

Title: Standing up for health - improving mental wellbeing during COVID-19 isolation by reducing sedentary behaviour

Authors: Rowan Diamond^{1*}, Erin Byrd²

1. Department of Psychiatry, University of Oxford, Warneford Hospital, Warneford Lane, Oxford OX3 7JX, UK. Email: rowan.diamond@psych.ox.ac.uk
2. Department of Sport and Health Sciences, Oxford Brookes University, Gypsy Lane, Oxford, OX3 0BP, UK. Email: e.byrd@brookes.ac.uk

*Corresponding author: Tel 07749 899839;
rowan.diamond@psych.ox.ac.uk

ABSTRACT: Manuscript (short communication) submission to Journal of Affective Disorders

The global COVID-19 outbreak and its management are disrupting ways of life and increasing the risk of poor mental and physical health for many. The restrictions on movement have made some forms of physical activity harder to achieve and increased the chances of more sedentary behaviour. Independent of exercise taken, sedentary behaviour can have a negative impact upon mental health, especially by lowering mood.

We suggest evidence-based ways of reducing sedentary behaviour with commentary on how they may be adapted for life at home. These include: ways to use external cues, moving more frequently, maximising movement whilst waiting, reallocating time, workstation alternatives, restructuring the physical environment and recruiting help from others.

At a time in which our mental and physical health needs are more critical than ever, the relationship between sedentary behaviour and low mood is of particular importance. The current situation represents a good opportunity for us all to change habits to implement a less sedentary lifestyle, for now and the future. This can start with changes we can make at home during lockdown.

- Sedentary behaviour is linked to low mood, independent of exercise
- COVID-19 and its management are likely to increase incidence and severity of mental health problems
- Lock-down measures are likely to increase sedentary behaviour
- We describe evidence-based strategies that can reduce sedentary behaviour
- These strategies can be applied in the home environment during enforced isolation

The global COVID-19 outbreak is necessitating enormous changes to the lifestyles of people across the world. Strategies to manage the pandemic spread of the virus have imposed restrictions on movement, social interaction and work. Together with anxiety about catching the virus, financial concerns and the loss of family members, friends or colleagues, this unprecedented situation is likely to have a dramatic effect on the mental wellbeing of millions, including those with and without pre-existing mental health problems.

A further consequence of “lockdown” is the limitations to physical activity. An increasing number of resources are being made available online for taking exercise of different kinds and the benefits of this to mental (and physical) wellbeing are well-known. However, what is less well understood is the impact of a different type of physical inactivity: sedentary behaviour.

Sedentary behaviour (SB) is defined as a very low energy expenditure (<1.5 METS) with increased time spent in a seated or reclined position during waking hours (Barnes, Colley, & Tremblay, 2012). Time spent in SB has been associated with a range of adverse physical health outcomes including obesity, cardiovascular disease, cancer and type II diabetes, independently of time achieved being physically active (Biswas et al., 2015; Wilmot et al., 2012). There is also emerging evidence for the relationship between sedentary behaviour and worse mental health.

The majority of studies on the association between sedentary behaviour and mental health are observational, highlighting an association between depression and sedentary behaviour (Zhai, Zhang, & Zhang, 2015) and evidence suggests that this is bidirectional (Smith et al, 2018). In one of the few experimental studies, enforcing sedentary behaviour led to mood disturbance, independent of exercise taken (Endrighi et al, 2016). In fact, a randomized

controlled trial demonstrated that imposing sedentary behaviour can negatively impact upon mood and increase depressive symptoms in as few as 7 days (Edwards & Loprinzi, 2016).

Research is emerging indicating that the type of sedentary behaviour being performed is also relevant, with mentally passive activities, for example watching television, being associated more strongly with low mood than mentally active activities such as working on a computer or doing a crossword puzzle (Hallgren et al, 2018).

Sedentary behaviour is therefore a significant potential factor in mental health deterioration, especially with regards to mood. Through Covid-19 lockdown we are experiencing a time in which sedentary behaviour is likely to increase through not travelling to work, having facilities (for example the kitchen) closer to hand than usual, and leisure activities becoming more sedentary. Furthermore, we are anticipating the emergence of mental health problems or exacerbation of pre-existing conditions due to the pandemic itself. The existence of either of these changes would be of concern enough, but their relationship may be synergistic, since increased sedentary behaviour is likely to exaggerate mood problems, establishing a vicious cycle of declining mental health.

In order to combat this we present evidence-based suggestions for how everyone can reduce sedentary time during this period of social distancing and isolation which may be beneficial not only for the lockdown, but also for our future wellbeing.

