

SECURITY ANALYSIS OF SPORTS COMPETITION UNDER THE INFLUENCE OF COVID-19



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ANÁLISE DE SEGURANÇA DA COMPETIÇÃO ESPORTIVA SOB A INFLUÊNCIA DA COVID-19

ANÁLISIS DE SEGURIDAD DE LA COMPETICIÓN DEPORTIVA BAJO LA INFLUENCIA DEL COVID-19

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ABSTRACT

Introduction: The continuous growth of COVID-19 has harmed sports competitions. Although the existing method of non-opening to spectators is very effective for preventing and controlling COVID-19, it will also seriously blow the sports economy's development. **Objective:** Explore the safety of sports competition under the influence of COVID-19 to realize sports practice in a safe and regulated condition. **Methods:** Firstly, the current public's willingness to participate in the competition was analyzed by questionnaire survey. Then, using the literature search method, this paper discusses the safety needs of sports competitions under the normalization of the prevention and control of COVID-19 in the research area at the present stage. **Results:** By completely controlling the crowd shift rule and skillfully controlling the crowd pace, the transmission risk in the competition process can be effectively reduced. **Conclusion:** The relevant departments and stadium managers should fully analyze the current epidemic prevention and control needs and strengthen spectator safety management in the study area in combination with regional characteristics and the actual spectator situation. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: COVID-19; Sports; Safety.

RESUMO

Introdução: O crescimento contínuo da COVID-19 tem tido um impacto negativo sobre as competições esportivas. Embora o método existente de não-abertura aos espectadores seja muito eficaz para a prevenção e controle da COVID-19, ele também trará um sério golpe ao desenvolvimento da economia esportiva. **Objetivo:** Explorar a segurança da competição esportiva sob a influência da COVID-19, de forma a realizar a prática esportiva em uma condição segura e regulamentada. **Métodos:** Primeiramente, a disposição do público atual para participar da competição foi analisada por meio de pesquisa por questionário. Em seguida, utilizando o método de pesquisa bibliográfica, este trabalho discute as necessidades de segurança das competições esportivas sob a normalização da prevenção e controle da COVID-19 na área de pesquisa na presente fase. **Resultados:** Controlando completamente a regra do deslocamento da multidão e controlando habilmente o ritmo da multidão, o risco de transmissão no processo de competição pode ser efetivamente reduzido. **Conclusão:** Os departamentos e gerentes de estádios pertinentes devem analisar plenamente as necessidades atuais de prevenção e controle de epidemias e fortalecer a gestão da segurança dos espectadores na área de estudo em combinação com as características regionais e a situação real dos espectadores. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: COVID-19; Esportes; Segurança.

RESUMEN

Introducción: El continuo crecimiento del COVID-19 ha tenido un impacto negativo en las competiciones deportivas. Aunque el método actual de no abrir para los espectadores es muy eficaz para la prevención y el control del COVID-19, también supondrá un duro golpe para el desarrollo de la economía deportiva. **Objetivo:** Explorar la seguridad de la competición deportiva bajo la influencia del COVID-19, para llevar a cabo la práctica deportiva en condiciones seguras y reguladas. **Métodos:** En primer lugar, se analizó la disposición del público actual a participar en el concurso mediante una encuesta por cuestionario. A continuación, utilizando el método de búsqueda bibliográfica, este trabajo analiza las necesidades de seguridad de las competiciones deportivas en el marco de la normalización de la prevención y el control del COVID-19 en el ámbito de la investigación en la etapa actual. **Resultados:** Si se controla completamente la regla de desplazamiento de la multitud y se controla hábilmente el ritmo de la multitud, se puede reducir eficazmente el riesgo de transmisión en el proceso de competición. **Conclusión:** Los departamentos competentes y los gestores de los estadios deben analizar a fondo las necesidades actuales de prevención y control de epidemias y reforzar la gestión de la seguridad de los espectadores en la zona de estudio en combinación con las características regionales y la situación real de los espectadores. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptores: COVID-19; Deportes; Seguridad.



