The Trier Social Stress Test in the Black Box: Inducing Social Stress in a Virtual Environment

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:: INDUCING SOCIAL STRESS IN A VIRTUAL ENVIRONMENT ::

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AIM

The Trier Social Stress Test (TSST) is a widely used protocol to induce stress with corresponding profound endocrine and cardiovascular responses. Briefly, a speech and an arithmetic task are performed in front of three hired actors. This study aimed to examine if a Virtual Reality (VR) version of TSST would provoke physiological responses comparable to real life TSST.

METHOD

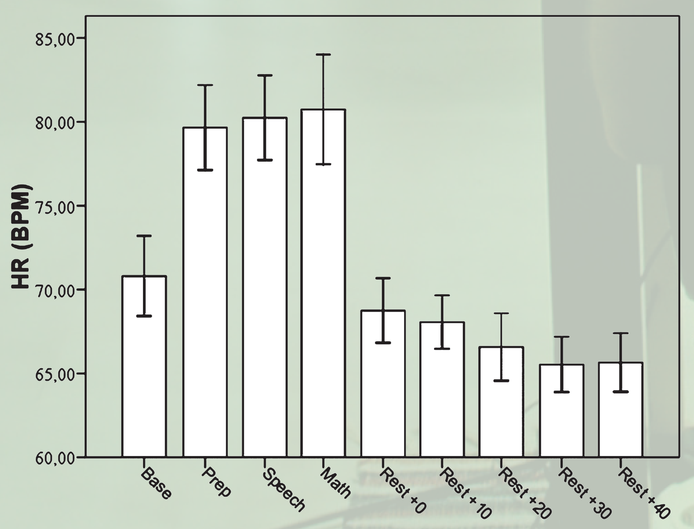
Participants: 11 healthy young males.
VR equipment: a CAVE™ system with three rear projected walls (4 x 3 m), and one floor projection together with head tracking and stereoscopy.
Heart rate (HR), T-wave amplitude (TWA, SNS activity), and high frequency heart rate variability (HF-HRV, PNS activity), were estimated during *baseline*, *preparation*, *speech*, *mental arithmetics*, and *rest* after TSST during 40 minutes.

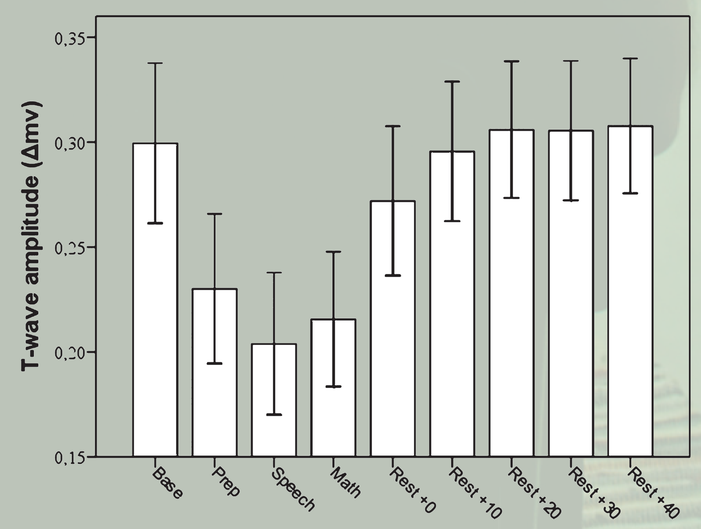
RESULTS

During stress:
– HR increased $F(8, 80) = 31.82$, $p < .0001$, $\eta^2 = 76$, $\varepsilon = 39$,
– TWA decreased $F(8, 80) = 19.24$, $p < .0001$, $\eta^2 = 66$, $\varepsilon = 26$,
– HF-HRV *n.s.*

DISCUSSION

HR increased during preparation, speech and arithmetics with about 10 BPM resembling many of the real life TSST studies. Decreased TWA (inversely related to SNS activity), and no effect of HF-HRV, during the stress conditions imply that HR increase was mainly an effect of increased sympathetic activity. The results suggest that VR technology is a promising tool to induce stress that is easy to administrate and replicate, without the cost of hired actors.





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