

Fit Is It in COVID-19, Future Pandemics, and Overall Healthy Living



Substantial evidence supports the importance of fitness, especially cardiorespiratory fitness (CRF) and muscular fitness, to prevent and to treat cardiovascular disease (CVD).¹ In fact, patients with various chronic diseases including obesity, dyslipidemia, and diabetes mellitus (DM) who present with a higher CRF often have a more favorable short- and long-term prognosis compared with individuals without these conditions but with low levels of CRF. This observation supports the importance of CRF as one of the strongest CVD risk factors or risk markers. In fact, through an American Heart Association Scientific Statement, we have called on clinicians to consider CRF a health status “vital sign.”²

In this issue of *Mayo Clinic Proceedings*, Brawner et al³ from the Henry Ford Medical Group in Detroit, Michigan, described 246 patients in their health care system who had a previous exercise treadmill test to determine CRF as indicated by peak metabolic equivalents (METs) and who tested positive for severe acute respiratory syndrome coronavirus 2 infection. The purpose of this study by Brawner et al was to determine the impact of CRF on hospitalization risk due to coronavirus disease 2019 (COVID-19). Importantly, their population was 75% African American (AA) with a mean body mass index of 32.7 kg/m². They demonstrated that in their population (mean age, 59 years; 42% male), peak METs were considerably lower (6.7±2.8 METs) in those hospitalized compared with those not hospitalized (8.0±2.4 METs; $P < .001$). In addition, peak METs were inversely associated with a 17% lower risk of hospitalization in an unadjusted analysis and 13% lower risk in an adjusted analysis for every 1 unit increase in METs, once again supporting the importance of CRF on major health outcomes, including risk for hospitalization due to COVID-19.

Very recently, we suggested that physical activity (PA) may be important for immunity

protection⁴ as evidence suggests that higher PA, such as running, is associated with significant reductions in mortality risk attributed to respiratory diseases, pneumonia, and aspiration pneumonia, including in those with DM.^{4,5} However, considering the low level of PA in our society,^{1,6} resulting in low levels of CRF, we recently suggested that the current state of physical inactivity and COVID-19 is a tale of 2 pandemics, highlighting how COVID-19 and global trends in physical inactivity and sedentary behavior are affected by one another.⁷ Indeed, regular PA and exercise have been shown to improve health and may be effective in reducing the occurrence, severity, and duration of respiratory tract infections.⁸ Also, we recently formed an organization for the global path forward, Healthy Living for Pandemic Event Protection (HL-PIVOT), whose overarching goal is to improve global health and to protect individuals from the risks associated with chronic disease and viral infections.⁹

Improving exercise capacity, namely, CRF, is an important target to reduce CVD risk as lower CRF levels are clearly associated with increased incidence of CVD.¹ The severity of COVID-19 is also considerably worse in those individuals with a history of CVD or DM.^{10,11} In this context, increasing PA and CRF may reduce CVD and DM risk and improve prognosis in these conditions,^{1,4,5,7-9} including during COVID-19 and future pandemics.

We have recently discussed in *Mayo Clinic Proceedings* that patients with obesity have a considerably worse prognosis during COVID-19.^{12,13} This Henry Ford COVID-19 population was quite obese, having a mean body mass index well into the obesity range.³ Improving PA and CRF may go a long way to reduce, to prevent, and to treat obesity in the first place as well as to prevent progression to more severe degrees¹⁴ and to improve prognosis in patients

See also page 32

with obesity during COVID-19 and future pandemics.^{12,13}

We have recently discussed the higher risk for the AA population during COVID-19,¹⁵ partly explained by a higher risk of untreated or undertreated hypertension and DM as well as a much higher prevalence of obesity. In addition, we have recently discussed that the AA population often has lower levels of CRF compared with White individuals.¹⁶⁻¹⁸ Moreover, we have demonstrated that AA individuals may have a lower improvement in CRF after participation in an exercise training program compared with White individuals.^{17,19} In this Henry Ford population, which was 75% AA, overall levels of CRF were low, only 7.5 METs, for a relatively young population in the mid to upper 50s at the time of the exercise assessment. Therefore, increasing levels of CRF, possibly with high-intensity interval training, could help reduce obesity, DM, and CVD in the AA population and improve prognosis in future pandemics.^{1,4,5,7-9,12,14} In this context, we think that taking urgent measures to improve CRF in the AA population is needed to improve health in AAs, including for future pandemics.

