(Protocol) Preferred Reporting Items for Resistance Exercise Studies (PRIRES): An Umbrella Review of Systematic Reviews, Guidelines, and Position Stands for Item Extraction

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Protocol

Abstract

Background

The issues of replication and scientific transparency have been raised in exercise and sports science research. A potential means to address the replication crisis and enhance research reliability is to improve reporting quality and transparency. This study aims to formulate a reporting checklist as a supplement to the existing reporting guidelines, specifically for resistance exercise studies.

Methods

Systematic reviews/meta-analyses, guidelines, and position stands related to resistance exercise since inception will be searched in PubMed and Scopus. Only studies published in English will be included. Two authors will independently screen titles/abstracts and then full-text articles against the inclusion criteria. Basic data will be extracted by the same two authors independently. The same two authors will independently extract items from systematic reviews, guidelines, and position stands that could potentially influence training efficiency, physiological/psychological functions, other health-related variables, or replication. Summaries of the findings and items extracted from the included systematic reviews/meta-analyses and included position stands or guidelines will be presented as tables. Using items adapted from the existing checklist Consensus on Exercise Reporting Template (CERT), a preferred reporting checklist for resistance exercise studies will be formulated. The protocol for this study was developed according to the reporting checklist for umbrella reviews published by Onishi and Furukawa in 2016.

Discussion

The proposed study is expected to build a reporting checklist with a high level of evidence, which can improve the reporting quality of future resistance exercise studies.

Ethics and dissemination

Approval from a human/animal research ethics committee is not required. The findings of the proposed study will be disseminated through conference presentations, our lab's website in plain language, and, if possible, letters to the editor in peer-reviewed journals related to sport and exercise science.

Registration

This study is registered with the EQUATOR Network under the title "Preferred Reporting Items for Resistance Exercise Studies (PRIRES)." PROSPERO registration number: CRD42021235259.

Background

Rationale

The issues of replication and scientific transparency have been raised in many research fields including psychology [1], social science [2], neuroscience [3], and medicine [4, 5]. Problems pertaining to reliability have also been raised in exercise and sports science research [6, 7]. Potential means to address the replication crisis and enhance research reliability include trial registration [8], publishing the protocol before data collection, the two-stage review process (Registered Reports) [8, 9], a results-free peer review [10], decreasing the risk of bias [9], increasing sample sizes [3, 7, 11], conducting replication studies [1, 2, 6], and improving reporting quality and transparency [6, 8, 12-14].

Although the Consolidated Standards of Reporting Trials (CONSORT) [12, 13] and Consensus on Exercise Reporting Template (CERT) [14] have been published to enhance the reporting quality of randomized controlled trials (RCTs) and exercise interventional studies, respectively, a supplementary preferred reporting items checklist can further improve the reporting quality of resistance exercise studies. For instance, there were concerns regarding the reported resistance exercise method and program of seven of the 11 studies summarized in our previous studies (Lin, Chueh & Hung, in press). Specifically, of these seven studies, three failed to report basic items related to resistance exercise, i.e. repetition, intensity, and rest intervals. In addition, some items regarding the resistance exercise such as the rest interval between sets and exercises and the order of exercises, which had been reported in our previous studies (Lin, Chueh & Hung, in press), are not fully covered by the CONSORT [12, 13] and CERT [14] checklists. Thus, a supplementary reporting checklist for resistance exercise studies can be beneficial to future research.

To overcome the limitations of the Delphi technique, which has been used to develop existing reporting checklists such as CONSORT [15] and CERT [16], an umbrella review will be applied in this study. The Delphi technique was first proposed by Norman Dalkey and Olaf Helmer in the 1950s to develop consensus among experts [17]. Although it can provide some information, it suffers from several methodological disadvantages that can be avoided using the newer technique of umbrella review. An umbrella review is a tertiary research design (in contrast to primary research such as RCTs and secondary research such as systematic reviews) that emerged at the beginning of the 21st century [18]. This design enables systematic data collection and synthesis on a broad issue, which is impractical for a traditional systematic review. Following are several major comparisons between these two research methods regarding that are of consequence to our study. First, expert opinions in the Delphi technique are ranked the lowest [19] in the evidence hierarchy, as opposed to the umbrella review wherein they are considered the highest [20]. The Delphi technique has been recommended to be used only for those research questions for which the evidence level is low due to the lack of a more scientific instrument [21]. Second, concerns have been raised that the Delphi technique is not fully "systematic," which leads to consequent problems. For instance, Humphrey-Murto and de Wit criticized the Delphi method for the ambiguity of its methodology, poor reporting quality, and the presence of little to no empirical evidence to support best practices in the consensus development stages [22]. Third, regarding the advantages of the proposed checklist, as a supplement to CONSORT it will need to be updated regularly and timely for it to function optimally. The feasibility of rapidly developing and updating an umbrella review will be an advantage over the time-consuming Delphi technique. A detailed discussion of the pros and cons of the Delphi

