Still striding toward social justice? Redirecting physical activity research in a post-COVID-19 world

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Abstract
The COVID-19 crisis and parallel Black Lives Matter movement have amplified longstanding systemic injustices among people of color (POC). POC have been differentially affected by COVID-19, reflecting the disproportionate burden of ongoing chronic health challenges associated with socioeconomic inequalities and unhealthy behaviors, including a lack of physical activity. Clear and well-established benefits link daily physical activity to health and well-being—physical, mental, and existential. Despite these benefits, POC face additional barriers to participation. Thus, increasing physical activity among POC requires additional considerations so that POC can receive the same opportunities to safely participate in physical activity as Americans who are White. Framed within the Ecologic Model of Physical Activity, this commentary briefly describes health disparities in COVID-19, physical activity, and chronic disease experienced by POC; outlines underlying putative mechanisms that connect these disparities; and offers potential solutions to reduce these disparities. As behavioral medicine leaders, we advocate that solutions must redirect the focus of behavioral research toward community-informed and systems solutions.

Keywords
Physical exercise, Racism, Health equity, African Americans, Ethnic groups, Hispanic Americans

The ongoing COVID-19 crisis and parallel Black Lives Matter movement in the USA have illuminated longstanding systemic injustices experienced by people of color (POC). As scientists, practitioners, and leaders of the behavioral medicine community, we advocate for redirecting research, practice, and policy to ameliorate disparities in physical activity among POC. We first briefly describe health disparities in COVID-19, physical activity, and chronic disease experienced by POC. Second, we outline underlying putative mechanisms of these disparities. Last, as framed by the Ecologic Model of Physical Activity [1,2] through an equity lens, we advocate for a shifting focus of behavioral research toward community-informed and sustainable solutions.

DISPARITIES IN COVID-19, PHYSICAL ACTIVITY, AND OTHER CHRONIC HEALTH CONDITIONS
POC are disproportionately burdened by COVID-19. Black adults in the USA are 2.6 times more likely to be diagnosed, 4.7 times more likely to be hospitalized, and 2.1 times more likely to die from COVID-19 than non-Hispanic White adults [3]. Data from other minority groups are equally striking. For example, Latinos are 2.8 times more likely to be diagnosed, 4.6 times higher to be hospitalized, and 1.1 times higher to die from COVID than non-Hispanic Whites [3]. COVID-19 outcomes mirror consistent patterns of higher chronic disease burden among Blacks and Latinos [4], including obesity [5], heart disease [6], and diabetes [7], key risk factors associated with severe COVID-19 outcomes [8–15].

Regular physical activity is an established modifiable risk factor for the prevention and control of chronic diseases [16–20] and has been widely recommended as a strategy to enhance immunity [21] and reduce hospitalization and mortality related to COVID-19 [22]. POC are at highest risk for COVID-19 yet exhibit consistently lower physical activity compared to their White counterparts [23, 24]. For example, a greater proportion of Black and Latino men (47% and 48%) and women (60% and 56%) are classified as insufficiently active, engaging in less physical activity than recommended, compared to non-Hispanic White men (39%) and women (45%) [25]. The COVID-19 pandemic has prominently highlighted the damaging consequences of chronic disease and physical activity disparities among POC.

Practice: Practitioners can be intentionally inclusive, promoting existing programming and implementing new practices to increase physical activity among people of color.

Policy: Policy makers can prioritize infrastructure development and reparation strategies to replace historically unjust policies.

Research: Researchers can include racism as a social determinant of health as well as conducting research employing an equity lens.

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and underscores the urgent actions that are needed to address the high prevalence of these conditions. The Black Lives Matter movement stimulates thinking beyond individual-level factors (e.g., lack of time and motivation) affecting these conditions and redirects our approach to acknowledge and address the historic roots of these conditions.

