Targeting Sedentary Behavior in Minority Populations as a Feasible Health Strategy during and beyond COVID-19: On Behalf of ACSM-EIM and HL-PIVOT

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ABSTRACT

Increased sedentary behavior has been an unintended consequence of social and physical distancing restrictions needed to limit transmission of SARS-CoV-2, the novel coronavirus that causes COVID-19. Sedentary behavior is defined as any waking behavior characterized by an energy expenditure ≤1.5 METs while in a sitting, reclining, or lying posture. These restrictions negatively affect peoples' cardiometabolic and mental health and disproportionately affect certain sectors of the population, including racial/ethnic minorities. In part, the higher risk for complications of COVID-19 could be the result of an increased prevalence of comorbid diseases. Further, regular participation and adherence to current physical activity guidelines, defined as at least 150 min·wk^{-1} of moderate-intensity physical activity or muscle strengthening activities on 2 or more days a week, is challenging for many and may be especially difficult to achieve during the COVID-19 pandemic. A practical strategy to promote health and well-being during COVID-19 is reducing sedentary behavior. Reducing sedentary behaviors (e.g., breaking up periods of prolonged sitting with light-intensity physical activity) may be more easily achieved than physical activity for all individuals, including individuals of racial/ethnic decent, as it does not require purchasing equipment nor require compromising the physical restrictions necessary to slow the spread of COVID-19. The purpose of this commentary is to argue that sedentary behavior is a feasible, independent target to modify during COVID-19, particularly in minority populations, and to address this behavior we need to consider individual, environmental, and policy-level factors.

INTRODUCTION

Increased sedentary behavior has been an unintended consequence of social and physical distancing restrictions needed to reduce transmission of SARS-CoV-2, the novel coronavirus that causes COVID-19 (1–3). For many adults working remotely, and for some, providing childcare and schooling, social distancing, and self-isolating at home have disrupted normal daily routines. For example, there has been a marked increase in screen time, a common form of sedentary behavior (4). As depicted in Fig. 1, sedentary behaviors are associated with poor cardiometabolic (e.g., diabetes) and mental (e.g., depression and anxiety) health (5,6), along with increased COVID-19 severity and mortality (7). Behavioral strategies targeting social and physically distanced reductions in sedentary behaviors can offset the negative health consequences of COVID-19-related social restrictions, while minimizing the likelihood of viral spread and severe COVID-19 outcomes (8). This commentary focuses on the connections between sedentary behavior and physical health and provides strategies and recommendations for reducing sedentary behavior, particularly for racial/ethnic minorities encompassing but not limited to non-Hispanic Black, Hispanic, and American Indian, through the lens of a socioecological model. We choose to focus on racial/ethnic minorities because of the higher prevalence of cardiometabolic disorders linked to excessive sedentarism (e.g., diabetes) compared with non-Hispanic Whites (9–11), predisposing them to worse COVID-19 outcomes (12), and disparities in vaccine uptake may suggest longer time at risk for COVID-19 (13,14).

REDUCING SEDENTARY BEHAVIOR IS IMPORTANT TO CARDIOMETABOLIC AND MENTAL HEALTH

Sedentary behavior, defined as any waking activity in a seated or reclining position at an energy level <1.5 METs (15),

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2379-2868/0604/e000174
Translational Journal of the ACSM

