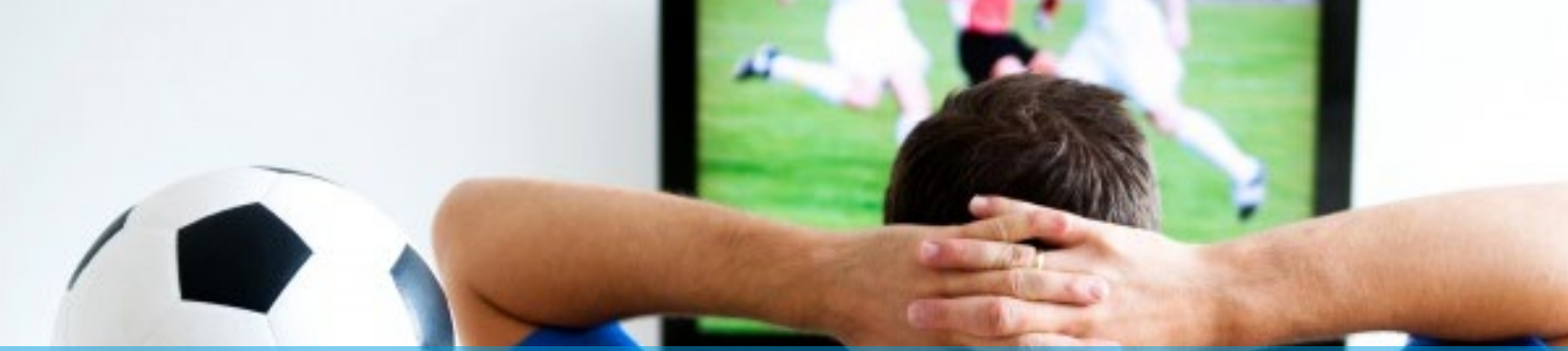

WellSpring
Sharing physical activity knowledge

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Are we lazy, or just being efficient?

The brain's struggle to avoid sedentary behaviours

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Physical inactivity on the rise

About twenty years ago, in 1997, the World Health Organization (WHO) issued comprehensive guidelines for promoting physical activity in older adults.[1] Since then, the adverse effects of physical inactivity on health have been widely reported and guidelines have been extended to all populations.[2] As a result, most individuals are now aware of the positive effects of regular physical activity and have the intention to exercise.[3] Yet, this intention is not sufficient as plans are often not executed.[4]

Despite prioritizing and scaling up actions promoting physical activity over the past two decades, the prevalence of physical inactivity keeps increasing. From 2010 to 2016, the percentage of inactive adults has increased by 5% worldwide, now affecting more than 1 in 4 adults (28% or 1.4 billion people).[5] This context raised the question: Why do we still fail to be more physically active?[6]

The exercise paradox

The discrepancy between the **intention** to exercise and the **acting out** in people tending to a sedentary lifestyle has already been shown by previous studies.[7] But what happens in the brain that prevents the intention to be followed by actions? Our hypothesis was that this "exercise paradox" results from a conflict between conscious and automatic processes taking place in the brain.[8] To illustrate this paradox, imagine people taking an elevator or escalator when they go to the gym instead of using the stairway. This non-sense, or paradox, could be due to the fact that their intention to exercise comes into conflict with an **automatic attraction** to sedentary behaviours.

Recent neurobehavioural research

In an article published in Neuropsychologia,[9] we argued that the failure of public policies in counteracting the pandemic of physical inactivity may be due to brain processes that have been reinforced across evolution.[8] **Energetic cost minimization** can be part of these processes as it has been essential to survive, search for food or shelter, interact with sexual competitors, and avoid predators.

SUMMARY

Inactive lifestyles are on the rise despite strong efforts to promote and support physical activity. Although many are aware of the benefits of an active lifestyle, there may be differences between intentions to be active and acting on these intentions.

This WellSpring highlights this discrepancy and provides tips for practitioners and policy-makers to support individuals and the greater population in achieving their daily physical activity goals.

To explore automatic reactions, participants in our study were asked to approach stimuli depicting sedentary behaviours and avoid stimuli depicting physical activity as fast as possible. In another condition, they were asked to do the opposite. Then, we compared the time required to avoid or approach sedentary behaviours and physical activities.