**SOCIETAL AND SYSTEMATIC ROOTS OF PHYSICAL ACTIVITY AND CHRONIC DISEASE HEALTH DISPARITIES AMONG POC**

The historic roots of health disparities among POC in America have been well documented by medical historians and other experts on race and health. We do not describe it in great detail here; rather, we provide a brief overview, highlight factors specifically associated with physical activity, and offer a reading list of recent scholarship by these experts (Fig. 1).

| Policies | European Colonization of America [116] |
|----------|---------------------------------------|
|          | The African Americans: Many Rivers to Cross [117] |
|          | America Cannot Bear to Bring Back Indentured Servitude [118] |
|          | The Burdens of Race and History on Black People’s Health 400 Years After Jamestown [119] |
|          | Stolen Breaths [67] |
| Poverty, wealth, education and health | What We Get Wrong About Closing the Racial Wealth Gap [63] |
|          | The Social Determinants of Health: Coming of Age [120] |
|          | Racial/Ethnic Discrimination and Health: Findings from Community Studies [121] |
| Residential segregation | Timeline of 100 Years of Racist Housing Policy that Created a Separate and Unequal America [122] |
|          | The Color of Law: A Forgotten History of How Our Government Segregated America [40] |
| Lack of safety and fear | Black People Don’t Exercise in My Neighborhood: Perceived Racial Composition and Leisure-Time Physical Activity Among Middle Class Blacks and Whites [123] |
|          | African American Social and Cultural Contexts and Physical Activity: Strategies for Navigating Challenges to Participation [124] |
| Chronic stress | Superwoman Schema: African American Women’s Views on Stress, Strength, and Health [125] |
|          | Sisters of the Yam: Black Women and Self-Recovery [126] |
|          | Relationship Between Self-Perceived Stress and Blood Pressure [127] |
|          | Understanding Associations Among Race, Socioeconomic Status, and Health: Patterns and Prospects [128] |
|          | Racism, Discrimination and Hypertension: Evidence and Needed Research [4] |
|          | “Being Black and Feeling Blue”: The Mental Health Consequences of Racial Discrimination [129] |
| A new generation of policies | The Importance of Policy Change for Addressing Public Health Problems [62] |
|          | Health in All Policies: A Guide for State and Local Governments [69] |
|          | Racism: Science and Tools for the Public Health Professional [34,130] |

**Policies favorable to Americans who are White**

America’s colonization was enacted by White, wealthy, land-owning men. Our founding fathers implemented policy grounded in 18th century European Liberalism ideals of individualism and rugged independence [26]. These ideals have been manifested in policies and practices designed to favor immigrants of European descent. This included removing, and at times killing, the native peoples and importing migrant and slave labor through inhumane systems. Additional common practices derived from the USA’s earliest policies included low or no compensation for some immigrant groups, restrictions on property ownership, and voting eligibility contingencies. Over time, these policies have become institutionalized into the fabric of 21st century America, contributing to socioeconomic health disparities observed centuries after their inception.
Poverty, wealth, education, and health

It is commonly accepted that social determinants (e.g., income level and educational opportunities) have a major influence on health behaviors, including physical activity [27]. The centuries of disadvantage and displacement of POC by Americans who are White have led to a population-wide differential advantage in terms of educational attainment, income, and accumulated wealth [28]. Although poverty is an enduring correlate of low physical activity levels [24], this relationship may be exacerbated for POC. Compared to POC, White people on average have higher educational attainment, earn more at the same level of educational attainment, and accumulate greater wealth, often enjoying wealth passed from previous generations, all of which are associated with more opportunities to be physically active [1, 29].

As an industry, physical activity has been guided by wealthy, White-based values, largely rooted in leisure-time pursuits that often require educational opportunities, disposable income, appropriate locations, and discretionary time. For example, group-based exercise classes, after-school sports and lessons, and even long walks in beautiful places may be unattainable for those with lower educational attainment, less income, or less leisure time [1, 30]. Many leisure time physical activities also have added costs to participate, such as gym memberships, program fees, or special equipment. Even apparently free of cost outdoor activities may be hampered by poor air quality, which is often observed in areas where more POC reside in part due to residential segregation [31–33].

Unequal health care

POC do not receive equal treatment from the health care system, reporting less access and poorer provider communication [34–36]. For example, Black patients receive shorter visits and less communication with providers compared to White patients [37, 38]. Even physicians who are Black report unequal treatment when they are patients. Consider the case of the late Susan Moore, MD, whose requests for additional and more effective care as she battled and ultimately succumbed to COVID-19 went unanswered. She stated that, “if I was White, I wouldn’t have had to go through that [39].” The unequal access and receipt of health care reflects systemic injustices and speaks to the broader problem of oppression that continues to affect POC.