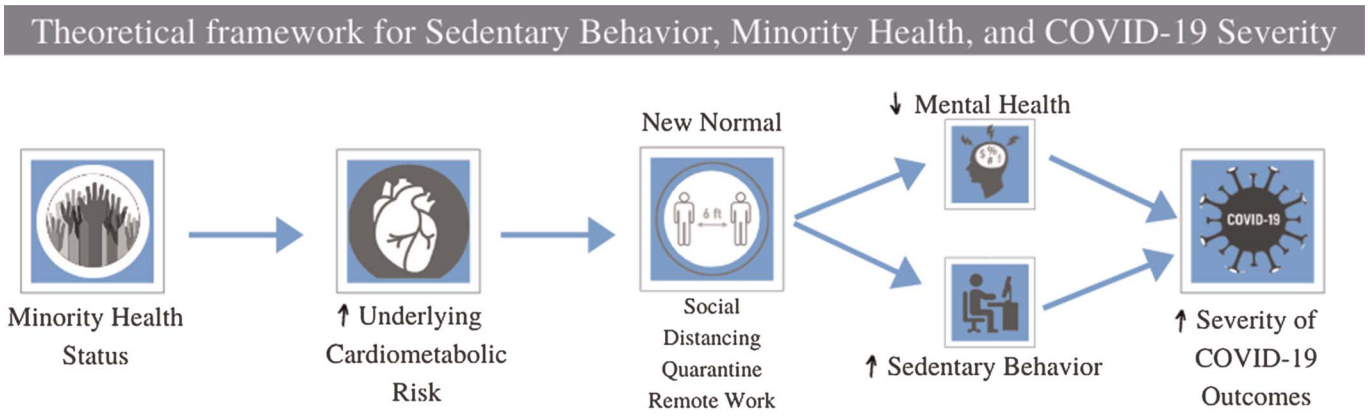

Figure 1: Theoretical framework for sedentary behavior, minority health, and COVID-19 severity.

is an established independent risk factor for cardiometabolic diseases and all-cause mortality (16). For example, watching television for ≥4 $h \cdot d^{-1}$ in comparison with <2 $h \cdot d^{-1}$ has been associated with 45% and 80% increased risk of all-cause and cardiovascular disease mortality, respectively (17). In older women, sedentary time (≥10.3 vs ≤8.3 $h \cdot d^{-1}$) has been associated with higher odds of diabetes (18). Sitting ≥6 $h \cdot d^{-1}$ is associated with a 1.19 increased risk of all-cause mortality compared with those that sat <3 $h \cdot d^{-1}$ (19). Although physical activity can modify CVD mortality, sedentary behavior mitigation appears to be important even for those who are physically active, and especially for those who are inactive (20–22). Chronic sedentary behavior negatively affects health. Two examples of the detrimental consequences of excessive sedentary behavior include impaired vascular function and glycemic control (23–25).

The COVID-19 pandemic has made evident the disparities that minority populations in the United States face, including access to health care, the severity of chronic diseases, and the effect of those diseases on health and well-being. Data from the Centers of Disease Control and Prevention have indicated that considerable proportions of underlying cardiometabolic conditions were present among COVID-19 hospitalizations in March of 2020, including hypertension (49.7%), obesity (48.3%), diabetes (28.3%), and cardiovascular disease (27.8%) (26). Compared with White individuals, non-White individuals have an increased prevalence of chronic conditions, including diabetes, asthma, hypertension, kidney disease, and obesity (27). These chronic conditions, along with the greater likelihood of being an essential workers and living in multigenerational households, are likely leading to greater infection rates among minority populations (Table 1) (28). That is, the factors likely help to explain why non-Hispanic Blacks and Hispanics comprise 21.8% and 33.8% of COVID-19 cases, although they only make up 13% and 18% of the U.S. population, respectively (29). In addition, American Indians in Arizona comprise 13% of the COVID-19 cases and 18% of COVID-19-related deaths, making up only 5.3% of Arizona's population (29).

The greater effects of COVID-19 on minority health outcome highlight the health disparities faced by these populations, as well as the need to identify simple strategies to improve health outcomes during and beyond COVID-19. In the next section, we argue that sedentary behavior is a feasible, independent target to modify health outcomes during COVID-19, particularly in minority populations. To address this behavior (i.e., reduce sedentary behavior), we need to consider individual, social environment, physical environment, and policy-level factors.

SOCIOECOLOGICAL-BASED INTERVENTION AND SPECIAL CONSIDERATIONS FOR MINORITIES

The socioecological model can be combined with psychological theories to affect behavior change. Behavior change is likely to be more successful if the physical and sociocultural environments support the behavior change. Individual (e.g., self-efficacy, enjoyment), social environment (e.g., social support), physical environment (e.g., home and neighborhood), and policy-level (e.g., government guidelines) determinants are unique factors that must be considered in the context of promoting the interruption of sedentary behavior. In the next sections, we consider the potential determinants of sedentary behavior at each level of the socioecological model. This section is not meant to be all inclusive; rather, it is meant to provide examples to increase discourse and lessons that can be learned as we transition from COVID-19 into the future. Although available guidelines for limiting sedentary behavior

TABLE 1.
Case, Hospitalization, and Death Rate Ratios by Race/Ethnicity.

Rate Ratios Compared with Non-Hispanic Persons	American Indian*	Non-Hispanic Black	Hispanic
Cases	1.8x	1.4x	1.7x
Hospitalizations	4.0x	3.7x	4.1x
Death	2.6x	2.8x	2.8x

Adapted from Centers of Disease Control and Prevention reports.

