

# Study on Physical Activity of College Students in China Against the Background of Coronavirus Disease 2019

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## ABSTRACT

Considering the situation that COVID-19 (coronavirus disease 2019) has brought great changes to people's lives, this paper studies the supply strategies of physical education courses in colleges and universities, and promotes the implementation of relevant strategies to improve the physical and mental health of house-bound college students. The research methods of network questionnaire and qualitative interview are adopted to investigate the physical activities of college students. Based on survey results, the supply strategy of physical education courses in colleges and universities is expounded. The results tell that home-based exercise dominates during the COVID-19 (coronavirus disease 2019) period with only 56.69% of college students reaching the standard of optimal immune status. The driving force of college students' physical activities is to improve their immunity and keep healthy, while the obstacles are lack of external motivation, supervision, and internalized fitness knowledge.

In such context, physical education courses should be adjusted in accordance with the above results, so as to meet the health needs of Chinese college students and adapt to the current dynamics.

**Keywords:** COVID-19 (coronavirus disease 2019), colleges and universities, physical education courses, home-bound state, immunity, amount of exercise

## I. INTRODUCTION

The COVID-19 pandemic suffering the world has brought about great changes in the way people live. Staying at home and not going out has become the most convenient and effective way to protect oneself. China, an integral part of global integration, cannot be immune to the intensified global epidemic despite its significant improvement. For a long time, staying at home and going out less will be the dominant lifestyle. "Classes suspended but learning continues" is a teaching mode advocated by the Ministry of Education to ensure the health of teachers and students and minimize the negative impact of the epidemic on normal teaching order. As a part of college curriculum, physical education courses are no exception. In addition, its unique function determines that it can play an irreplaceable role during this period. The study investigates the physical activity of college students in the context of COVID-19, especially their motivations and obstacles, and analyzes the pressing and important issues faced by them in physical activity, in a bid to provide constructive suggestions for the supply strategy of physical education courses in colleges and universities, and to provide reference for the implementation of "classes suspended but learning

continues" and the promotion of physical and mental health of college students.

## II. RESPONDENTS AND DATA SOURCES

### A. Respondents

Adhering to the principle of convenience, the authors conducted online questionnaire and telephone interviews with 20 universities in 6 cities including Beijing, Chongqing, Hangzhou in Zhejiang, Nanjing in Jiangsu, Guangzhou in Guangdong and Xiamen in Fujian. The first-line physical education teachers distributed questionnaires in the classes, and the telephone interviewees were the first-line physical education teachers and some part-time physical education teaching managers. This helps to collect questionnaires more quickly and directly target the service objects of physical education courses in colleges and universities, so as to connect the demand and supply.

### B. Data source

All the questions in the questionnaire are required, covering three parts. The first part is the basic information of the respondents, including gender, grade

level, place of residence, etc. The second part is the activity status of the respondents in such context, including whether it will affect their exercise habits, physical activity patterns, indicators of physical activity (exercise intensity, exercise time, etc.), physical activity motivation and obstacles. The third part is about the physical education courses in colleges and universities under COVID-19. A total of 2,475 questionnaires were recovered. After preliminary screening, 53 obviously deviated questionnaires were eliminated, and 2,422 were valid, with an effective rate of 97.85%. The personal information of the respondents is shown in "Table I".

TABLE I. PERSONAL INFORMATION OF RESPONDENTS

	Total	Proportion (%)
<b>Respondents</b>	2422	
Male	1299	53.63
Female	1123	46.37
<b>Grade level</b>		
Fresh year	1310	54.09
Sophomore	1059	43.72
Junior	42	1.73
Senior	11	0.45

### III. RESEARCH RESULTS

#### A. Physical activities of college students in China against the background of COVID-19

The results showed that among the 2,422 college students interviewed, more than half (1,379, 56.94%) were affected by the COVID-19 epidemic. During the period, the majority of college students (2009, 82.95%) chose "home-based exercise" as the means of physical activity, while another 6.52% resorted to "exercise in open places" because of their preference for outdoor environment, regular exercise habit and better exercise effect. There was no gender difference between the two types of exercise. In addition, 140 people (5.78%) "gave up their usual exercise habits" due to COVID-19, as shown in "Table II". Among college students who do

"home-based exercise", the main content of exercise is "mixed" exercise such as aerobics, strength and stretching. But in the "outdoor exercise" group, the main aerobic exercise is running.

