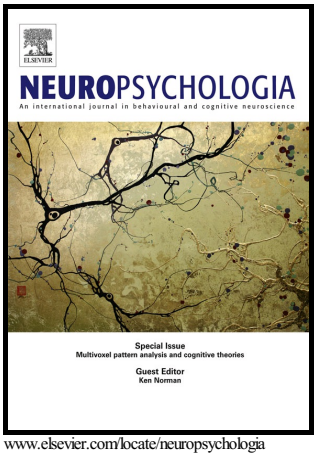

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Avoiding sedentary behaviors requires more cortical resources than avoiding physical activity: an EEG study

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Abstract

Why do individuals fail to exercise regularly despite knowledge of the risks associated with physical inactivity? Automatic processes regulating exercise behaviors may partly explain this paradox. Yet, these processes have only been investigated with behavioral outcomes (i.e., based on reaction times). Here, using electroencephalography, we investigated the cortical activity underlying automatic approach and avoidance tendencies toward stimuli depicting physical activity and sedentary behaviors in 29 young adults who were physically active (n=14) or physically inactive but with the intention of becoming physically active (n=15). Behavioral results showed faster reactions when approaching physical activity compared to sedentary behaviors and when avoiding sedentary behaviors compared to physical activity. These faster reactions were more pronounced in physically active individuals and were associated with changes during sensory integration (earlier onset latency and larger positive deflection of the stimulus-locked lateralized readiness potentials) but not during motor preparation (no effect on the response-locked lateralized readiness potentials). Faster reactions when avoiding sedentary behaviors compared to physical activity were also associated with higher conflict monitoring (larger early and late N1 event-related potentials) and higher inhibition (larger N2 event-related potentials), irrespective of the usual level of physical activity. These results suggest that additional cortical resources were required to counteract an attraction to sedentary behaviors. Data and Materials [https://doi.org/10.5281/zenodo.1169140]. Preprint [https://doi.org/10.1101/277988].

Keywords: Automatic Behaviors; Electroencephalography; ERP; Exercise; LRP; Physical activity

1. Introduction

Why do we fail to exercise regularly (Kohl, et al., 2012) despite the known negative effects of physical inactivity on health (e.g., Ekelund, et al., 2016; Lee, et al., 2012)? This exercise