(21) lack the specificity of guidelines for moderate-to-vigorous physical activity, our group's recently published meta-analysis indicates that the most extensively reported and efficacious strategies are standing and walking for 2–5 min every 20–30 min (Table 2) (30). Here we provide example strategies at each level of the model to motivate change in postures for 2–5 min every 20–30 min, as we believe reducing sedentary behavior should be a priority and promoted within the context of each level of the socioecological model (Fig. 2). The examples we have highlighted are not resource dependent and can be quickly adopted.

Individual Level

The individual-level determinants of sedentary behavior are arguably the most important to consider in that they are closely related to an individual's locus of control. Rather than relying on the development of local initiatives, individual-level determinants allow individuals to focus on how they can tackle sedentary behavior. Unlike engaging in more physical activity, which may require time for leisurely activities, access to local facilities, and specific equipment that low-income individuals may not be able to afford (31), sedentary behavior can be modified without the need for equipment and space to implement. Further, in the context of mitigating cardiometabolic dysfunction associated with sedentary behaviors in racial/ethnic minority populations, we emphasize strategies to interrupt sedentary behavior that can be implemented at home and in office spaces.

Effective sedentary behavior interruption strategies can include standing, walking, calisthenics, and resistance band exercises (30). However, this could be substituted by activities that the individual perceives to be enjoyable. Individuals will be more likely to adhere to behavioral changes if a particular activity is enjoyable, as opposed to mundane (32). Individuals should be encouraged to move more and sit less every day, recognizing that any form of physical movement is beneficial, and digress from the exclusive all or none message (i.e., 150 min·wk^{-1} of moderate-intensity aerobic exercise) (33–35). Health promotion efforts should also encourage individuals to seek out creative strategies to interrupt sedentary behavior, which are enjoyable to them, whether that be spending a few minutes gardening throughout the day, dancing along to one's favorite music, or playing with children or pets. For example, this could entail incorporating a short 3-min sedentary behavior break for individuals to dance or stand to their favorite song or they could stand during commercial breaks while viewing television programs.

In addition, another strategy that could be incorporated at the individual level could be the use of reminders on any smart device (i.e., phones, computers, and watches). These reminders could be used to prompt the individual to stand up for a minute every hour and consider using as an opportunity for a self-monitored break. The reminders could serve as an opportunity to not only break up the bouts of sedentary behavior but also incorporate daily steps. For example, when the reminder goes off, instead of standing for the minute, walk around the house for 5 min. This 5-min break could also confer benefits in relation to screen time break and double as a focus break to improve productivity and attention. Although strategies designed to interrupt sedentary behavior to improve psychological health have been less extensively studied, available evidence does suggest that reducing sedentary behavior also benefits mental health by reducing anxiety and depression (36,37).

TABLE 2.
Best Evidence for Sitting Interruption (30).

Frequency	Every 20–30 min
Intensity	Light
Time	2–5 min
Type	Walking, standing

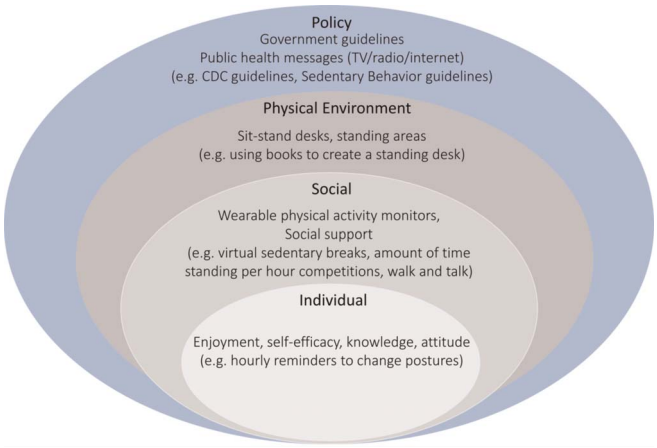

Figure 2: Socioecological model for sedentary behavior interventions.

Social Environment Level

At the social environment level, social support to reduce sedentary behavior may include encouraging colleagues to take standing up or stretching breaks during work-related virtual meetings, or challenging family and friends to friendly step-count competitions via wearable or smart phone–based physical activity monitors. These interindividual efforts are of particular interest considering the strong familial and community ties within minority communities (38). For example, this could be a weekly challenge where individuals compete to break up their sedentary time the most during the week. Furthermore, this strategy could be facilitated by technological devices such as physical activity monitors or built-in activity trackers within mobile phones. These devices are particularly attractive as they can be implemented/modulated at multiple levels of the socioecological model and have been shown to successfully (i) increase cognitive/emotional constructs related to motivation and positive behavior change, (ii) reduce sedentary behavior, and (iii) improve broad health outcomes (39–42). In addition, it could be as simple as standing up and pacing while talking on the phone.

