



Emotionally overreacting after sleep loss?

– A fMRI study on the effects of sleep restriction on cognitive reappraisal

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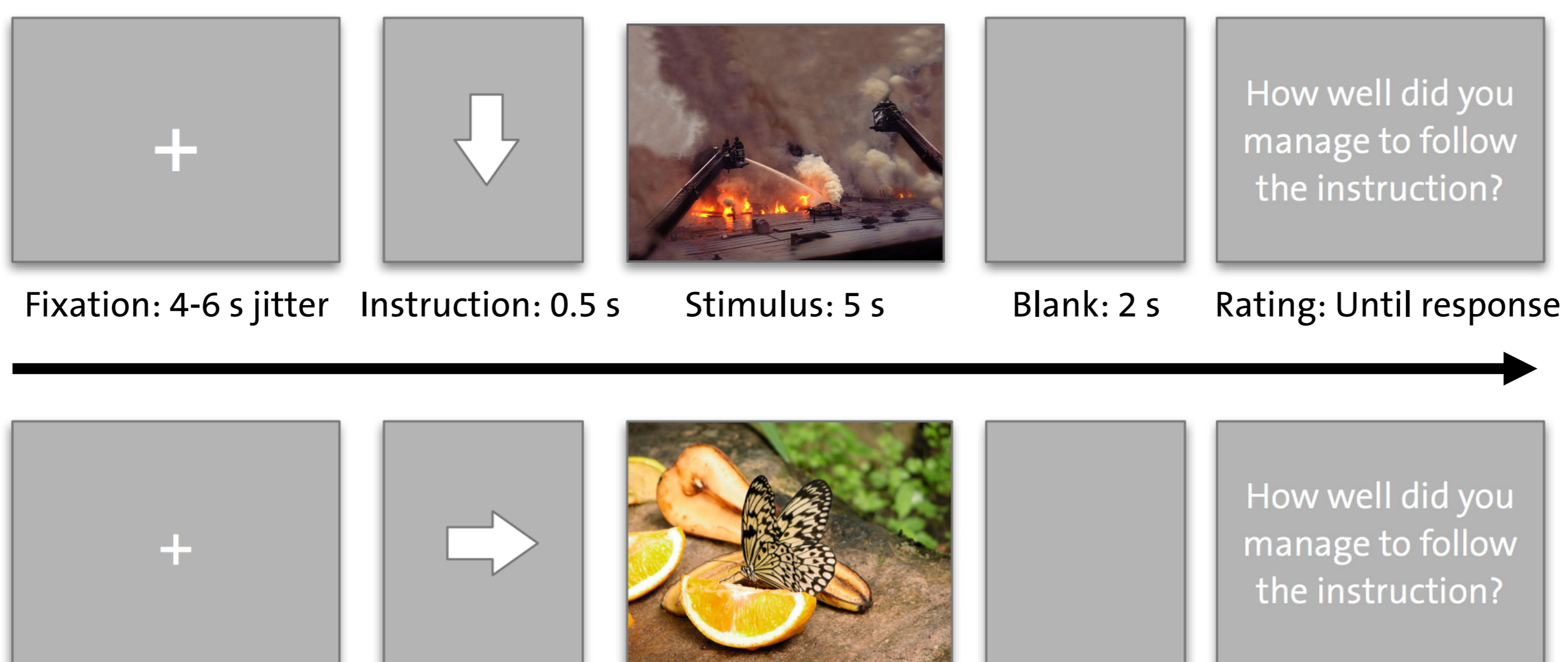
Objectives

Sleep loss affects emotional processing and has been shown to be associated with changes in brain activation patterns, i.e. increased amygdala reactivity, in response to negative stimuli. Behaviourally, sleep deprivation also affects aspects of more complex emotional functions, such as emotional regulation, but how this is reflected in the brain is unknown. The study aims to investigate how emotional regulation, through cognitive reappraisal, is affected by experimental sleep restriction in young and older adults. Behavioural outcomes, as well as brain correlates are studied.