Residential segregation

Neighborhoods with higher concentrations of POC are often in lower-income areas with fewer resources due to policies that favor people who are White (e.g., red lining and predatory lending, gentrification and displacement, targeting by criminal justice system) [40]. These policies and the resulting de jure segregation of communities by skin color have created inequitable residential environments where there are still limited opportunities for safe and accessible physical activity today [24, 32].

Lack of safety and fear

Due in part to aforementioned policies, Blacks and Latinos are disproportionally located in underresourced, higher crime communities, and neighborhood crime and safety are important hindrances to physical activity [41]. For example, higher rates of pedestrian, bicycle, and traffic incidents and deaths occur among Americans who are Black compared to those who are White [42–46]. Black cyclists are more likely to be ticketed by police officers and hit by cars. Black men’s leisure-time physical activity is also decreased in predominantly White neighborhoods compared to more racially diverse or mostly Black neighborhoods [42–45].

Racism has a unique effect, suppressing physical activity in POC, even when opportunities are readily available [47]. Fear of provocation and brutality at the hands of people who are White due to unjustified racialized insecurities and biases owing to denial of systemic racism is a documented phenomenon [48]. Lack of familiarity with others who look differently contributes to dehumanization and creates irrational and exaggerated fear as documented in neural imaging studies [49–51]. Thus, fear results in POC facing both real and perceived threats to safety (Cf. Fig. 1), ranging from microaggressions to dangerous assaults, interfering with participation in physical activity [52]. The tragedy of Ahmaud Arbery, a Black man who was murdered by White neighbors while jogging, is a tragic example. These stories are, unfortunately, not anomalies of “Walking While Black” [53, 54] and have also been documented among other POC, such as people who are Latino [55].

Chronic stress

POC face daily situations that create chronic stress contributing to the development of chronic health conditions and attenuating immunological responses to unexpected health threats (e.g., COVID-19 exposure) [56]. Chronic stress from the above detailed determinants also presents greater challenges to engaging in physical activity. Socioeconomic deprivation limits opportunities and time to participate in physical activity and renders physical activity as a lower priority, a luxury even, far below the greater necessities of daily survival [57]. Regularly performed physical activity measurably improves the perception of stress [58]. However, the burden of
chronic stress contributes to fear and inability to do regular physical activity [59].

Summary
The impact of racism on the ability of POC to be physically active is clear. Policies, social determinants, residential segregation, lack of safety, and chronic stress have become institutionalized causes and consequences of failed civic systems that disadvantage POC. This scenario makes it easy for individual actors within it to cast unfounded blame on POC, deny injustices, or assume someone else will solve the problem [60]. These complex, systems-level problems will not be solved without systems-based solutions. Solutions cannot be found solely at the individual level, but must be grounded in rectifying the systems that created these inequalities and increasing physical activity opportunities for all Americans.

| EMPA level       | Strategies                        | Examples                                                                 |
|------------------|-----------------------------------|--------------------------------------------------------------------------|
| Macro-level      | Reparations policies              | Implement seeded baby bonds                                               |
|                  |                                   | Reinstitution of job guarantee programs                                  |
| Health promotion policies | Bundle physical activity counseling with other billable preventive care services |
|                  |                                   | Diversify health care provider workforce                                  |
|                  |                                   | Enhance medical education with historical understanding of medical mistrust curricula |
| State and local allocation policies | Improve and enhance city infrastructure                  |
|                  |                                   | Incentivize business owned by local POC                                  |
| Change social norms | Mandate racism as a social determinant of health                         |
|                  |                                   | Intentionally include researchers and practitioners of color               |
|                  |                                   | Enhance mentoring of POC at all training and professional levels           |
| Meso-, Exo-level | Advocacy                          | Advocate for POC for leadership positions                                |
|                  |                                   | Ensure diverse over representation in professional settings               |
|                  |                                   | Publish scientific findings for lay audiences                             |
|                  |                                   | Respond to requests for information from funding agencies                 |
| Social support   |                                   | Encourage community groups with diverse participation                    |
|                  |                                   | Advance existing groups facilitating physical activity participation among POC |
| Micro-level      | Neighborhood safety               | Create shared-use facilities                                              |
|                  |                                   | Improve existing resources with lighting and amenities                     |
| School and workplace promotion | Increase active programming            |
|                  |                                   | Prioritize space and time for physical activities                         |
| Community-based participatory research | Engage community members via citizen science methodology                  |

