The Impact of COVID-19 on College Students' Physical Activity: A Protocol for Systematic Review and Meta Analysis

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Study protocol

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Abstract

Background: We aimed to conduct a meta-analysis to assess the impact of coronavirus disease 2019 (COVID-19) on college students' physical activity.

Methods: All cohort studies, comparing college students undertaking physical exercise at school before the COVID-19 pandemic and physical exercise at home during the COVID-19 pandemic will be included in this review. We will use index words related to college students, physical exercise and COVID-19 to perform literature searches in PubMed, Medline, Embase and CNKI databases, to include articles indexed as of June 20, 2021 in English and Chinese language. Two reviewers will independently select trials for inclusion, assess trial quality and extract information for each included trials. Primary outcomes are exercise frequency, duration and intensity and associated factors. Based on Cochrane assessment tool, we will evaluate the risk of bias of the included studies. Revman 5.3 will be used for heterogeneity assessment, data synthesis, subgroup analysis, sensitivity analysis and generating funnel-plots.

Discussion: The stronger evidence about the impact of COVID-19 on college students' physical activity will be provided, so as to better guide teaching practice.

Systematic review registration: PROSPERO CRD42021262390.

1. Background

The coronavirus disease 2019 (COVID-19) is a global pandemic[1] leading to a global shutdown that closed schools for months[2, 3]. In many nations, schools were closed to students[4], and teachers directed educational activities remotely via digital devices or homeschooling resources[5]. However, different from exercising at school, home exercise during the COVID-19 pandemic was affected by various factors[6, 7], such as limited venues, family sports atmosphere and incomplete equipment, college students' physical activity was difficult to reach the school requirements[8–11].

To promote college students' active participation in physical exercise and provide reference for the teaching practice, we aim to conduct a meta-analysis of cohort studies to assess the impact of COVID-19 on college students' physical activity.

2. Methods

2.1 Registration

We have registered this protocol on the International Prospective Register of Systematic Reviews (PROSPERO) in July 1 as CRD42021262390. In this paper, we will perform the protocol according to the Cochrane Handbook for Systematic Reviews of Intervention and Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) guidance[12, 13].

2.2. Inclusion criteria for considering studies

2.2.1. Types of studies

All cohort studies, comparing college students undertaking physical exercise at school before the COVID-19 pandemic and physical exercise at home during the COVID-19 pandemic will be included in this review.

2.2.2. Types of participants

College students, grade 1–4.

2.2.3. Types of interventions

The impact of COVID-19 on college students' physical activity.

2.2.4. Types of outcome assessments

Any available information about the impact of COVID-19 on college students' physical activity will be assessed. Primary outcomes are exercise frequency, duration and intensity and associated factors.

2.3. Search strategy

We will use index words related to college students' physical activity and COVID-19 to perform literature searches in PubMed, Embase, Medline and CNKI databases, to include articles indexed as of June 20, 2021 in English and Chinese language. The key search terms will be used are ["Exercises" OR "Physical Activity" OR "Activities, Physical" OR "Activity, Physical" OR "Physical Activities" OR "Exercise, Physical" OR "Exercises, Physical" OR "Physical Exercise" OR "Physical Exercises" OR "Acute Exercise" OR "Acute Exercises" OR "Exercise, Acute" OR "Exercises, Acute" OR "Exercise, Isometric" OR "Exercises, Isometric" OR "Isometric Exercises" OR "Isometric Exercise" OR "Exercise, Aerobic" OR "Aerobic Exercise" OR "Aerobic Exercises" OR "Exercises, Aerobic" OR "Exercise Training" OR "Exercise Trainings" OR "Training, Exercise" OR "Trainings, Exercise" AND "2019 novel coronavirus disease" OR "COVID19" OR "COVID-19 pandemic" OR "SARS-CoV-2 infection" OR "COVID-19 virus disease" OR "2019 novel coronavirus infection" OR "2019-nCoV infection" OR "coronavirus disease 2019" OR "coronavirus disease-19" OR "2019-nCoV disease" OR "COVID-19 virus infection"]

2.4. Data collection

2.4.1. Selection of studies

Two reviewers will select trials for inclusion independently. We will exclude articles if they meet any of the following criteria: (1) the object is not college students; (2) fewer than 10 students; (3) studies not comparing college students undertaking physical exercise at school before COVID-19 pandemic undertaking physical exercise at home during COVID-19 pandemic. The process of study selection is shown in Fig. 1.