Since we aimed to investigate the exercise paradox, all participants had the intention to be active. Indeed, if there is no initial intention to be active, a conflict between this conscious intention to be active and the automatic attraction towards sedentary behaviours cannot emerge.

At the behavioural level, results showed that participants were faster at avoiding sedentary behaviours compared to physical activity, and even more so in participants who were more physically active. The reaction-time difference was in the order of 30 milliseconds on average and 45 milliseconds for more active participants. This result was expected because it has been reported multiple times before.[7,10,11] The fact that participants were faster at approaching a picture related to physical activities than to sedentary behaviours confirmed that they had the intention to be active. However, these behavioural results did not explain the exercise paradox. The brain results did reveal, for the first time, that intentions to be physically active conflict with automatic brain processes attracting us to sedentary behaviours.

Are we wired to sit?

Specifically, the novelty of our study lies in the fact that this faster avoidance of sedentary behaviours is at the cost of an increased recruitment of frontal brain resources. The electroencephalographic results showed that avoiding pictures of sedentary behaviours was associated with higher brain activity in spatiotemporal regions that are related to conflict monitoring and inhibition. In other words, the brain struggles to avoid images depicting sedentary behaviours.

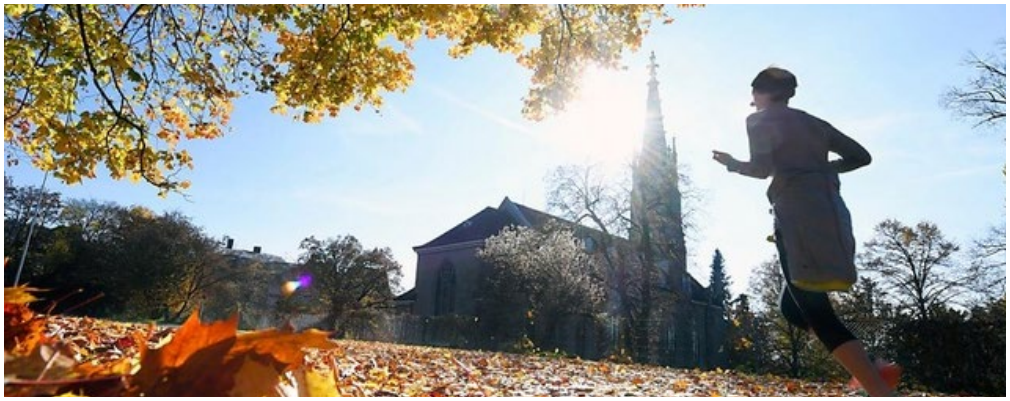
Recent media coverage has interpreted our results as an innate laziness.[12,13] Yet, in many instances, being lazy also means being efficient. This efficiency provided an advantage for survival when it came to chasing prey or searching for shelter. Due to this vital advantage it confers, brain mechanisms and behaviours supporting energetic cost minimization likely evolved into automatisms.

The struggle is real

Our results highlight the importance of changing the way we look at our own struggles to be physically active. Our results explain that this struggle is real. Taking the path of physical activity requires the need to take control of our brain when the environment incites us to be more sedentary. There is a need to support individuals' understanding that being physically active starts in the brain by refusing to be tricked into the automatic attraction to be sedentary. As an example, when we have to choose between the elevator and the stairs, we cannot afford to be cognitively passive because our brain will attract us to the elevator if we do not prevent it from doing so.

The failure of public policies in counteracting the pandemic of physical inactivity may be due to brain processes that have been reinforced across evolution.

The next step for our team, which has not been addressed in the scientific literature yet, is to understand whether we can rewire our brain into wanting to go to the gym. We believe that there may be opportunity to re-train the brain to adopt physically active automatisms and that cognitive resources may be critical for this re-training.[14] In the meantime, practitioners and policy-makers should be aware of this automatic attraction to sedentary behaviours and should adapt their actions accordingly.



How practitioners can support individuals' physical activity?