Physical Environment

At the level of the physical environment, improving working conditions is a key consideration. For employees who have returned to traditional work environments that are sitting intensive, this could be easily achieved by incorporating areas where employees can take a standing meeting or stretch and the use of antifatigue standing mats in these areas. In addition, employers could offer financial assistance to incorporate wellness clinics or provide pedometers, activity trackers, applications that track

health, and rewards programs for achieving predetermined milestones. An example incentive could include providing rewards for those that break up their sedentary behavior for more than 50% of the working day. For those still working from home, it could include using resources available to them (e.g., old books on countertops) to create a makeshift standing desk and take meetings or stand while working for at least 5 $min \cdot h^{-1}$.

Policy Level

At the policy level, international and collaborative research efforts such as the Collaborative Outcomes Study on Health and Function During Infection Times (COH-FIT) are needed to better understand the social and behavioral determinants of negative health outcomes during the COVID-19 pandemic, which in turn can help shape appropriate, preventive health-promoting policies, including understanding racial/ethnic disparities (43). This will be of particular importance to facilitate safe, physically distant, true sedentary behavior interruption strategies such as an easily accessible 5-min walk between virtual meetings, even after the end of the current pandemic. Further, these policy changes should be implemented in short-term initiatives but considered as long-term initiatives to encourage the adoption of health improving behaviors. However, for these policy changes to be implemented, policy makers need to consider culturally appropriate initiatives and advocacy efforts in underrepresented communities.

It is important to cater initiatives to the minority communities of interest considering that they might not have adequate resources. For example, promoting community center relationships within the communities as points of access to resources (i.e., access points to literature on breaking up sedentary behavior in many languages) while considering social physical distancing restrictions may be a viable approach to reducing sedentary behavior. Providing useful reliable information on sedentary behavior in many languages could mitigate misinformation due to language barriers. Further, to account for distancing restrictions, appointments can be encouraged and scheduled at community centers to facilitate the use and distribution of resources as needed and/or use of technology (i.e., community center Web site as a point of access).

CONCLUSION

The COVID-19 pandemic has rapidly changed and is a global health crisis that will likely continue beyond 2021. It is imperative that the lessons learned from this pandemic be implemented and considered when developing new strategies. Efforts to contain the virus are centered on physical distance restrictions, which threaten cardiometabolic and mental health (44,45). Not only are decrements in health concerning in and of themselves, but cardiometabolic diseases and their risk factors predispose individuals to severe COVID-19 outcomes (7,46). Furthermore, considering minority populations have a high prevalence of cardiometabolic diseases, a high risk of contracting COVID-19 as they are more likely to work essential jobs that cannot be done remotely, and lower access to adequate and affordable health care, it is imperative that these populations have accessible resources to partake in healthy behaviors, specifically reducing sedentary behavior. Although reducing sedentary behavior may not affect contracting the virus and, subsequently, the disease, addressing sedentary behavior could mitigate the severity and mortality from the COVID-19.

Behavioral strategies, such as moderate–vigorous physical activity, reduce cardiometabolic disease risk, and such behaviors should be encouraged and promoted during the COVID-19 pandemic (22). However, even under normal circumstances, the difficulty in promoting healthy physical activity habits is well documented (47). The chances of maintaining or improving exercise levels during the COVID-19 pandemic is now even more challenging, which is especially true for physically and financially vulnerable populations. As we progress, community engagement and access to resources (e.g., health care and implementation of preventive strategies) will be important to modify these disproportionate health disparities and COVID-19 infections and contribute to the adoption of healthier behaviors. Using a socioecological model (e.g., individual level, social environment, physical environment, and policy level), we posit that reducing sedentary behavior is a particularly important behavioral target that is more amenable to change compared with increasing physical activity. Simple, enjoyable low-intensity sedentary behavior interruption strategies should be encouraged by policy makers, health care providers, academic institutions, and other social and family networks to reduce sedentary behavior and to promote health in the face of the COVID-19 pandemic. In addition, incorporating these strategies now could lay the foundation for future pandemics or situations that merit similar lockdown and isolation.

PPL was supported by the National Institute on Aging of the National Institutes of Health under award number R01AG062488. The authors declare no conflicts of interest.

The views of this article do not constitute endorsement by the American College of Sports Medicine.

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