

We believe the IOC's determination to proceed with the Olympic Games is not informed by the best scientific evidence. The playbooks maintain that athletes participate at their own risk, while failing both to distinguish the various levels of risk faced by athletes and to recognize the limitations of measures such as temperature screenings and face coverings. Similarly, the IOC has not heeded lessons from other large sporting events. Many U.S.-based professional leagues, including the National Football League (NFL), the National Basketball Association, and the Women's National Basketball Association, conducted successful seasons, but their protocols were rigorous and informed by an understanding of airborne transmission, asymptomatic spread, and the definition of close contacts.² Preventive measures, adapted amid continuous expert review, included single hotel rooms for athletes, at least daily testing, and wearable technology for monitoring contacts, supported by rigorous contact tracing. Despite increasingly rigorous protocols, outbreaks of Covid-19 have caused multiple game cancellations. The World Men's Handball Championship, held in Egypt in January 2021, showed the limits of housing even two people together when roommates were both forced out of games after one tested positive. In February, the Australian Open was challenged by hotel-driven exposures and two local outbreaks. In early May, the Indian Premier League cricket tournament was suspended in its third week.

The IOC's playbooks¹ are not built on scientifically rigorous risk assessment, and they fail to consider the ways in which exposure

occurs, the factors that contribute to exposure, and which participants may be at highest risk. To be sure, most athletes are at low risk for serious health outcomes associated with Covid-19, but some Paralympic athletes could be in a higher-risk category. In addition, we believe the playbooks do not adequately protect the thousands of people — including trainers, volunteers, officials, and transport and hotel employees — whose work ensures the success of such a large event.

The World Health Organization (WHO) and the Centers for Disease Control and Prevention have both recognized the important role of infectious-particle inhalation in person-to-person transmission of SARS-CoV-2.^{3,4} When planning any event, the first task should involve identifying the people most at risk of being exposed and the jobs, activities, and locations for which exposure will be the highest. When it comes to aerosol inhalation, the most important features of exposure are the concentration of infectious particles in the air and the length of time spent in contact with those particles. Concentration of particles depends on the number of infected people, the type of activity (i.e., the degree to which it generates aerosols), the amount of time that infected people spend in a particular space, and the degree of ventilation. Over long periods, physical distancing plays a less-relevant role in enclosed spaces, as particles become distributed throughout the space.

We believe that the IOC's playbooks should classify events as low, moderate, or high risk depending on the activity and the venue and should address differ-

ences among these categories. For example, outdoor events for which competitors are naturally spaced out, such as sailing, archery, and equestrian events, may be considered low risk. Other outdoor sports for which close contact is unavoidable, such as rugby, hockey (field hockey), and football (soccer), could be considered moderate risk. Sports that are held in indoor venues and require close contact, such as boxing and wrestling, are probably high risk. Any sport that takes place indoors — even if athletes compete individually, as they do in gymnastics — will pose a greater risk than outdoor events. Protocols for keeping athletes and everyone else involved safe could vary on the basis of these risk levels.

The playbooks could also address differences among venues, including noncompetition spaces. Smaller, enclosed spaces where many athletes congregate, including stadiums, buses, and cafeterias, are higher-risk settings than outdoor areas. Hotels are likely to be high-risk areas, in light of close contact in shared rooms (three athletes per room will be standard), dining spaces, and other common areas and inadequate ventilation systems that were designed before the pandemic.

Because people with Covid-19 can be infectious 48 hours before they develop symptoms (and may not develop symptoms at all), routine temperature and symptom screening will not be effective for identifying presymptomatic or asymptomatic people. Polymerase-chain-reaction testing, at least once (if not twice) per day, is best practice, as the NFL experience shows.² The IOC plans to provide every athlete with a smartphone that has mandatory contact-tracing and health-reporting apps.