INTRODUCTION

Now, due to the impact of the COVID-19, countries around the world have adopted certain policies for the COVID-19, and major sports events have been seriously affected.¹ Under the impact of the COVID-19, higher requirements have been put forward for the safety of sports competitions.² Sports competitions can be carried out smoothly through high-level and efficient competition organization, which also requires us to be professional and professional in the conduct of sports competitions.³ In the face of the possible safety problems in the process of sports competition, we can fully consider and put on record more scientifically, so that we can be more calm in the face of the safety problems of sports competition, and also enable us to better solve the safety problems in the competition.⁴ At present, there are many factors that affect the safety of sports competitions. At this stage, the novel coronavirus is more concealed and spreads more rapidly, which also brings many difficulties to our event epidemic prevention and control work.⁵ This requires us to make more targeted deployment for the event epidemic prevention and control according to the relevant prevention and control requirements and policies proposed by the state for the COVID-19 at this stage, as well as the specific sports nature of sports competitions. In order to avoid the impact of the COVID-19 on the organization of sports events and the physical health of athletes, a more closed competition environment can be implemented at this stage. However, due to the closeness of the competition environment, the physical and mental health of athletes should also be fully considered.⁶ For the possible physical and mental diseases of athletes in the closed competition, adequate plans and treatment measures should be taken, avoid affecting the competition state and performance of athletes.⁷

METHOD

With the impact of the COVID-19, there are certain potential safety hazards in sports competitions. Therefore, both the wishes of the audience and the needs of stadiums and gymnasiums have changed. Firstly, this paper uses the way of questionnaire to inquire and investigate the audience participation of sports competitions during the new crown. The score is given on a five point scale. Five points are very willing to watch the game on site, four points are relatively willing, three points are average, two points are not very interested, and one point is determined not to watch the game on site The relevant questionnaires were distributed through the network platform. After a week of collection, a total of 1763 questionnaires were obtained. The data results of the questionnaire were input, integrated and analyzed, so as to analyze the safety of current sports competitions from the perspective of participants. The study and all the participants were reviewed and approved by Ethics Committee of Northeast Agricultural University (NO.20NAUEB-2019).

Sports competitions during the new crown put forward extremely high requirements for the safety of stadiums and gymnasiums. For example, good ventilation facilities are required. When arranging stadiums and gymnasiums, we need to fully consider the actual needs of the crowd and the safety of the competition, so as to prevent the infection risk caused by crowd aggregation. In addition, conventional safety hazards, such as stampede fire, should also be eliminated in time. Therefore, sports venues need to pay more research to ensure the safety of sports competitions.

RESULTS

Analysis of willingness to participate in sports competitions during the new championship

As shown in Figure 1, the audience participation in sports competitions during the new crown period is shown. Through a comprehensive analysis of several attitudes, it can be seen that although the relevant departments have set a high threshold for the holding of sports events,

which can be carried out only if they ensure to meet the high scale of epidemic prevention, the people's participation enthusiasm is generally not high. At present, most people have a high awareness of prevention and will participate in sports competitions on the premise that they determine safety, and some people are out of their own safety considerations, Put an end to any risky behavior.

Research results on the safety of sports venues

During the epidemic prevention and control period, if relevant sports events are held, there will be more distance between seats, and generally speaking, there will be no more risk to the infection of COVID-19. However, relatively speaking, it is easy to have a certain risk of infection in the process of audience admission and departure. Therefore, the safety in the process of audience action is particularly important. As the outbreak of COVID-19 is relatively sudden and is currently in the normalization stage of epidemic prevention and control, there is a relatively lack of systematic analysis of population density and epidemic prevention status. During the research, this paper judges the risk of Xinguan infection by referring to the population density and audience psychology describing the stampede accident.

