Stress and recovery measured with heart rate variability: Do the findings of laboratory research translate to daily life?

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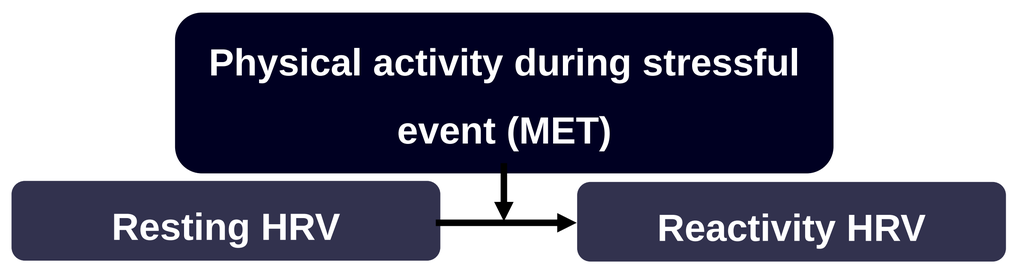
1. Introduction

- **Stress** can have many negative health effects (Marsland et al., 2017)
- Temporal dynamics of stress have been studied in the laboratory but not daily life
- **Heart rate variability (HRV)** is a physiological indicator of stress
- We aim to investigate the predictions of laboratory research in daily life (Vagal Tank Theory: Laborde et al., 2018)

2. Hypothesis: Higher resting HRV leads to more adaptive reactivity in daily life

- **H1a:** In events of **low physical activity**, higher resting HRV relates to higher reactivity HRV.
- **H1b:** In events of **high physical activity**, higher resting HRV relates to lower reactivity HRV.

Figure 1. Hypothesis.

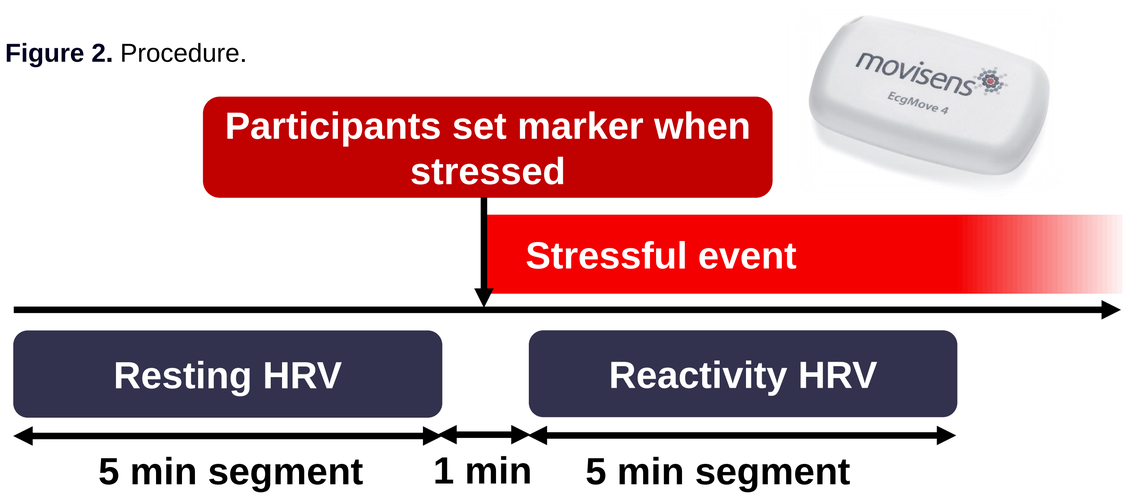


Note. MET = metabolic equivalent of task, HRV = heart rate variability.

3. Methods

- **Sample**: 67 university students, female (79.1%), male (20.9%), average age *M*=23.8 years (*SD*= 4.2)
- **Observations**: 536

Figure 2. Procedure.



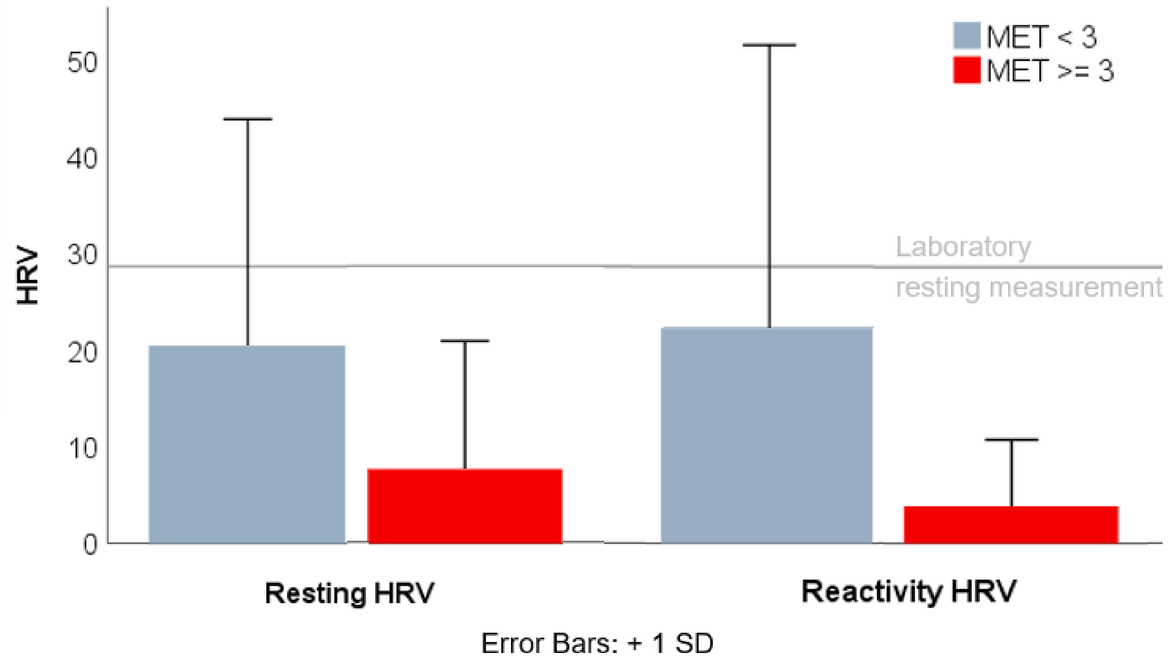
Note. HRV = heart rate variability.