External Cuing

Periods of inactivity, especially sitting, for work or leisure, should be interrupted regularly. This can be prompted by external cues, such as advert breaks when watching TV or the use

of alarms. Various apps exist which purport to maximise time efficiency by setting out periods for work with breaks in between (for example the Pomodoro technique, <https://francescocirillo.com/pages/pomodoro-technique>) in which movement can occur.

Many wearable devices (eg actigraphy watches) now include a reminder to move when the wearer has been inactive for a long period of time. Additionally, time limits can be set on the use of technology devices as a stimulus to get away from the screen and move. Mobile and wearable technology devices have been found to be effective in reducing sedentary behaviour (Stephenson, McDonough, Murphy, Nugent, & Mair, 2017).

Moving more often

Encouragement should be given to conduct work and leisure activities whilst moving wherever possible. For example, listening to an audiobook could be achieved whilst moving around the room or cleaning the house and work phone calls could be conducted whilst moving gently. 'Walk and talk' meetings and standing meetings have been found to reduce sedentary behaviour in people with traditional office-based jobs, and increase productivity, creativity and wellbeing of participants (Parry, Straker, Gilson, & Smith, 2013).

Moving during routine times of waiting

Routine tasks at home can often involve an element of waiting, for example waiting for the kettle to boil, food to cook or while washing our hands for those 20 seconds recommended by public health entities. These frequent events throughout the day could act as useful reminders to move, creating more active waiting. For example, gentle movement such as stretches could be performed or more demanding activity such as squat or calf raise exercises. Having frequent routine events associated with movement will make habit formation easier to achieve.

Reallocating time

Previous literature has demonstrated the importance of both increased PA and decreased SB and therefore it could be a beneficial strategy to consider how we might reallocate our time (Prince et al., 2014). Identifying specific times during the day that are more sedentary and replacing even 10 minutes of that time with light physical activity could have a significant impact. Any movement is better than nothing, and research has shown that even small bursts of up to 10 minutes of PA can impart important health benefits (Loprinzi & Cardinal, 2013). Even if movement is not increased, replacing periods of mentally passive sedentary behaviours with more mentally active ones is also likely to have a beneficial effect on mood (Hallgren et al, 2019).

Workstation Alternatives

There has been emerging evidence in recent years into workstation alternatives for increasing energy expenditure (Thorp et al., 2016). Sit-stand workstation set-ups and continuous standing desks have been shown to increase overall energy expenditure, and heart rate (Gibbs, Kowalsky, Perdomo, Grier, & Jakicic, 2017). If at all possible people should therefore explore any opportunities they may have at home to create standing workstations and aim to spend at least 4 hours of their workday in the standing position.

Restructure the physical environment

Restructuring the physical environment is a commonly used socio-ecological approach to promote behaviour change (Coffeng et al., 2014). Changing the surrounding environment at home during this time of isolation using exercise equipment 'stations' in areas where one is

normally sedentary, could potentially provide visual cues and lead to activity breaks during periods of SB.

Recruiting help

Changing habits can be more interesting and fun if other people in the household are also making the change. Sharing times of movement with others in the household or by connecting virtually with other people can provide reminders to move and also provide motivation to do so. Social support has been shown to be beneficial for reducing SB (Tam-Seto, Weir, & Dogra, 2016), and will independently help to promote good mental health.

Conclusion

Over two thousand years ago the philosopher Plato recognised that “lack of activity destroys the good condition of every human being while movement and methodical physical exercise save it and preserve it”. As lifestyles are being disrupted and people are experiencing more challenges to their mental health, increasing or maintaining movement is crucial to help prevent deterioration in mental health and to relieve existing symptoms. Sedentary behaviour is an often neglected, yet critically important part of addressing activity. These techniques for reducing sedentary behaviour can be adopted during lockdown for immediate impact but also to build new habits for beneficial effects in the future.

Declarations of interest: none.