It can be seen from Table 1 that when the crowd density is different, there are different situations in the audience's mind, and the risk of new crown infection is also different. Generally speaking, when the population density is > 2.3m²/person, there is a relatively open space between people, so the infection risk of new crown is small; When the population density is 0.9-0.45m²/person, although there is a small distance between people, if preventive measures are taken, the risk of infection can be reduced; However, when the density is less than 0.45m²/person, the infection risk of Xinguan is higher; When the density is further reduced, stampede accidents will occur due to overcrowding, which will not only increase the transmission risk of the epidemic, but also pose a serious threat to the life safety of visitors.

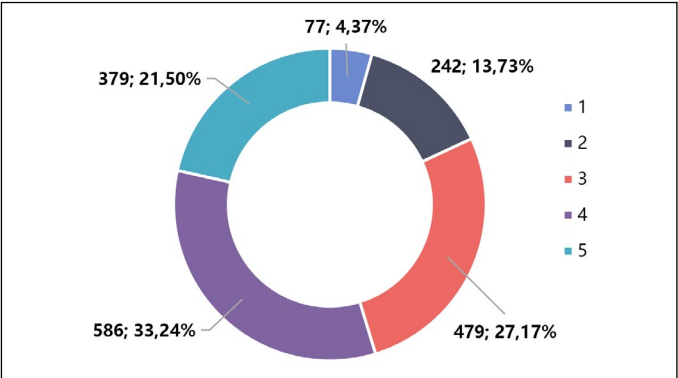


Figure 1. Audience participation in sports competitions during the new championship.

Table 1. Analysis of crowd density and epidemic prevention in stadiums and gymnasiums.

Population density	Audience psychology	New crown infection risk
>2.3m2/people	Walk freely, can be out of order, maintain a relatively free state	Smaller
0.9m2/people	Can walk freely, but at a slower pace	Generally
0.45 m2/people	Crowded but still free to walk	Generally
<0.45m2/people	Walking becomes more difficult, but can not touch each other	Generally
0.3 m2/people	During walking, there is a certain amount of contact with the surrounding people	Higher
<0.2 m2/people	Very crowded, but not yet a threat to life	Higher
0.14m2/people	Stampede accidents are prone to occur, threatening life safety	Higher

As shown in Figure 2, the safe area of the stadium during the new crown period is divided. It can be seen from the figure that the outdoor ventilation area is large, and the distance between people can be kept outside the safe distance. Therefore, the outdoor belongs to the absolute safe area. The entrance hall, corridor and platform are also relatively large and well ventilated. Therefore, although there is a certain risk of contact and infection, they are relatively safe compared with the infield stands. In the central competition venue, only staff and contestants often enter. Although some activities will be carried out without masks to avoid affecting the competitive state of athletes, because the athletes and staff have good health certificates, they also belong to a relatively safe area despite the risk of transmission. The highest communication risk is in the stand area, which belongs to the unsafe area, including the access and communication between people. In order to further prevent the communication risk in the stand area, most sports venues choose the form of interval ticket sales, so as to form a relatively safe protection area and reduce the communication risk of the stand.

As shown in Table 2, the evacuation speeds of different groups are shown. In the process of holding a sports competition, the participants are not only adult men and women, but also the elderly and children, and their movement speeds are different. When analyzing the safety of stadiums and gymnasiums, it is also necessary to fully consider the movement speed of different people, so as to provide an effective reference for the personnel arrangement and order guidance of stadiums and gymnasiums, which not only improves the efficiency of entering and leaving the venue, prevents the increased infection risk caused by a large number of people staying due to too slow speed, but also prevents congestion and stampede accidents caused by speed control problems. So as to improve the safety of the whole game as much as possible. It can be seen from table 2 that the movement speed is adult male > adult female > children > the elderly. From the movement area, the upward < downward < plane walking of the vertical channel of the grandstand plays a good guiding role by fully matching the speed of different groups, so as to reduce the risk of infection in the process of action.



Figure 2. Division of safe areas of stadiums and gymnasiums during the new crown.

Table 2. Action speed of different personnel (m/s).