4. Data preparation and analysis

- **HRV** (based on the parameter RMSSD) was calculated with software from movisens
- Personal HRV means for **5 minute segments** during resting and reactivity were calculated (see Figure 2)
- **Multi-level analysis** with a focus on intraindividual differences

5. Results: Descriptive Statistics

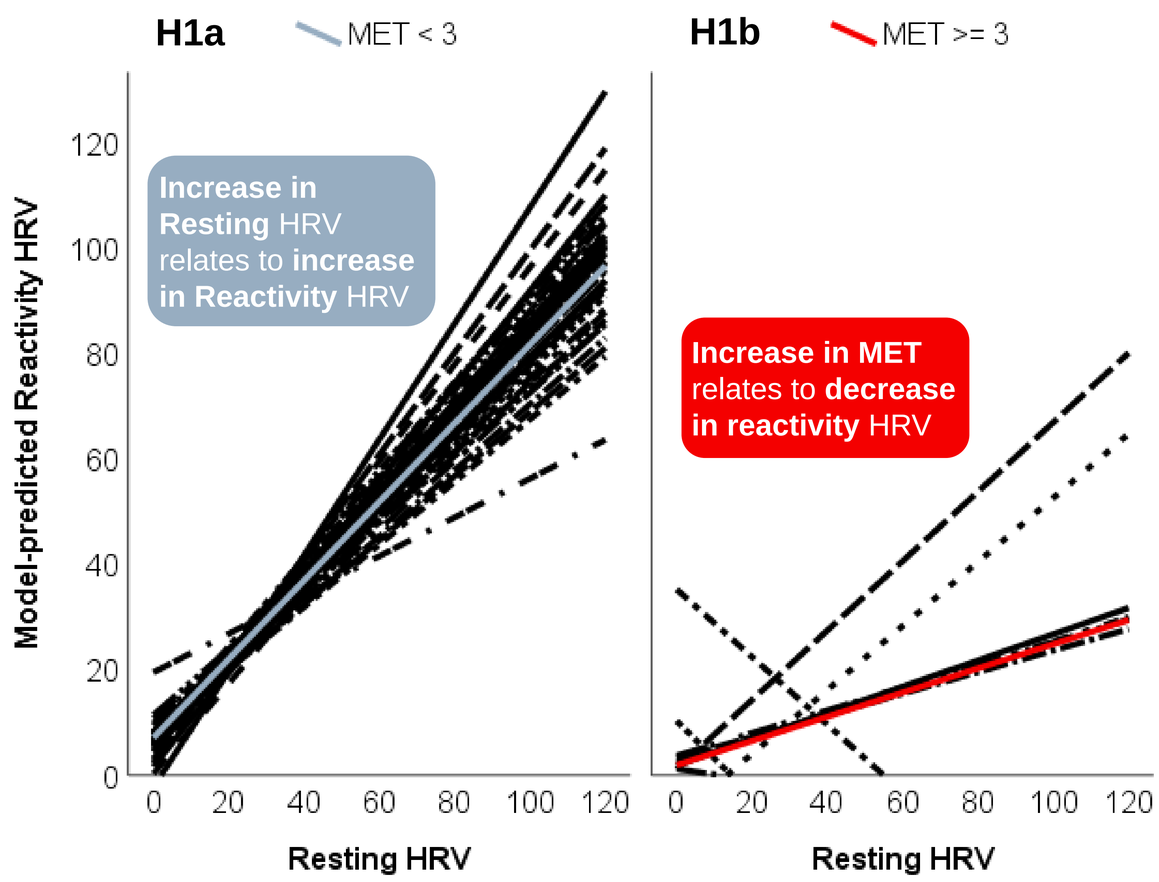
Figure 3. Resting and reactivity HRV by MET.



Note. Laboratory resting measure (M = 28.7, *SD* = 24.3) was the traditional 5 minutes baseline measurement in laboratory, MET = metabolic equivalent, HRV = heart rate variability.

6. Results: Hypothesis Tests

Figure 4. Model-predicted Reactivity HRV by MET.



Note. MET= metabolic equivalent, HRV = heart rate variability. The interaction between Resting HRV and MET was significant (p < 0,001) with greater physical activity (MET) being related to lower Reactivity HRV.

7. Discussion

- **Hypothesis confirmed:** Higher resting HRV was related to more adaptive stress reactivity in daily life
- Naturalistic stressful events cannot be clearly divided into events requiring low or high physical activity
- **We found lower resting HRV levels in daily life** compared to laboratory studies, and more noise

Literature
Laborde, S., Mosley, E., & Mertgen, A. (2018). Vagal Tank Theory: The three Rs of cardiac vagal control functioning – Resting, reactivity, and recovery. *Frontiers in Neuroscience*, *12*. https://doi.org/10.3389/fnins.2018.00458
Marsland, A. L., Walsh, C., Lockwood, K., & John-Henderson, N. A. (2017). The effects of acute psychological stress on circulating and stimulated inflammatory markers: A systematic review and meta-analysis. *Brain, Behavior, and Immunity*, *64*, 208–219. https://doi.org/10.1016/j.bbi.2017.01.011