2.4.2. Data and information extraction

Two authors will extract general information independently for each included trial, including the name of first author, year, country, design, sample size, average age and sex ratio. The third author will check all the data.

In the same manner, we will extract data for impact assessments. For each study, we will extract the following information: exercise frequency, duration and intensity and associate factors. We will resolve disagreements by discussion.

2.5. Assessment of risk of bias

The review authors will independently assess the quality of the trials included in the review, in accordance with Chap. 8 of the Cochrane Handbook for Systematic Reviews of Interventions (Higgins 2011), by (1) allocation concealment (selection bias), (2) blinding (performance bias and detection bias), (3) blinding of participants and personnel (performance bias), (4) blinding of outcome assessment (detection bias), (5) incomplete outcome data (attrition bias), (6) selective reporting (reporting bias), and (7) other bias. The fifth author will check all the data. We will use this information to evaluate quality and resolve disagreements by discussion until consensus is reached.

2.6. Data analysis

2.6.1. Assessment of heterogeneity

We will use chi-square test and I^2 statistic to assess heterogeneity. If the heterogeneity is in the acceptable range ($P > 0.10$, $I^2 < 50\%$), the fixed effect model shall be used for data analysis; otherwise, the random effect model will be used.

2.6.2. Data synthesis.

Two authors will extract information independently for each included trial. The third author will check all the data. Review Manager 5.3 will be used to assess the risk of bias, heterogeneity, sensitivity and subgroup analysis. We will calculate a weighted estimate across trials and for the interpretation of the results. $P < 0.05$ will be considered statistically significant.

2.6.3. Subgroup analysis

We will do the following subgroup analysis to explore the possible causes of high heterogeneity: (1) grade (1, 2, 3 and 4); (2) gender (male and female) and (3) different counties.

2.6.4. Sensitivity analysis.

Sensitivity analysis will be conducted by excluding trials one by one and observe whether the synthesis result changes significantly. If there are significant changes, we will cautiously make a decision to decide whether to merge it. If there is little change, it indicates that our synthesized result is firm.

2.7. Assessment of publication bias

If more than 10 articles are available for analysis, funnel plots will be generated to assess publication bias. A symmetrical distribution of funnel plot data indicates that there is no publication bias, otherwise, we will analyze the potential reasons for this outcome and give reasonable interpretation for asymmetric funnel plots.

2.8. Confidence in cumulative evidence

The Grades of Recommendations Assessment, Development and Evaluation (GRADE) system will be used to assess the quality of our evidence[14]. According to the grading system, the level of evidence will be rated high, moderate, low and very low.

3. Discussion

COVID-19 is an emerging, rapidly evolving situation that leading to a global shutdown[15]. Schools were closed for months and students took online courses at home[16, 17]. It was very important to pay attention to the physical and mental health of students and to guide students to strengthen exercise. Teachers encouraged students to do physical exercise through various methods such as online physical education, assigning exercise assignments and cloud competitions. However, home physical exercises rely more on students' independent practice, and teachers lack effective monitoring[18]. The physical exercise of college students at home may not be able to meet the standards[19, 20].

By conducting a meta-analysis of related cohort studies, we will provide the impact of COVID-19 on college students' physical activity, so as to better guide teaching practice.

4. Abbreviations

COVID-19 = coronavirus disease 2019, GRADE = Grades of Recommendations Assessment, Development and Evaluation, PRISMA-P = Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols, PROSPERO = International Prospective Register of Systematic Reviews.

5. Declarations

Ethics approval and consent to participate

There is no need for ethical approval, and the review will be reported in a peer-reviewed journal.

Consent for publication

Not applicable.

Availability of data and materials

All the data pertaining to the present study are willing to share upon reasonable request.

Competing interests

No conflicts of interest have been declared.

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Authors' contributions

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Funding acquisition: Yunxia Ding.

Investigation: Yunxia Ding, Song Ding and Jiali Niu.

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Software: Yunxia Ding and Jiali Niu.

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Writing – review and editing: Yunxia Ding, Song Ding and Jiali Niu.

Approval – Yunxia Ding, Song Ding and Jiali Niu.

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Figures

Figure 1

Flow diagram of the study selection process. From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

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