Person Type	Class I: stands, longitudinal passages, ramps and stairs		Class II: lounge, horizontal walkway, entrance and exit
	Upstream	Down	
Adult man	0.65	0.78	1.30
Adult woman	0.55	0.66	1.10
Child	0.45	0.54	0.90
Elder	0.40	0.48	0.80

DISCUSSION

Organization of sports competition under the influence of covid-19

In the context of the COVID-19, the following measures can be taken to carry out sports competitions to minimize the impact of the COVID-19 on the competitions. First of all, we should organize the professional event organizing committee, staff and medical team. Before the start of the game, we should carry out relevant epidemic prevention training for the event organizers and staff, so that the event staff can firmly establish their safety awareness. At the same time, we should also sort out the relevant competition requirements and epidemic prevention policies during the game, so that every athlete participating in the event can master the competition requirements and epidemic prevention policies. Be fully prepared. When the athletes arrive at the host city, isolation and nucleic acid detection will be carried out. At the same time, nucleic acid detection will be carried out for the staff, athletes, coaches and other relevant participants every day. During the athletes' participation in the competition, closed-loop management will be carried out to prevent the mobilization and staff from increasing the risk of infection with novel coronavirus through contact with the outside world. Secondly, the participation of spectators in sports events is also essential. Whether the spectators can enter to watch the athletes' competitions should be scientifically judged according to the COVID-19 situation and situation in the host place. In the planning of the competition schedule, the complexity should be reduced to simplicity on the principle of fairness and justice, and the competition items should be reasonably shortened by appropriately shortening the competition cycle and events. Finally, we should also properly plan the training venue to ensure the daily training of athletes and avoid the decline of athletes' competitive status and competition results caused by the site conditions.

Measures to ensure safety in sports competitions under the influence of covid-19

Due to the impact of the COVID-19, there will be safety hazards and problems different from the previous ones in the process of sports competitions. Relevant measures should be taken to reasonably prevent and deal with the possible safety hazards and problems. The first is to scientifically plan the security force of the event, and make effective planning through the scientific suggestions of relevant security departments, so as to avoid the relevant situation of ineffective handling of sudden security situations caused by insufficient security force. Secondly, we should also pay attention to the disinfection and ventilation of the competition field and training field. In the competition field and training field, after athletes' competition or training, we should disinfect and ventilate the competition field and training equipment to avoid possible cross infection. In the process of holding the competition, we should also reserve relevant epidemic prevention equipment, and reserve sufficient epidemic prevention equipment that may be widely used in the process of holding the competition, such as masks, alcohol and other common medical supplies. Due to the closed-loop management implemented during the competition, the athletes' daily life and competition have changed compared with their daily life. We should pay attention to the athletes and coaches. Because of the psychological problems caused by the change of lifestyle, the prevention of psychological safety problems of athletes and coaches should not only rely on the professional psychologists prepared by the Competition Organizing Committee during the competition, but also before the competition, Improve the competition staff through the training of relevant staff. Improve the service enthusiasm in the daily life of athletes during the competition to avoid the psychological safety problems caused by the change of lifestyle. In the

preparation of safety measures for sports competitions, we should not only rely on the guidance of professionals, but also introduce relevant technologies with the help of the development of modern science and technology to improve the efficiency of ensuring safety.

CONCLUSION

Through this study, we can see that in the normalization stage of COVID-19, we always face the contradiction between the competition needs of athletes, the competition needs of spectators and the current actual situation of epidemic prevention. In view of this problem, in addition to strengthening the inspection of health certificates and the disinfection of sports venues, we should also start with the actual situation of athletes and the spectator's heart, so as to explore the order guidance of spectators in the process of visiting the game, so as to reduce the occurrence of canceling spectators for epidemic prevention and provide more and safer opportunities for sports lovers to watch the game.

The results show that the combination of evacuation prevention and control of people flow and interval statistics between people can effectively control the density and distance between people in the process of crowd movement. By fully mastering the law of crowd movement and skillfully controlling the rhythm of crowd watching, it can effectively reduce the transmission risk in the process of competition, promote the safety of sports competition as much as possible and promote the orderly development of epidemic prevention and control.

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