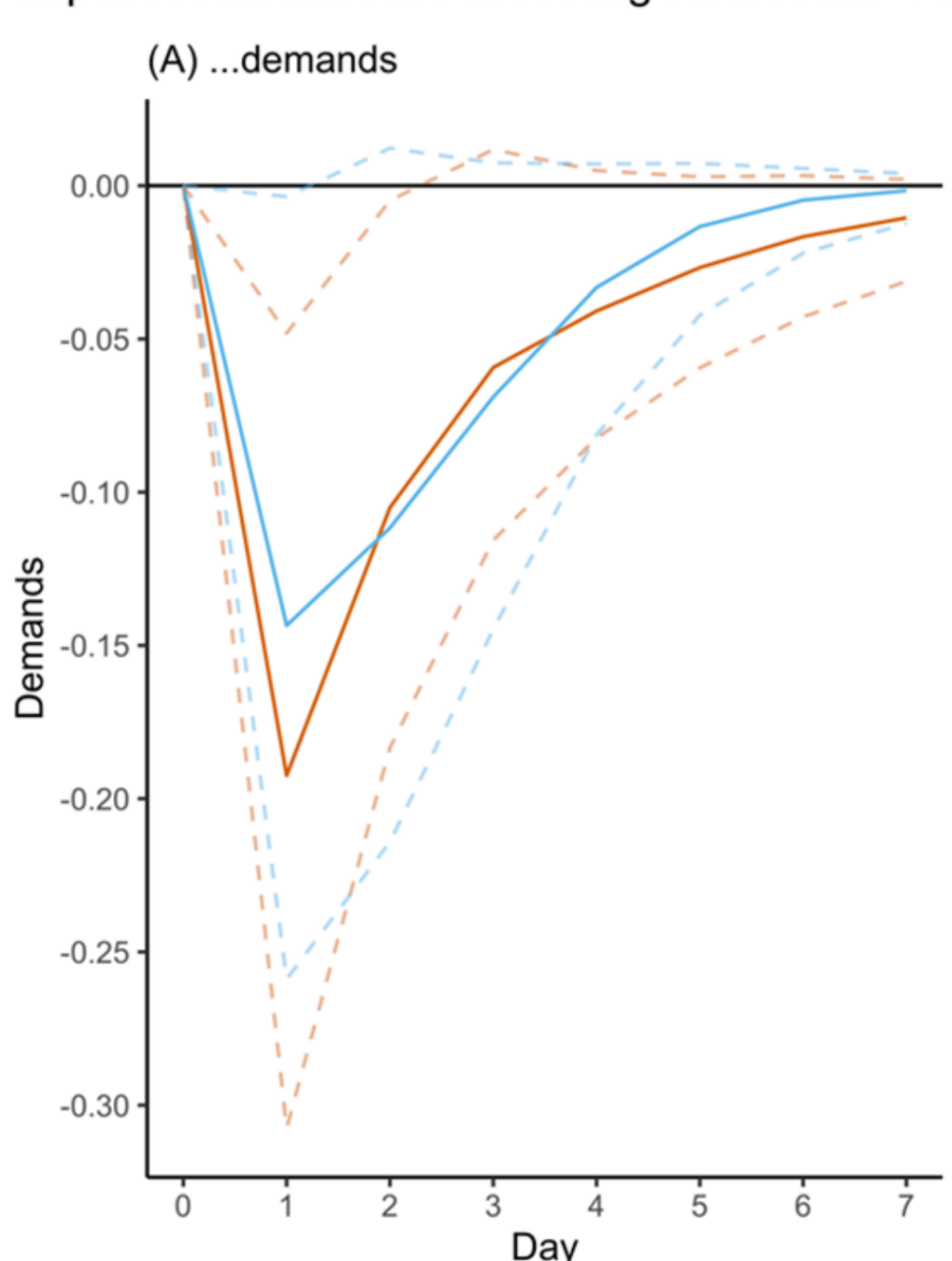
Methods

- Design:** Multiple N-of-1 observational study
- Participants:** 8 police officers
- Duration:** 15-55 weeks
- Outcome:** Subjective demands, stress, mental exhaustion and vigor
- Predictors:** Oura-ring measured sleep and resting Heart Rate Variability (HRV)
- Modelling:** Vector Auto-Regression (VAR)
- Visualizations:** Impulse Respons Function (IRF)