TABLE II. PHYSICAL ACTIVITIES OF COLLEGE STUDENTS IN CHINA AGAINST THE BACKGROUND OF COVID-19

Physical activities	Number of people	Proportion (%)
Home-based exercise	2009	82.95
Empty places	158	6.52
Give up the usual exercise habits	140	5.78
No fitness habits	115	4.75
Total	2422	100.00

#### B. Amount of exercise of college students in China against the background of COVID-19

A classic symptom of COVID-19 is an upper respiratory infection (URI). Previous studies have found a strong relationship between the risk of URI during physical activity and the intensity [1] and amount [2] of exercise. Among the college students surveyed, up to 93.19% believe that exercise can improve immunity. But when asked what intensity and time of exercise would boost the immune system to its optimal state, only 76.89% of college students said "moderate intensity, about 30 minutes". There was a cognitive gap, with only 56.69 percent of those who exercised consistently meeting the criteria. However, in the two groups of "home-based exercise" and "exercise in open place", there was a significant difference in the proportion of 50.39% and 76.76% who could reach the standard of "moderate intensity, about 30 minutes". Individually, there was no significant difference in the proportion of "moderate intensity" achieved between the two groups, but there was a significant difference in exercise time, as shown in "Table III". This indicates that outdoor exercise can better meet the standard of improving immunity than home exercise because of exercise time.

TABLE III. EXERCISE TIME OF TWO EXERCISE GROUPS FOR COLLEGE STUDENTS IN CHINESE COLLEGES AND UNIVERSITIES AGAINST THE BACKGROUND OF COVID-19

Exercise time	Home-based exercise		Exercise in open place	
	Number of people	Percentage (10%)	Number of people	Percentage (10%)
30 minutes or less	989	49.23	21	13.29
30-60 minutes	860	42.81	66	41.77
60 minutes or more	160	7.96	71	44.94
Total	2009	100.00	158	100.00

#### C. Motivation of college students' physical activities in China against the background of COVID-19

A survey of college students in two categories, "home-based exercise" and "exercise in open places",

shows that the top four motivations for college students to take part in sports activities are, in order, improving their immunity, keeping healthy, achieving good sports effects and killing leisure time. The proportions are 71.71%, 67.56%, 61.19% and 35.12%, respectively (see

"Table IV"). There were differences in physical activity motivation between the two groups. People who exercised at home were most motivated to "improve their immunity," while those who exercised outdoors were most motivated to "stay healthy."

TABLE IV. MOTIVATION OF CHINESE COLLEGE STUDENTS TO PARTICIPATE IN PHYSICAL ACTIVITIES AGAINST THE BACKGROUND OF COVID-19

Motivation	Number of people	Proportion (%)
Professional fitness instruction	399	18.41
Favorable exercise effect	1326	61.19
Keep healthy	1464	67.56
Improving immunity	1554	71.71
Killing leisure time	761	35.12
Communicate with family and friends	368	16.98
Other	78	3.60
Total	2167	100.00

*D. Factors that impede physical activity of college students in Chinese colleges and universities against the background of COVID-19*

Although 89.47 percent of college students still insist on physical exercise, more than half of the population's exercise habits have been swayed. When analyzing the obstacle factors, the authors found that the biggest problems affecting exercise were "no suitable place and equipment", "no one urged me and no partner, so It was difficult to insist" and "no knowledge of exercise", as shown in "Table V". According to the survey of 5.78% of college students who have given up their daily exercise habits, the lack of fitness conditions in their families, the stipulation that they cannot leave home and the dislike of home-based exercise are the most important factors. It indicates that the lack of motivation, supervision and internalized fitness knowledge from the external environment has become an obstacle to the physical activities of college students during the period.

TABLE V. OBSTACLES TO COLLEGE STUDENTS' PHYSICAL ACTIVITIES IN CHINA DURING THE COVID-19 PERIOD

Obstacle factors	Number of people	Proportion (%)
There is too much pressure to study and no time	513	22.48
No knowledge of exercise	549	24.06
No suitable place and equipment	1178	51.62
Negative perception of physical activity	69	3.02
No one urged me and no partner, so it was difficult to insist	835	36.59
Other	45	1.97
Total	2282	

**IV. ANALYSIS AND DISCUSSION**

*A. The COVID-19 epidemic has affected the physical activities of most college students in China*

China has taken strict anti-epidemic measures in response to the outbreak. In the worst phase of the epidemic, the vast majority of people were not allowed to go outside, and college students were no exception. The way of physical activities of college students has been forced to change. Just as the authors investigated, 56.94% of college students' sports habits have been affected, and "home-based exercise" has become the first choice for most college students in China. Therefore, the physical education courses should provide more content suitable for home-based exercise, and develop more content that makes use of furniture and common tools at home for physical exercise, so that students can take exercise conveniently with the equipment at home. In addition, for college students who do not like home-based exercise but give up the habit of exercise, attention should be paid to its fun, such as adding courses suitable for family members to exercise together.