*Fig 2* | Actionable solutions for redirecting physical activity research by level of the Ecologic Model of Physical Activity (EMPA) [1,2].
Ecologic frameworks, such as the Ecologic Model of Physical Activity, as adapted for Fig. 3, can be used to conceptualize dynamic, complex systems problems, such as the current state of affairs in the USA by applying an equity lens to conceptualize drivers of individual-level behavior in terms of external factors [1, 2]. These include macrolevel environmental contextual elements, such as many of the policies that we have described, and microlevel environments, or the places and context in which people are physically active. Ecologic frameworks also describe a system that can link meso- and exo-level environmental and social actions that happen in one place or time to actions in other places or later in time. Forces of change, such as technology and pandemics, can shape all levels of the human ecologic milieu, including contributing to individual outcomes. Consequently, by creating equitable improvements to the system, we can contribute to greater equity in opportunities for physical activity and, subsequently, begin to ameliorate disparities in physical activity.

Macrolevel environments

Policies are a macrolevel environmental influence on individual-level health behavior and outcomes. Structural racism in the USA is a result of centuries of policies that have systematically disenfranchised POC. Policies that systematically and intentionally support POC in ways that prioritize health and equity are needed. For example, policies should recognize racism as a social determinant of health and provide access, opportunities, and other forms of support to enhance educational opportunities, improve socioeconomic status, and impact health in a myriad of other ways [61, 62]. These long-view solutions must be accompanied by short-term measures to halt and reverse the immediate crisis [63]. Ultimately, remedying the damage from past policies could mean providing additional support for communities of color to resolve immediate issues, such as reparations policies. For example, “baby bonds” programs can provide every child in America an account seeded with $1,000 to $3,000, an amount allocated in inverse proportions to that child’s family’s income, which matures when the child reaches adulthood [64]. These funds could be used to help increase homeownership (i.e., the source of most accumulated wealth for most Americans), pay for educational opportunities, or improve retirement planning. Reinstating federal job guarantee programming would help to guarantee jobs meeting a livable wage by improving training, working conditions, and workers’ rights and benefits [65]. Universally subsidized early care and education programming, allowing parents to take advantage of these programs, and further paying forward educational opportunities would be essential.

In the domain of federal health care policy, the Affordable Care Act has improved access to preventive measures, such as screening and well woman care [66]. There is room for improvement by systematically bundling existing preventive services with recommendations that emphasize physical activity. The American College of Sports Medicine’s Exercise Is Medicine represents a well-established strategy for providers to encourage patients to be more physically active through referrals to evidence-based exercise programs and qualified physical activity professionals [67]. Such training and incentives may take the shape of diversifying the predominantly White health care workforce, improving clinician training to include competency in how structural racism impacts health, and mandating health care systems to measure and address outcomes to produce equitable results [67]. Moreover, providers may need additional guidance in supporting people who have had historic mistrust of medical care [67]. Educational and policy efforts are needed to overcome medical mistrust among POC and encourage health care providers to talk with all patients, regardless of skin color, about the importance of physical activity for health and wellness and to direct patients to the resources, to help them become more physically active [68].

At the state and local levels, policy makers must also enact and review appropriation strategies to
support “health in all policies” [69]. For example, this includes policies dedicating funding toward improving and increasing the quality and quantity of affordable, safe neighborhoods with improved design and infrastructure (e.g., sidewalk, lights and road quality) and amenities (e.g., parks and community centers) [70]. These efforts should leverage assets already located within the community to avoid gentrification efforts that have historically displaced POC from their neighborhoods [62, 71–74]. Researchers can help this effort with rapid and robust evaluation plans, such as health impact assessments, to monitor and aid implementation [62, 75]. Improved and free/affordable public infrastructure via policy enhances the quality of life for all residents and improves opportunities for daily physical activity for all. As examples, public spaces for physical activity, such as gyms, parks, and other physical activity resources, should be made, programmed, and maintained in the same fashion as public libraries. Researchers can help to accelerate policy change by driving the narrative of funded research by responding to federal requests for information, published regularly by the National Institutes of Health, and documenting the effects of policy change on behavior and health outcomes. Moreover, it goes without saying that each of us must vote and encourage others to do so.