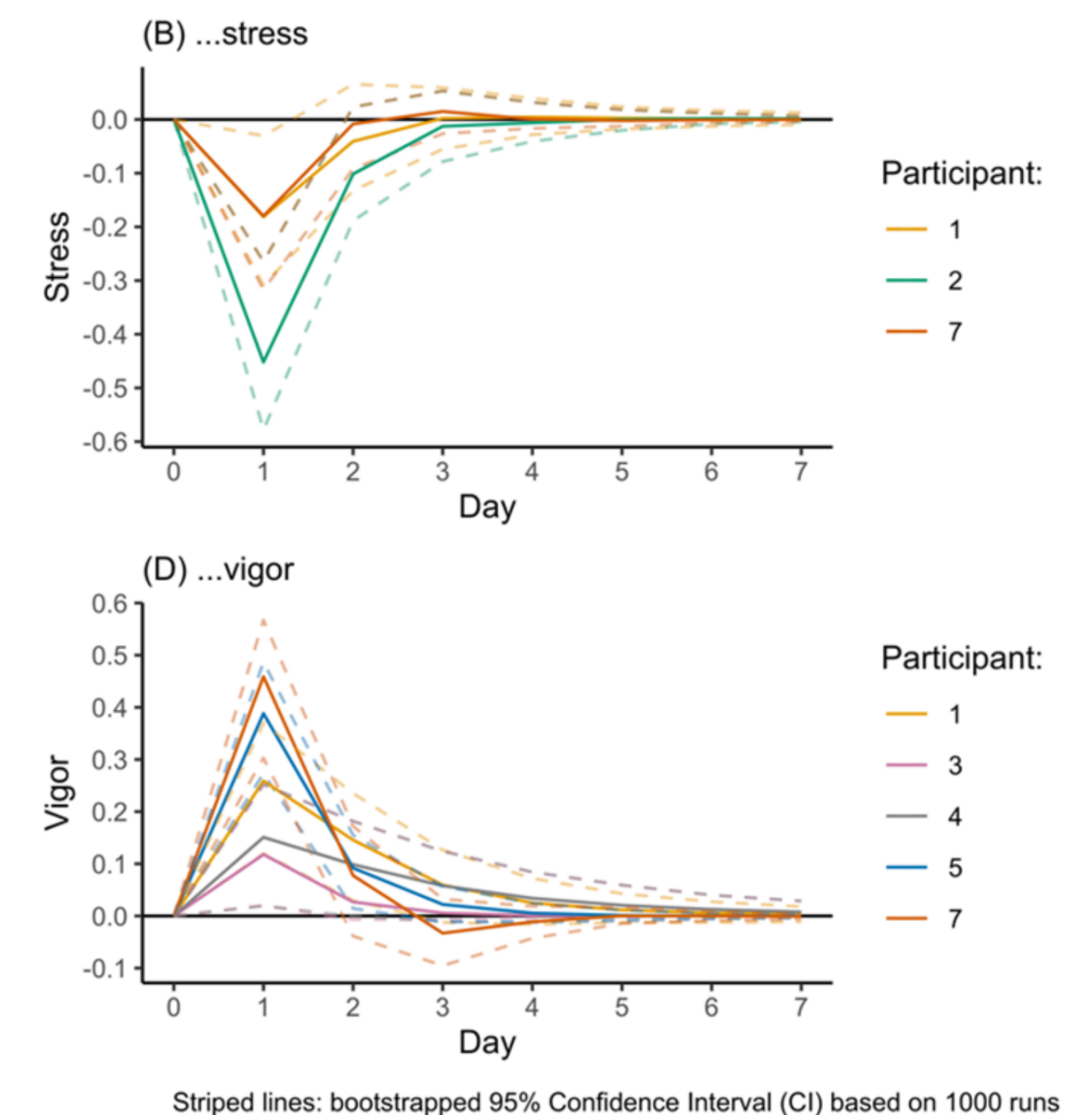
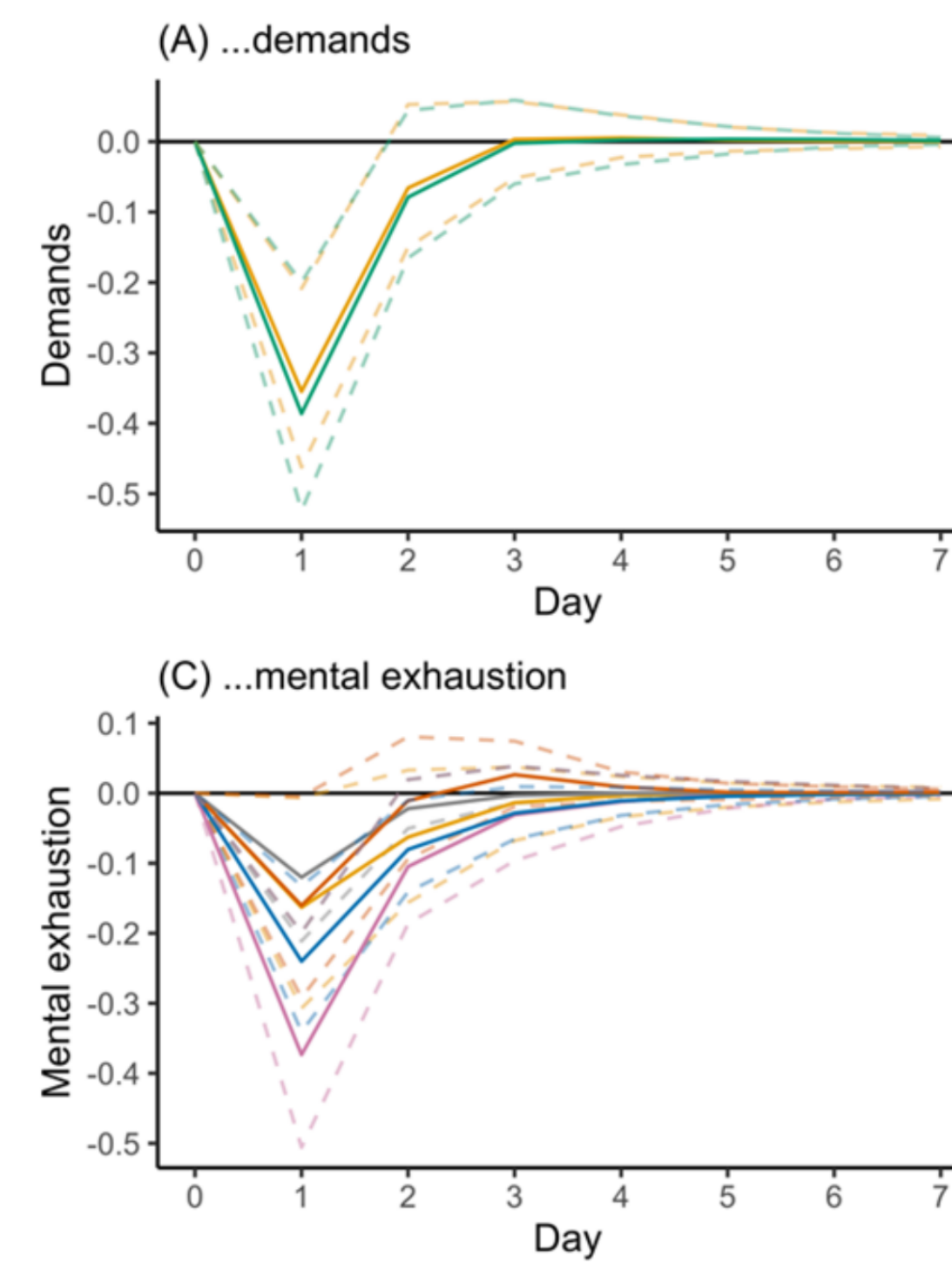
Impact of an increase in demands on...



Impact of an increase in resting Heart Rate Variability (HRV) on...



Impact of an increase in Total Sleep Time (TST) on...



Main findings & discussion

- Wearable-measured Total Sleep Time (TST) and resting HRV were more consistent predictors of the subjective stress-related outcomes than vice versa. This generally aligns with other studies on the topic.
- The direction of the associations between TST, resting HRV and the subjective stress-related outcomes are consistently similar, but these associations are not consistently observed in all participants.
- The impact of changes in resting HRV appears to be more abiding than that of changes in TST.
- The small number of participants (n=8) limits the generalizability of the findings, but the sizable datasets per participant (N=125 to N=386) with mostly complete (80.7-96.8%) and high-quality data contributed to novel insights.
- Future studies may consider exploring Multi-Level and Time-Varying Vector Auto-Regression analyses.

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