*B. Improving immunity has become the main motivation for Chinese college students to exercise against the background of COVID-19*

Prevention is particularly important given that novel coronavirus vaccines and drugs are not yet available. The ideal precaution at this stage is to stay at home, which can easily lead to sedentary behavior. Studies have shown that sitting and sedentary practice reduce the body's immunity [3]. Novel coronavirus will favor those with weakened immune systems. Numerous studies have also demonstrated a close relationship between exercise and immunity [4] [5] [6]. Thankfully, college students also have a clear understanding of this. According to the survey data, 71.71% of college students engaged in sports during the epidemic stage for "improving immunity". Therefore, the physical education courses of colleges and universities should give play to their own advantages and take improving the immunity of college students as one of the responsibilities at the present stage.

*C. Lack of exercise time is the main reason why Chinese college students are unable to meet the maximum immunization standard against the background of COVID-19*

A study from the School of Medicine, University of California, San Diego found that even a moderate amount of exercise for 20 minutes can boost the immune system, triggering an anti-inflammatory response in cells that improves immunity [7]. However, long, intense workouts can backfire [8]. Another animal study found that mice with influenza virus had

significantly higher survival rates after 30 minutes of moderate exercise than those who were sedentary or physically active for a long while [9]. So Professor Woods suggests that 30 minutes of moderate intensity exercise is appropriate during an outbreak [10]. The authors' research shows that the percentage of people who know about it is higher than the percentage who can actually do it. The same is true of "home-based exercise", making it harder to meet this immunization standard. Among the two subtypes of exercise intensity and exercise time, the lack of exercise time is the main reason why it is difficult for Chinese college students to reach the maximum immunization standard. Therefore, to improve students' immunity, the physical education courses in colleges and universities should follow the principle of "immunity optimization" and arrange the amount of exercise within certain range for best immune status.

*D. The lack of external help and supervision has become a factor hindering the exercise of college students in China in the context of COVID-19*

Under COVID-19, college students are prone to unhealthy psychological tendencies due to their long stay at home, confined space, fixed group of communicators, the unknown situation of the epidemic and their worries about academic performance. The survey showed that 55.34 percent of college students experienced anxiety, 45.38 percent depression, and 35.21 percent irritability. The solution of unfavorable psychological tendency of college students requires various efforts, and appropriate physical activities has a positive role in promoting mental health, which has been recognized by everyone [11]. However, the authors' survey reveals that many college students fail to do regular exercise, and 5.78% of them "give up their usual exercise habit" due to the pandemic. As for the obstacle factors, the external factors and the lack of supervision, such as "there is no proper place and equipment", "it is difficult for me to insist without any supervision or companion", have become the biggest factors affecting the exercise of college students in China. Therefore, the physical education courses should also serve as "supervisor", "companion" and "psychological mentor", attach importance to the guidance of extracurricular exercise, and incorporate the extracurricular exercise of college students into the management of the course with the popular way of "clocking in" now.

## V. CONCLUSION AND RECOMMENDATION

### A. Conclusion

In the context of COVID-19, the majority of college students in China take exercise at home, accounting for 82.95% of the respondents. However, only 56.69% of those can reach the exercise standard of the optimal

immunity state, far lower than those who take exercise outdoors, mainly because of the lack of exercise time. Through investigation, the study found that the main motivation for Chinese college students to take part in physical activities at this stage was "to improve their immunity" and "to keep healthy". 93.19% of college students believed that exercise could improve their immunity, but 10.53% of them had never taken physical exercise during the period. The factors that hamper college students from physical activities in the stage are lack of motivation, supervision and internalized fitness knowledge from the external environment.

### B. Recommendation

In the context of COVID-19, the physical education courses should be adjusted as follows: first, more courses suitable for home-based exercise should be provided, and courses that utilize furniture and common household tools for physical exercise should be developed, so that students can exercise conveniently with home equipment. In addition, the fun of home-based exercise should be enhanced for those who give up exercise because of their dislike to home-based exercise, and the content suitable for family members to exercise together should also be added. Secondly, it should be the responsibility of current physical education courses to improve the immunity of college students, follow the principle of "immunity optimization", and arrange the amount of exercise within the range for best immune status. Thirdly, physical education courses should serve as "supervisor", "companion" and "psychological mentor", encourage extracurricular exercise, and include extracurricular exercise into the course management with the help of the popular "clocking in" method.

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