Changing social norms to account for implicit bias

As a society, we need to recognize the privilege and safety that is afforded to people who are White while performing physical activity in public spaces and advocate for these same rights for POC. To be clear, the fact that Americans who are White may feel insecure, uncomfortable, or threatened by the mere presence of POC using public spaces for leisure-time physical activity or other types of recreation is a White person problem—a problem that manifests as unwarranted harassment, injury, and death among POC. Despite evidence of ongoing implicit racism, there had been little effort on the part of researchers to measure or address this as a social determinant of health in our studies [76].

To change these social norms, it is up to Americans who are White to recognize and interrogate their racialized insecurities and the privilege afforded by their skin color and advocate for the same rights, opportunities, and hassle-free daily activities among individuals whose skin color may not match their own. Funding agencies must prioritize research that moves society toward progress in this arena [77]. For example, norms of physical activity may differ by race or ethnicity, something that must be recognized and incorporated by researchers and promoters. Racism must be acknowledged as a social determinant of health, carefully measured in research, and acknowledged as a limitation if it is not accounted for [78, 79]. Actively including researchers who represent POC as members of research teams must be a priority [77]. Mentoring must be enhanced to intentionally include mentees of color at all training levels, leveraging mentors of color when and where available.

Meso- and exo-level environment

Meso- and exo-level environments are the physical and social linkages and process that connect microenvironments as well as activating macrolevel environmental factors to improve microlevel environments [1, 2].

Advocacy is a process that can link people and places to support the health of individuals and communities. Advocacy comes in many forms. Everyone needs to intentionally advocate to empower colleagues, friends, and families who represent POC in their communities. Informal advocacy efforts can include advocating for POC for leadership positions, including POC in planning for and programming of physical activity opportunities, and connecting with local organizations that support these same issues. Professional and training organizations (e.g., department faculty and doctoral programs) must ensure diverse representation, reevaluating and adjusting policies in ways to foster greater representation of POC. It is not enough to say we support POC; advocacy requires actions that include and support POC in equitable ways.

It is important to use multiple advocacy strategies for promoting physical activity. For example, although the U.S. National Football League (NFL) has been criticized for contributing to sports injuries among youth [80], there is no question of the success of the American Heart Association-NFL Play-60 campaign for increasing physical activity participation in youth [81, 82]. The Play-60 campaign leveraged the success of Cam Newton as an effective strategy to encourage youth and young adults to adopt physically active recreational pursuits and positions. At the same time, providing role models, testimonials, and encouragement from “real people” who are POC may be more effective for others who may value someone whom they can more easily identify with, particularly among women of color [83, 84].

Although ameliorating racial disparities and improving societal norms is not an easy process with readily available evidence-based programs, it is vital to link what evidence base is available to decision makers. Scientists must translate knowledge to policy makers and practitioners via widely read channels, such as op-eds, blogs, and social media. For example, the Society of Behavioral Medicine Health Policy Committee routinely provides evidence-based, best practice position pieces to policy makers [85]. Researchers are rarely formally trained for this kind of “boots-on-the-ground” dissemination but must learn to...
use these strategies to connect the science with those who can put it to good use.

**Social support**

Americans of color have consistently voiced the need for increased social support to increase their own physical activity [86–88]. With COVID-19 limiting physical activity, as individuals, we can create community walking/biking groups with diverse participation where individuals exercise outdoors and wear masks [89, 90]. We can also amplify the reach and impact of existing community groups, like GirlTrek, Black Girls Run!, and Latinos Run, groups who focus on activating communities of color via advocacy efforts (see above) [91, 92]. Black and Latino interviewees reported that increasing the number of structured exercise programs within their communities and fostering social support among residents led to higher engagement in physical activity [86]. Exercise groups foster social support and shape social norms while creating additional security and reducing isolation.

**Microlevel environments**

Microlevel environments are the settings where human behavior occurs, such as neighborhoods, homes, workplaces, and schools. These are perhaps the most well-studied level of the Ecologic Model of Physical Activity.

