

Physical activity recommendations during the COVID-19 virus outbreak

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Physical activity significantly reduces the risk of viral infections^{1,2} and levels of anxiety^{3,4}. In addition to its short-term benefits, regular physical activity lowers one's risk of suffering from chronic health conditions (e.g. diabetes, coronary heart disease, hypertension) which are cited as the most frequent comorbidities in recent studies of COVID-19⁵. Because of the COVID-19 pandemic that has become a global problem, many will face the necessity of requiring hundreds of millions of people to volitionally self-confine themselves in their own homes, or even be 'locked down' in a quarantined community. Confinement affects most aspects of human physiology considerably. It can be induced operationally (submarines, polar stations, and deep-sea laboratories), during expeditions (e.g. Antarctica over-wintering)⁶ and, as many are now experiencing, for population health and global security reasons. The psychological stress of remaining in a confined space causes endocrinological changes that in turn, affect immune status⁷ and have other negative psychological effects including post-traumatic stress symptoms, confusion, and anger⁸. Even a relatively short, 10-day confinement can cause the markers of lymphocyte expression to be reduced and alterations in natural killer cell profiles can occur⁹. On the opposite side, after a period of longer confinement the number of circulating neutrophils and lymphocytes rapidly increases¹⁰. In certain environments people in isolation will encounter an exceptional situation where they will be exposed to both, a hypoxic and confined environment (e.g. living at high altitude such as Denver, Mexico City, Kathmandu, La Paz). The combined effect of hypoxia and inactivity causes the most negative psychological profiles to appear as confinement continues¹¹. To decrease health problems related to confinement and prolonged periods of inactivity, and to acutely high levels of stress, depression and anxiety, experienced during these exceptional circumstances, exercise professionals should encourage local authorities and governments to promote physical activity during this period of mass quarantine, whether is it performed in the safety of people's homes or, if it is safe and allowed by authorities, in nature. The clearest evidence for reducing the psychological stress of confinement is regular physical activity. Data from a recent meta-analysis concluded that dose responses for both the intensity and duration of exercise show large benefits to mental health from even short engagements in green spaces¹². The existing evidence shows that natural environments have the most effective restorative effects for psychological fatigue¹³ and that green spaces increase feelings of contentment, reduce depression, reduce feelings of anger and diminish anxiety¹⁴.

The logistical issues governing all aspects of daily life that hundreds of millions of people are now confronted with during the current COVID-19 outbreak are unprecedented. It is critical that all persons take collective responsibility of their actions as never before. During this rapid and evolving international crisis, everyone is searching for the best-practice medical advice on how to maintain a (somewhat) normal daily life, whilst still attempting to curtail this most serious viral outbreak and follow social distancing protocols. With this in mind, sport science researchers, medical professionals, and environmental physiologists from the Faculty of Sport, University of Ljubljana have developed a set of physical activity recommendations for the people of the Republic of Slovenia specifically, that we believe could be of some help for global community and other exercise professionals. These recommendations consider accumulated knowledge communicated in physical activity position stands from WHO, UN, American College of Sports Medicine and compelling research from numerous space agencies (e.g. NASA, ESA, Canadian Space Agency) on the physiological effects of confinement on the human body. The guidance below is intended for people without any symptoms or diagnosis of acute respiratory illness, who find themselves in a self-quarantine situation for days (or weeks) at a time. The guidelines do not replace medical guidance

from your healthcare provider. Considering this, we suggest emphasizing the following points for promoting physical activity during times of self-quarantine:

- DO exercise outdoors wherever possible and perform your choice of low to moderate level physical activity daily, either alone or with your family unit. It is critical to stress here that all persons must follow the suggested guidelines of their authorities. Whenever possible use the largest possible distance from others while outside (even more than the typically suggested 1.5 m). Physical activity (exercise as well as active commuting) from home door to home door without directly contacting others is highly recommended.
- DO NOT socialize and play group sports with people outside your household. Parents, avoid having your children interacting directly with other children. In particular, explain in age-appropriate language the risks of virus transmission that can occur with socializing in group or team sport situations.
- DO NOT allow children to climb on park equipment, slides and other features (especially metal and plastic), including outdoor fitness equipment, since they provide a surface for virus transmission.
- DO engage in a variety of exercises in your home and with your family – climb stairs, hop, skip jump and dance with children and other household members, perform strength exercises or even active video-gaming in short bursts of activity to increase heart rate, blood flow and circulation periodically throughout the day. Improvise on exercise equipment with rope, broom, bottles etc. If you have a balcony or terrace, exercise there.
- DO incorporate stretching and breathing deeply each day. Take at least 10 minutes each day to slowly move arms and legs throughout their range of motion comfortably.
- DO follow online exercise classes, or post photos/videos on social media of yourself doing exercise at home if that keeps you motivated and connected to others.
- If you suspect you may have contracted a contagious disease, or are feeling ill in any way, limit your physical activity to within your home and contact your medical professional. Always call first to receive further instructions before going to a medical facility in person.
- It is critical that older adults remain physically active during this time, since they are the ones most likely to experience dramatic structural and functional changes to their muscles and bones after prolonged confinement and low levels of mobility. We want to avoid an increased risk of falls in the elderly overburdening health care services.
- DO check in on elderly individuals you may know (neighbors, family members) to see if they require assistance with their mobility during the day (avoid direct contact – call or inquire through other channels).
- Be aware of the cumulative screen and sedentary time – break up sitting times with physical activity, standing up and stretching. For example, for every 60 minutes seated or recumbent throughout the day, perform 5 to 10 min of structured movement. This is especially important for those with impaired circulation, diabetes, and other vascular issues.
- Avoid screen viewing of all kinds after 8 pm to promote proper sleep quality, as increased stress and low physical activity each exacerbate poor nocturnal sleep patterns.
- Stay hydrated-choose water over sugary drinks or alcohol. Some indoor environments can be dry and may exacerbate those who suffer with breathing difficulties.
- Avoid prolonged, strenuous exercise; this type of exercise can reduce the body's resistance to viral and other infections in the short term.
- Most importantly – do what is comfortable and right for you and your family! Regular physical activity is meant to be fun and reduce stress. It helps cognitive function, attention and reduces anxiety in children, who will be particularly affected by extended periods of time spent indoors. Be sure to avoid doing activities that have a higher risk of injury in order to avoid over-burdening the health system, and putting yourself at increased risk of exposure to the novel COVID-19 or other illnesses.
- **BOTTOM LINE: AVOID INACTIVITY THROUGHOUT THE DAY AND BE AWARE THAT ANY ACTIVITY YOU DO IS BETTER THAN NO ACTIVITY AT ALL.** All persons

(who are physically able), should try to accumulate between 60-75 minutes of low to moderate physical activity each day, but as stated before every minute counts. At least 15 minutes of this activity should take place outside, in natural light, whenever possible. If there is no other option due to political, health risk or other constraints, use a balcony or exercise by open window. Some activities should be of longer duration (e.g. walking or cycling outside for 30 minutes), and other activities should incorporate strength and flexibility, ideally performed with family members.

Finally, the exercise and public health professionals should be aware that involving the media is crucial to increase awareness about the importance of keeping physically active, even during outbreaks and government-enforced lockdowns. We must be pro-active to provide evidence-based knowledge and recommendations to continue exercising safely, whether it be in the home, outside in open public places, or ideally, in natural green spaces, where and when appropriate.

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