Method

47 healthy young (age: 20-30, 24 females) and 32 healthy older participants (age: 65-75, 17 females) participated in an fMRI experiment on 2 occasions, once after a normal night’s sleep and once after restricted sleep (3h). Participants were instructed to maintain, up-regulate or down-regulate their emotional response to 60 negative and neutral IAPS pictures and to rate their success in following the instruction after every stimulus (*fig 1*).

Figure 1.



Preliminary results

Sleep restriction did not significantly affect spontaneous unpleasantness in response to negative pictures. Sleep restriction caused a general decrease in self-rated success in regulating emotions (*fig 2*). In young participants, negative compared to neutral pictures yielded increased brain activity in bilateral amygdalae (*fig 3a*), and there was a non-significant trend towards increased activity in the sleep restriction condition. Down-regulation compared to maintain yielded a robust activation of dorsolateral prefrontal cortex and lateral orbitofrontal cortex (*fig 3b*). Sleep restriction caused less activity in these regions, but the effect was not significant.

Figure 2.

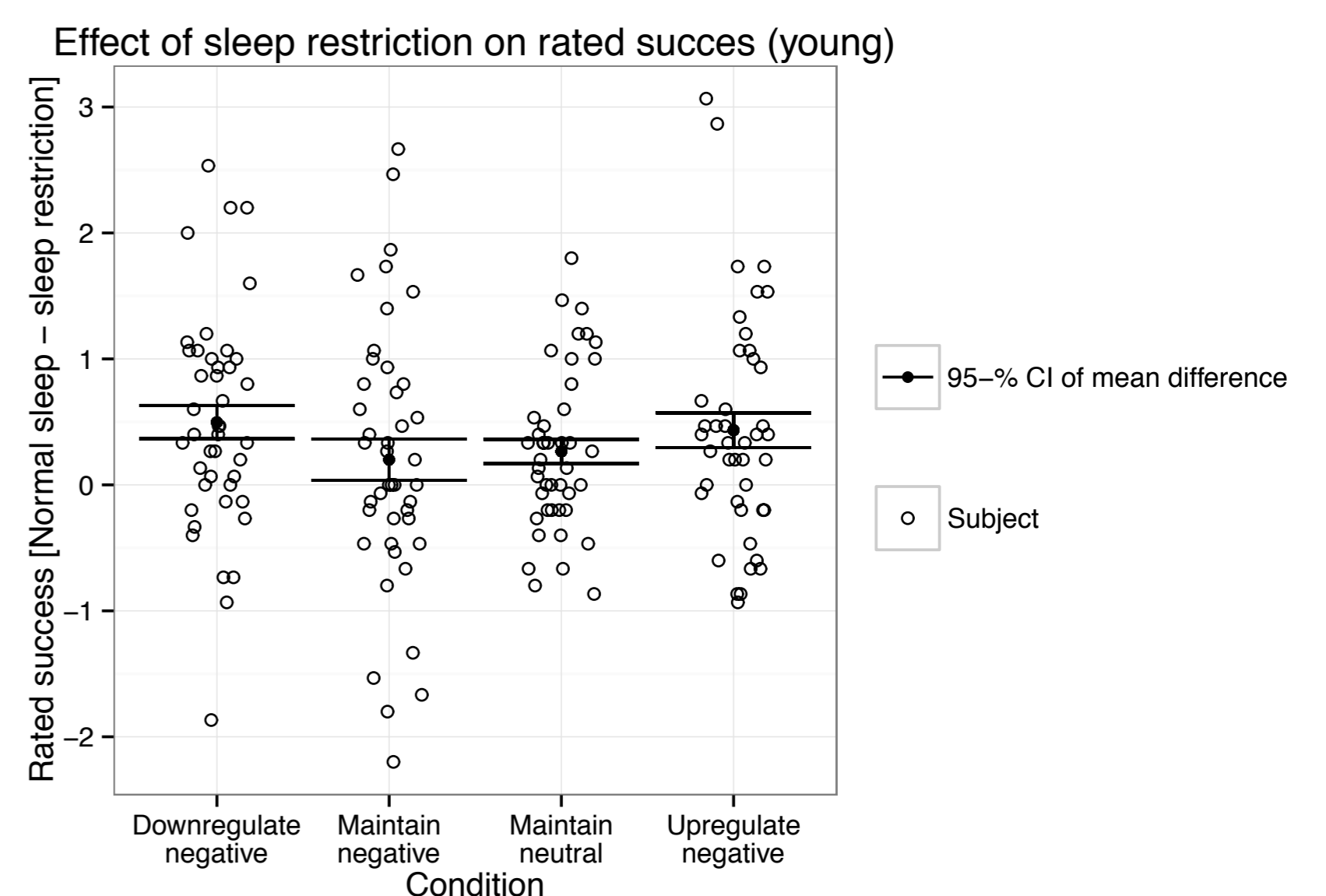
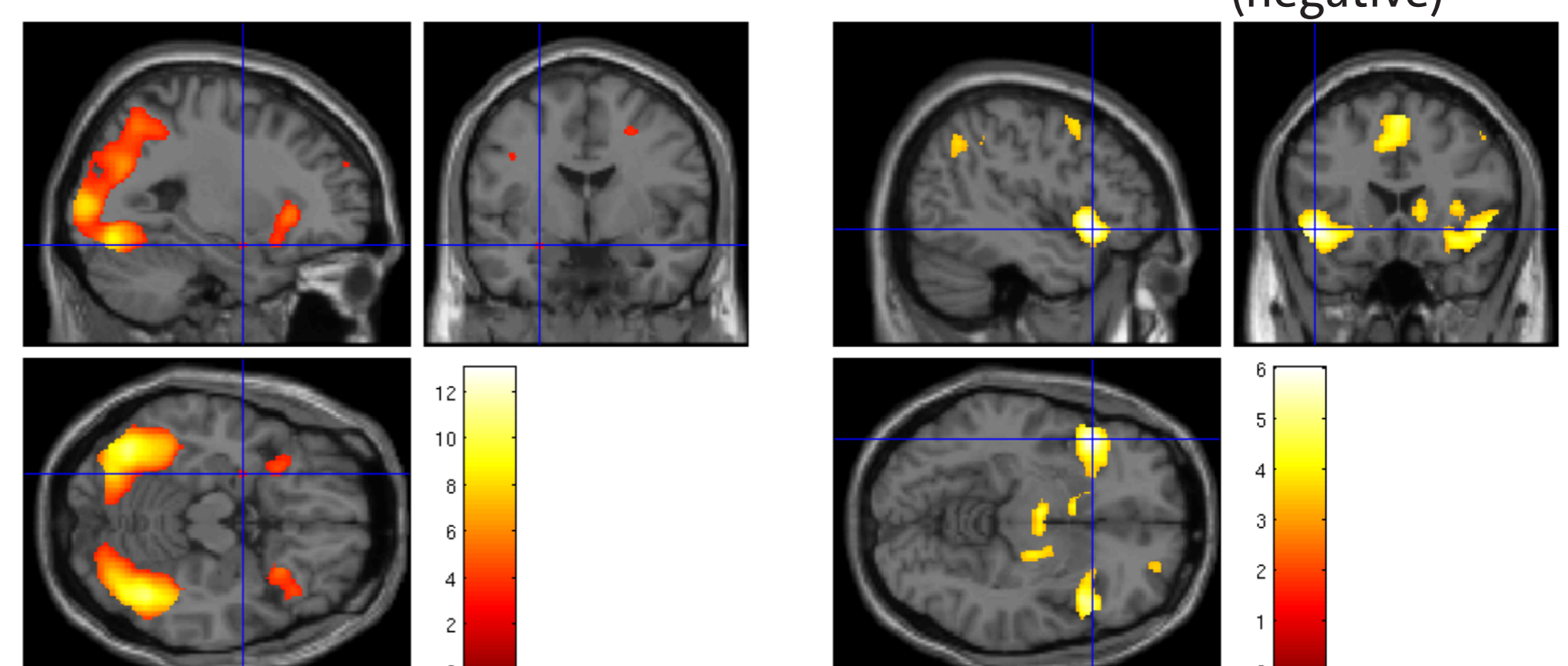


Figure 3.

a) Negative > neutral

b) Downregulate > maintain (negative)



Conclusions

Emotional regulation through cognitive reappraisal was inhibited by sleep restriction according to participants’ ratings. The behavioural effects can partly be related to changes in brain activity.

CONTACT