References

- Barnes, J. D., Colley, R. C., & Tremblay, M. S. 2012. Results from the Active Healthy Kids Canada 2011 report card on physical activity for children and youth. *Appl Physiol Nutr Metab*, 37(4), 793-797. doi:10.1139/h2012-033
- Biswas, A., Oh, P. I., Faulkner, G. E., Bajaj, R. R., Silver, M. A., Mitchell, M. S., & Alter, D. A. 2015. Sedentary time and its association with risk for disease incidence, mortality, and hospitalization in adults: a systematic review and meta-analysis. *Ann Intern Med*, 162(2), 123-132. doi:10.7326/M14-1651
- Coffeng, J. K., Hendriksen, I. J., Duijts, S. F., Twisk, J. W., van Mechelen, W., & Boot, C. R. 2014. Effectiveness of a combined social and physical environmental intervention on presenteeism, absenteeism, work performance, and work engagement in office employees. *J Occup Environ Med*, 56(3), 258-265. doi:10.1097/JOM.000000000000116
- Edwards M.K., Loprinzi P.D. 2016 Effects of a Sedentary Behaviour-Inducing Randomized Controlled Intervention on Depression and Mood Profile in Active Young Adults. *Mayo Clin. Proc.* 91(8):984-998. doi:10.1016/j.mayocp.2016.03.021
- Endrighi, R., Steptoe, A., & Hamer, M. 2016. The effect of experimentally induced sedentariness on mood and psychobiological responses to mental stress. *British Journal of Psychiatry*, 208(3), 245-251. doi:10.1192/bjp.bp.114.150755
- Gibbs, B. B., Kowalsky, R. J., Perdomo, S. J., Grier, M., & Jakicic, J. M. 2017. Energy expenditure of deskwork when sitting, standing or alternating positions. *Occup Med (Lond)*, 67(2), 121-127. doi:10.1093/occmed/kqw115
- Hallgren M, Nguyen T-T-D, Owen N, Stubbs B, Vancampfort D, Lundin A, Dunstan D, Bellocco R, Lagerros YT. 2019. Cross-sectional and prospective relationships of passive and mentally active sedentary behaviours and physical activity with depression. *Br J Psychiatry* 1-7.
- Mats Hallgren, Neville Owen, Brendon Stubbs, Zangin Zeebari, Davy Vancampfort, Felipe Schuch, Rino Bellocco, David Dunstan, Ylva Trolle Lagerros. 2018. Passive and mentally-active sedentary behaviors and incident major depressive disorder: A 13-year cohort study, *Journal of Affective Disorders*, Volume 241, 2018, Pages 579-585, ISSN 0165-0327, <https://doi.org/10.1016/j.jad.2018.08.020>. (<http://www.sciencedirect.com/science/article/pii/S0165032718310905>)
- Loprinzi, P. D., & Cardinal, B. J. 2013. Association between biologic outcomes and objectively measured physical activity accumulated in ≥ 10 -minute bouts and < 10 -minute bouts. *Am J Health Promot*, 27(3), 143-151. doi:10.4278/ajhp.110916-QUAN-348
- Parry, S., Straker, L., Gilson, N. D., & Smith, A. J. 2013. Participatory workplace interventions can reduce sedentary time for office workers--a randomised controlled trial. *PLoS One*, 8(11), e78957. doi:10.1371/journal.pone.0078957
- Prince, S. A., Saunders, T. J., Gresty, K., & Reid, R. D. 2014. A comparison of the effectiveness of physical activity and sedentary behaviour interventions in reducing sedentary time in adults: a systematic review and meta-analysis of controlled trials. *Obes Rev*, 15(11), 905-919. doi:10.1111/obr.12215
- Smith, L., Hamer, M., Gardner, B. 2018 Sedentary Behaviour and Mental Health. In Stubbs, B., Rosenbaum, S. (Eds) *Exercise-Based Interventions for Mental Illness: Physical Activity as Part of Clinical Treatment*. Elsevier. London.
- Stephenson, A., McDonough, S. M., Murphy, M. H., Nugent, C. D., & Mair, J. L. 2017. Using computer, mobile and wearable technology enhanced interventions to reduce sedentary behaviour: a systematic review and meta-analysis. *Int J Behav Nutr Phys Act*, 14(1), 105. doi:10.1186/s12966-017-0561-4
- Tam-Seto, L., Weir, P., & Dogra, S. 2016. Factors Influencing Sedentary Behaviour in Older Adults: An Ecological Approach. *AIMS Public Health*, 3(3), 555-572. doi:10.3934/publichealth.2016.3.555

- Thorp, A. A., Kingwell, B. A., English, C., Hammond, L., Sethi, P., Owen, N., & Dunstan, D. W. 2016. Alternating Sitting and Standing Increases the Workplace Energy Expenditure of Overweight Adults. *J Phys Act Health*, 13(1), 24-29. doi:10.1123/jpah.2014-0420
- Wilmot, E. G., Edwardson, C. L., Achana, F. A., Davies, M. J., Gorely, T., Gray, L. J., . . . Biddle, S. J. 2012. Sedentary time in adults and the association with diabetes, cardiovascular disease and death: systematic review and meta-analysis. *Diabetologia*, 55(11), 2895-2905. doi:10.1007/s00125-012-2677-z
- Zhai, L., Zhang, Y., & Zhang, D. 2015. Sedentary behaviour and the risk of depression: a meta-analysis. *Br J Sports Med*, 49(11), 705-709. doi:10.1136/bjsports-2014-093613

There are no conflicts of interest for either author

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Rowan Diamond conceived the article; Rowan Diamond and Erin Byrd drafted the text. Both authors were involved in text revisions and approved the final draft.