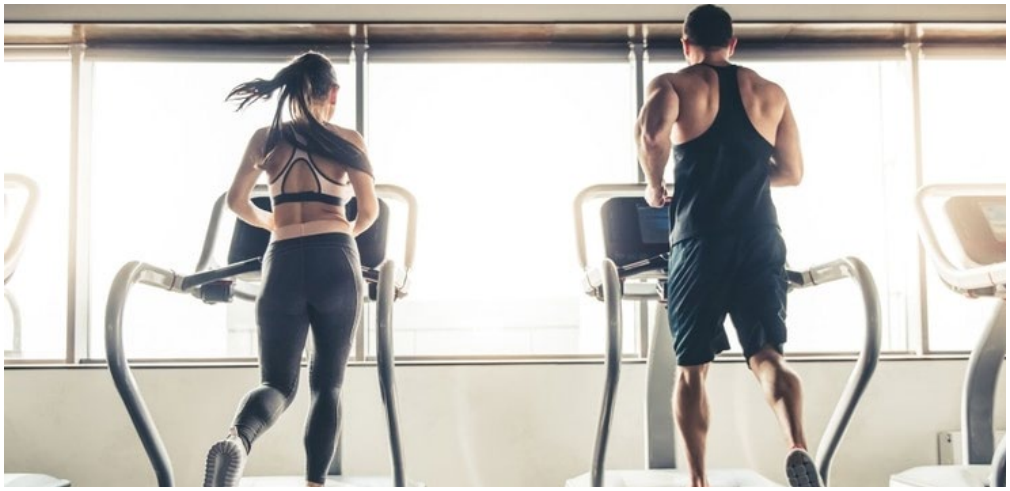
Practitioners should encourage and inform their clients that fitting in large block of physical activity time is not necessary to achieve health benefits.[15] Thus, each step counts. To help patients implement their intention to by physically active, practitioners should provide simple tips that support the integration of physically active habits in everyday life.

Being physically active starts in the brain, by refusing to be tricked into the automatic attraction to be sedentary.

Tips to increase physical activity:

- Take the stairs as a rule that should be applied as many times as possible until it becomes automatic.
- Get off the bus two or three stops prior to your destination.
- Park a 15-minute walk away from your destination.
- Go for lunch outside of your workplace.
- Find a partner to keep your motivation up.
- Schedule exercise sessions in your agenda, just like professional meetings.
- Use a motivating (e-)coach, for example, Fitness Buddy, BodySpace, or MapMyRun.
- Go for a walking meeting with a colleague.
- Go to the gym during lunch break to avoid losing time with your family.
- Plan your exercise sessions ahead.
- Establish a routine, for instance, "Each week, I will go for a run three times."
- Put your sport bag at the entrance of your house the day before.
- Have a Plan B in mind in case things turn bad, such as poor weather.
- Challenge yourself and track your progress.

Practitioners should be aware of the importance of emotions for the regular engagement in physical activities.[16,17] Feeling uncomfortable during exercise builds negative memories that can lower the chances of maintaining an active lifestyle. Finding activities that are enjoyable is key. Practitioners can also explain that the "no pain, no gain" analogy does not work. Patients don't have to suffer to get all the health benefits associated with regular physical activity practice (150 minutes of moderate physical activity per week).[2] Therefore, practitioners should carefully advise their clients and patients to create and protect the conditions that maximize the pleasure associated with their physical activity.



How can policy-makers support individuals' physical activity?

Built environments have been found to play a key role in predicting physical activity.[18] Therefore, to counteract the current pandemic of physical inactivity,[4] policy-makers should build an environment that provides opportunities to be active. Specifically, they should promote safe, well maintained infrastructure, facilities, and public open spaces that provide access to places for walking, cycling, and other physical activity. To promote physical activity throughout the day, the architecture of new buildings should support physical activity, such as accessible stairs, standing work stations, etc. Employers can also play a role by fostering the use of active work stations[19] and supporting active opportunities throughout the workday.

From our perspective, a multi-dimensional approach combining neurobehavioural, clinical, and political efforts is an effective way to take up the challenge of the physical inactivity pandemic.

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Links to free resources

Behavioral and neural evidence of the rewarding value of exercise behaviors: a systematic review: www.biorxiv.org/content/early/2018/01/24/211425

Avoiding sedentary behaviors requires more cortical resources than avoiding physical activity: an EEG study: www.biorxiv.org/content/early/2018/07/24/277988

Avoiding sedentary behaviors requires more cortical resources than avoiding physical activity: data and scripts: zenodo.org/record/1169140#.W_MXIi2ZM6U

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