We applaud this Henry Ford group for undertaking this study and demonstrating the impact of CRF in COVID-19 prognosis. Clearly, this group and others may later study much larger cohorts to determine the impact of CRF on severe COVID-19 conditions, such as intensive care unit admissions, need for mechanical ventilators, and death, as well as the relative impact of fitness vs fatness in COVID-19 prognosis.³ Clearly, greater efforts are needed to improve PA as recent statistics demonstrate low levels of PA and high levels of sedentary behavior and physical inactivity in both adults and children worldwide.⁶ Increasing PA and overall fitness, both CRF and muscular fitness,^{1,20-24} is an essential approach to preventing CVD and adverse CVD outcomes^{1,20,21,23,24} as well as probably improving prognosis in future pandemics,^{4,7-9} supporting our assertion that “fit is it!”

Carl J. Lavie, MD

John Ochsner Heart and Vascular Institute
Ochsner Clinical School—The University of Queensland
School of Medicine
New Orleans, LA
Healthy Living for Pandemic Event Protection (HL-PIVOT)
Network
Chicago, IL

Fabian Sanchis-Gomar, MD, PhD

Department of Physiology
Faculty of Medicine
University of Valencia and INCLIVA
Biomedical Research Institute
Valencia, Spain

Ross Arena, PhD, PT

University of Illinois at Chicago
Chicago, IL
Healthy Living for Pandemic
Event Protection (HL-PIVOT) Network
Chicago, IL

Potential Competing Interests: The authors report no competing interests.

Correspondence: Address to Carl J. Lavie, MD (clavie@ochsner.org).

ORCID

Carl J. Lavie:  <https://orcid.org/0000-0003-3906-1911>;
Fabian Sanchis-Gomar:  <https://orcid.org/0000-0003-0424-4208>

REFERENCES

1. Lavie CJ, Ozemek C, Carbone S, Katzmarzyk PT, Blair SN. Sedentary behavior, exercise, and cardiovascular health. *Circ Res*. 2019;124(5):799-815.
2. Ross R, Blair SN, Arena R, et al. Importance of assessing cardiorespiratory fitness in clinical practice: a case for fitness as a clinical vital sign: a scientific statement from the American Heart Association. *Circulation*. 2016;134(24):e653-e699.
3. Brawner CA, Ehman JK, Bole S, et al. Maximal exercise capacity is inversely related to hospitalization secondary to coronavirus disease 2019. *Mayo Clin Proc*. 2021;96(1):32-39.
4. Laddu DR, Lavie CJ, Phillips SA, Arena R. Physical activity for immunity protection: inoculating populations with healthy living medicine in preparation for the next pandemic. *Prog Cardiovasc Dis*. 2020 [Online ahead of print].
5. Lavie CJ, Lee DC, Sui X, et al. Effects of running on chronic diseases and cardiovascular and all-cause mortality. *Mayo Clin Proc*. 2015;90(11):1541-1552.
6. Ozemek C, Lavie CJ, Rogmo O. Global physical activity levels—need for intervention. *Prog Cardiovasc Dis*. 2019;62(2):102-107.
7. Hall G, Laddu DR, Phillips SA, Lavie CJ, Arena R. A tale of two pandemics: how will COVID-19 and global trends in physical inactivity and sedentary behavior affect one another? *Prog Cardiovasc Dis*. 2020 [Online ahead of print].
8. Grande AJ, Keogh J, Silva V, Scott AM. Exercise versus no exercise for the occurrence, severity, and duration of acute respiratory infections. *Cochrane Database Syst Rev*. 2020;4(4):CD010596.

