A novel method to induce mental fatigue

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Introduction

- We all experience mental fatigue, yet know little about it
- It is important to understand the origins, nature, and effects of mental fatigue
- Mental fatigue is an ill-defined concept
- Current literature relies on self-report measures to determine whether participants are mentally fatigued, and fails to consider performance in the fatiguing task
- Aim: develop a method that causes subjective increase in feelings of fatigue as well as reduced task performance

Sample

- 45 healthy adults aged 18-65 with no known cognitive or uncorrected visual impairments completed the full set of procedures (26 withdrawals/exclusions)

Procedures

Battery of four computerized cognitive tasks
1) A-X Continuous Performance Test
   - Probe – distractor – distractor – cue
   - Press ‘K’ if probe A and cue X, ‘D’ if not
   - Recorded response time and key presses
2) N-Back Task
   - 3-back
3) Visual Search Task
4) Mental Rotation Task

Two sessions on the computer at home:
1) Training session (< 45 minutes)
   - Practiced each task for 5 minutes
2) Testing session (> 2 hours)
   - 10 minutes per task x 3 repeats
   - AX-CPT first and last
   - Brunel Mood Scale at beginning and end
   - Questionnaire immediately following session (optional)

Conclusions

- Our method is suitable for inducing mental fatigue
- Our subjective fatigue findings are similar to other literature
- The effect of the mental fatigue battery on task performance was significant but very small. Mental fatigue may be difficult to reliably detect in smaller samples
- Mental fatigue affects everyone but is particularly important for older adults or populations who work in highly demanding environments (healthcare, military, engineering)
- Mental fatigue is complex
- We would benefit from a more coherent definition and understanding of mental fatigue so that we can reliably study its possible effects
- Further work: explore effects of age and break duration, qualitative analyses of questionnaire responses, replicate findings

Hypotheses

a) Completing a two-hour cognitive test battery will cause an increase in subjective feelings of mental fatigue
b) Completing a two-hour cognitive test battery will cause a decline in performance on a cognitive task

Dependent Variables

a) Subjective measure of fatigue: Brunel Mood Scale (BRUMS) fatigue subscale
   - Score range from 0-16 where 16 is extremely fatigued
b) Objective measure of fatigue: Balanced Integration Score calculated using AX-CPT outcomes
   - Standardised integrated measure of response time and accuracy
   - Higher number = better performance, and zero = average

References