Research Methods

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Introduction
We all experience mental fatigue
Mental fatigue is an ill-defined concept
Current literature relies on self-report measures of mental fatigue and lacks consideration of task performance
Aim: develop a method that causes subjective increase in feelings of fatigue as well as reduced task performance

Sample
71 healthy adults aged 18-65 with no known cognitive or uncorrected visual impairments
12 withdrew
5 had technical error
8 discarded due to poor data quality
Final sample size n = 46

Procedures
Cognitive test battery comprising 4 computerized tasks:
1) A-X Continuous Performance Test²
   Probe – distractor – distractor – target
   Press ‘X’ if probe is A and target is X, ‘O’ otherwise
   Recorded response time and key presses
2) N-Back Task³
3) Visual Search Task⁴
4) Mental Rotation Task⁵

2 sessions on the computer at home:
Training session (<45 mins)
Practiced each task for 5 minutes
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

Dependent variables
Subjective measure of fatigue
Brunel Mood Scale (BRUMS) fatigue subscale⁶
Score range from 0-16 where 16 is extremely fatigued
Objective measure of fatigue
Balanced Integration Score² calculated using AX-CPT performance measures
Standardised integrated measure of accuracy and reaction time
Higher number = better performance

Hypotheses
Completing a 2 hour cognitive test battery will cause an increase in subjective feelings of mental fatigue
Completing a 2 hour cognitive test battery will cause a decline in performance on a cognitive task

Results
Increase in subjective fatigue
BRUMS Fatigue Subscale Rating
Before and After the Mental Fatigue Battery

Decrease in cognitive task performance
Balanced Integration Score in the AX-CPT Task at the Beginning and End of the Mental Fatigue Battery

Discussion
We successfully caused an increase in subjective fatigue and reduced task performance
Our method is suitable for inducing mental fatigue
The effect of the mental fatigue battery on task performance was significant but very small. Is this a problem for research with smaller sample sizes, that may not be able to reliably detect an effect of mental fatigue on task performance?
Mental fatigue is a complex affective response and consequently can be difficult to induce and detect⁶⁹
Mental fatigue affects everyone but is particularly important for older adults or populations who work in highly demanding environments (healthcare, military, engineering)
Further work: explore effects of age and breaks, qualitative analyses of questionnaire responses, reproduce findings

Conclusions
Our method is suitable for inducing mental fatigue
Mental fatigue may still be difficult to detect in smaller sample size
We need to develop a more coherent definition and understanding of mental fatigue so we can reliably study its possible effects

References