9. Arena R, Lavie CJ; HL-PIVOT Network. The global path forward—Healthy Living for Pandemic Event Protection (HL-PIVOT). *Prog Cardiovasc Dis*. 2020 [Online ahead of print].
10. Aggarwal G, Cheruiyot I, Aggarwal S, et al. Association of cardiovascular disease with coronavirus disease 2019 (COVID-19) severity: a meta-analysis. *Curr Probl Cardiol*. 2020;45(8):100617.
11. Aggarwal G, Lippi G, Lavie CJ, Henry BM, Sanchis-Gomar F. Diabetes mellitus association with coronavirus disease 2019 (COVID-19) severity and mortality: a pooled analysis. *J Diabetes*. 2020;12(11):851-855.
12. Sanchis-Gomar F, Lavie CJ, Mehra MR, Henry BM, Lippi G. Obesity and outcomes in COVID-19: When an epidemic and pandemic collide. *Mayo Clin Proc*. 2020;95:1445-1453.
13. Sharma A, Garg A, Rout A, Lavie CJ. Obesity is associated with more critical illness in COVID-19. *Mayo Clin Proc*. 2020;95(7):2040-2042.
14. Lavie CJ, Laddu D, Arena R, Ortega FB, Alpert MA, Kushner RF. Healthy weight and obesity prevention: JACC Health Promotion Series. *J Am Coll Cardiol*. 2018;72(13):1506-1531.
15. Sanchis-Gomar F, Lippi G, Lavie CJ. Why is COVID-19 especially impacting the African American population? *Ann Med*. 2020;52(7):331-333.
16. Swift DL, Staiano AE, Johannsen NM, et al. Low cardiorespiratory fitness in African Americans: a health disparity risk factor? *Sports Med*. 2013;43(12):1301-1313.
17. Swift DL, Johannsen NM, Earnest CP, Newton RL Jr, McGee JE, Church TS. Cardiorespiratory fitness and exercise training in African Americans. *Prog Cardiovasc Dis*. 2017;60(1):96-102.
18. Lavie CJ, Kuruvanka T, Milani RV, Prasad A, Ventura HO. Exercise capacity in adult African-Americans referred for exercise stress testing: is fitness affected by race? *Chest*. 2004;126(6):1962-1968.
19. Swift DL, Johannsen NM, Lavie CJ, et al. Racial differences in the response of cardiorespiratory fitness to aerobic exercise training in Caucasian and African American postmenopausal women. *J Appl Physiol (1985)*. 2013;114(10):1375-1382.
20. Martinez-Gomez D, Ortega FB, Hamer M, et al. Physical activity and risk of metabolic phenotypes of obesity: a prospective Taiwanese cohort study in more than 200,000 adults. *Mayo Clin Proc*. 2019;94(11):2209-2219.
21. Bonikowske AR, Lopez-Jimenez F. Physical activity: the secret—not so secret—to prevent and revert metabolic dysregulation in people of all sizes. *Mayo Clin Proc*. 2019;94(11):2164-2165.
22. Lavie CJ, Lee D, Ortega FB. UK Biobank contributes to aerobic and muscle fitness research. *Mayo Clin Proc*. 2020;95(5):840-842.
23. Wang Y, Lee DC, Brellenthin AG, et al. Association of muscular strength and incidence of type 2 diabetes. *Mayo Clin Proc*. 2019;94(4):643-651.
24. Jimenez-Pavon D, Brellenthin AG, Lee DC, Sui X, Blair SN, Lavie CJ. Role of muscular strength on the risk of sudden cardiac death in men. *Mayo Clin Proc*. 2019;94(12):2589-2591.