Comparison of Best Practices to Protect Public and Athlete Health with the IOC's Current Plan.*		
Principle	Best Practices	IOC Playbook Guidelines
Public health emphasis	Establish Covid-19 advisory committees that include player associations, governing bodies, and experts; have a plan B to respond quickly to an outbreak	No involvement of player associations; no plan B in the event of an outbreak; no specific risk assessment communicated
Athlete protection	No forced waivers for athletes; full and comprehensive insurance for training and competition periods	Requires athletes to participate at their own risk; limited insurance coverage
Clearly defined responsibilities	Safe international travel policies; sport-specific protective measures	Predeparture testing may be insufficient; sport-specific measures haven't been sufficiently detailed
Effective testing, contact tracing, and isolation policies	At least daily RT-PCR testing for athletes, which may be supplemented with lateral-flow antigen tests; wearable technology for proximity monitoring, backed by human contact tracing; designated hotel isolation facilities	Insufficient detail on testing frequency; reliance on contact tracing by smartphone rather than wearable technology; emphasis on testing for fever; insufficient detail on hotel isolation facilities
Proper treatment and care	Tailored treatment and rehabilitation programs; mandatory cardiac screening; access to on-the-ground mental health support	Insufficient detail on treatment and rehabilitation measures; no mention of athlete mental health or well-being support
Easy access to effective PPE	Distribution of medically approved face masks, including filtering facepiece respirators for high-risk settings, such as buses	Athletes bring their own masks
Athlete education	With player associations, develop easy-to-understand interactive materials	Emphasizes role of "Covid-19 liaison officers" with unclear qualifications and training
Safe and secure life at the Games	Individual rooms for athletes; modified means of travel and access; capacity limits for all indoor environments, including cafeterias; proper ventilation and Covid-19 detection	Shared rooms; lack of specified social-distancing measures for shared spaces; lack of information about review, adaptation, and modification of HVAC systems

* Adapted with permission from the World Players Association (<https://uniglobalunion.org/news/ioc-must-urgently-guarantee-world-class-covid-19-protections-tokyo-olympics>). HVAC denotes heating, ventilation, and air conditioning, IOC International Olympic Committee, PPE personal protective equipment, and RT-PCR reverse-transcriptase-polymerase-chain-reaction.

Contact-tracing apps are often ineffective, however, and very few Olympic athletes will compete carrying a mobile phone. Evidence suggests that wearable devices with proximity sensors are more effective than such apps.

We recommend that the WHO immediately convene an emergency committee that includes experts in occupational safety and health, building and ventilation engineering, and infectious-disease epidemiology, as well as athlete representatives, to consider these factors and advise on a risk-management approach for the Tokyo Olympics (see table). There is precedent for such an

approach: the WHO convened an emergency committee to provide guidance ahead of the Olympic and Paralympic Games in Brazil during the Zika virus Public Health Emergency of International Concern in 2016.⁵

A global health security strategy relies on understanding the interconnectedness among countries. If our experience facing Covid-19 represents a moment of truth, it also provides an unrivaled opportunity for the realization of human values and collective human interests — the world's new contract — and for preparing to defeat future threats. With less than 2 months until the Olympic

torch is lit, canceling the Games may be the safest option. But the Olympic Games are one of the few events that could connect us at a time of global disconnect. The Olympic spirit is unparalleled in its power to inspire and mobilize. We rally around the torch because we recognize the value of the things that connect us over the value of the things that separate us. For us to connect safely, we believe urgent action is needed for these Olympic Games to proceed.

Disclosure forms provided by the authors are available at [NEJM.org](https://www.nejm.org).

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1. International Olympic Committee, International Paralympic Committee. The playbook: athletes and officials. April 2021

(<https://olympics.com/ioc/tokyo-2020-playbooks>).

2. Mack CD, Wasserman EB, Perrine CG, et al. Implementation and evolution of mitigation measures, testing, and contact tracing in the National Football League, August 9–November 21, 2020. *MMWR Morb Mortal Wkly Rep* 2021;70:130-5.

3. World Health Organization. Coronavirus disease (COVID-19): how is it transmitted? December 13, 2020 (<https://www.who.int/news-room/q-a-detail/coronavirus-disease-covid-19-how-is-it-transmitted>).

4. Centers for Disease Control and Prevention. Scientific brief: SARS-CoV-2 transmission. May 7, 2021 (<https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/sars-cov-2-transmission.html>).

5. World Health Organization. WHO to convene an International Health Regulations Emergency Committee on Zika virus and observed increase in neurological disorders and neonatal malformations. January 28, 2016 (<https://www.who.int/news/item/28-01-2016-who-to-convene-an-international-health-regulations-emergency-committee-on-zika-virus-and-observed-increase-in-neurological-disorders-and-neonatal-malformations>).

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