**Neighborhood safety**

Neighborhoods are the microlevel environment where daily physical activity happens for most people. Over the past decade, POC have consistently voiced the need for improvements in neighborhood safety as ways to increase their own physical activity [86–88]. Solutions have corresponded with infrastructure and programming, rather than increasing policing, showing how policy allocation at the macrolevel can improve microlevel influences on physical activity [74]. For example, Blacks and Latinos report that creating shared-use facilities at high schools or universities and installing/fixing lighting and sidewalks can help address perceived safety barriers to physical activity [86, 88].

**Health care settings**

The patient-provider visit is a golden opportunity for providers to identify preventable morbidity and mortality that may be improved by increasing physical activity and disseminate information. It is vital to acknowledge historical and present-day medical racism and require providers, institutions, and professional organizations to implement implicit bias trainings [93]. Institutions and organizations must develop partnerships with POC community leaders and invest resources in training, recruitment, and sustaining POC in the medical workforce as an essential priority for reducing physical activity disparities that are perpetuated through health care [34, 94, 95].

**Meeting people where they are**

Schools, early care and education centers, workplaces, and other places where people regularly spend their time can continue to play an important role in promoting physical activity by offering opportunities, places, and programs [96–99]. In addition to providing routinized physical activity, these microenvironments often bundle already existing social supports and behavioral prompts, both important for maintaining physical activity [100–102]. Daily physical activity in these settings can not only improve various health indicators but also enhance performance and reduce burnout, an important consideration for how resources may be allocated in school and workplace settings [103–105].

**Community-based participatory research**

Community-based participatory research (CBPR) is an approach to equitably involve community members, stakeholders, leaders, and researchers in the research process to ultimately benefit the community. Collaboration between researchers and participants to create strategies and systems for sustainable health improvements is a hallmark of CBPR. This kind of citizen science has received little attention in health research until recently [106]. Citizen science increases awareness and promotes representative engagement [106, 107]. It provides a means for people to engage with science related to issues they value [106, 108]. Researchers who implement CBPR approaches that rely on the voices of POC to guide the implementation of culturally relevant, evidence-based physical activity programs can improve ecologic validity and the potential for sustainability [109, 110]. CBPR can also improve the translation of science to practice. For example, practitioners can work with POC to identify places where there is access to restricted-use physical activity spaces that are safe and appealing (e.g., school track, baseball and soccer fields, and community centers) to facilitate their use for communities.

**Forces of change**

Forces of change are super structures, like technological innovation or societal trends (such as pandemics), that permeate and influence all levels of human ecology [1, 2]. As reliance on technology has increased during the COVID-19 pandemic, physical activity opportunities and monitoring have migrated to online platforms. These forces of change have necessitated the expansion of cellular mobile phone use and broadband internet access, gaining accessibility via local and state initiatives [111]. Nearly all Americans routinely carry mobile phones [112],...
CONCLUSION

Regularly performed physical activity continues to be a privilege rather than a blessing of liberty. It is up to us, the leaders of behavioral medicine, to ensure that physical activity opportunities are available for everyone to reduce disparities in health outcomes. The Black Lives Matter movement has illuminated disparities that are a direct result of centuries of structural racism, woven into the very fabric of America. Disparities in COVID-19 are pressing but simply cap a long line of disparities as observed in chronic diseases. Race-based discrimination and institutionalized racism are so embedded in U.S. society that it is often difficult to document and acknowledge [48] and adds an extra penalty to the lives of two in five Americans who represent POC. The only way to effectively “undo” the damage of systematically penalizing a group of people is to create change in or build new systems that enable agency in people and communities of color. A guiding systems framework, such as the Ecologic Model of Physical Activity, can guide our science, practice, and policies. As presented above and in Fig. 2, we must implement innovations at the macrolevel of policy enhancement [62], meso- and exo-levels that dynamically link people and opportunity, and in the microlevel behavior settings where physical activity actually happens. We must move beyond the tragedy, investigate progress, and disseminate success stories, prioritizing research, publications, and translation of findings to practice and science that lead to progress [77]. These systemic changes can help to make amends for past damage that these systems have caused—an action that must be the priority for ALL members of the society. Although the singular challenge of racism and accompanying health disparities can be overwhelming and extends even beyond what is discussed in this paper, focusing our efforts on promoting physical activity for all people is a feasible goal and something that we can and must do to enable health equity.

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