technique is beyond the scope of this protocol. An integrative introduction to the umbrella review has been edited by Biondi-Zoccai [18]. The limitations of the Delphi technique in methodology, process, results, and conclusion have been reviewed by Vernon [23], and the disadvantages of this technique, including researcher bias and shortcomings, unethical behavior caused by anonymity, and debates over the method rather than the topic, have been discussed by Avella [24].

Objective

Develop a reporting checklist to supplement the existing reporting guidelines, including CONSORT [12, 13] and CERT [14], specifically for resistance exercise studies.

Methods

Criteria

Inclusion criteria for systematic reviews: 1. All steps of the reviewing processes such as search strategy and inclusion/exclusion criteria are explicitly and clearly defined. 2. The primary studies of the systematic review are exercise interventional studies. In addition to systematic reviews, guidelines and position stands related to resistance exercise training will also be included.

Search strategies and information sources

Two categories of data will be extracted: data from (1) systematic reviews/meta-analyses that investigated the effects of different resistance exercise parameters such as the types of resistance exercise and training frequency, and from (2) position stands or guidelines related to resistance exercise.

Systematic reviews/meta-analyses, guidelines, and position stands will be searched in PubMed and Scopus using the following keywords:

"resistance exercise*" or "resistance train*" or "weight exercise*" or "weight train*" or "weight bear*" or "weight-bear*" "weightlift" or "weight lift*" or "strength train*" or "strength exercise*" or "power train*" or "power exercise" or "explosive exercise*" (in Title/Abstract)

AND

systematic* or meta* or statement* or guideline* or stand* (in Title)

The search syntax is outlined below.

Scopus:

[TITLE-ABS ("resistance exercise*" OR "resistance train*" OR "weight exercise*" OR "weight train*" OR "weight bear*" OR "weight-bear*" OR "weightlift*" OR "weight lift*" OR "strength train*" OR "strength exercise*" OR "power train*" OR "power exercise" OR "explosive exercise*") AND TITLE (systematic* OR meta* OR statement* OR guideline* OR "position stand*" or recommend*)]

PubMed:

("resistance exercise*" [Title/Abstract] OR "resistance train*" [Title/Abstract] OR "weight exercise*" [Title/Abstract] OR "weight train*" [Title/Abstract] OR "weight bear*" [Title/Abstract] OR "weight-bear*" [Title/Abstract] OR "weightlift*" [Title/Abstract] OR "weight lift*" [Title/Abstract] OR "strength train*" [Title/Abstract] OR "strength exercise*" [Title/Abstract] OR "power train*" [Title/Abstract] OR "power exercise" [Title/Abstract] OR "explosive exercise*" [Title/Abstract]) AND (systematic* [Title] OR meta* [Title] OR statement* [Title] OR guideline* [Title] OR "position stand*" [Title] or recommend* [Title])

Limitation

Date: no limitation

Language: English

Review selection process

The authors TYL and TYC will independently screen the titles and abstracts yielded by the search against the selection criteria. The authors will conduct full-text screenings if the titles and abstracts appear to meet the criteria or there is any uncertainty. Any inconsistency between the two authors will be discussed; if the disagreement cannot be resolved, we will consult the author TMH.

Data extraction and management

Relevant titles and abstracts identified from PubMed and Scopus will be loaded into Microsoft Excel to remove duplicates and then be screened. The reference lists of articles whose full texts are screened will be uploaded to Endnote software.

Data included

Systematic reviews

Basic data including identifier and publication year, PICO, dates covered by the literature search, number of included primary studies and participants, as well as the overall pooled effect estimate with 95% confidence interval for the primary outcome, will be extracted by TYL and TYC independently [18].

Guidelines and position stands

Identifier, publication year, and the name of the organization that published the guideline or the position stand will be extracted by the same two authors independently.

Quality, overlap, and discordance of included reviews

The quality of reviews will not be judged and issues regarding overlap and discordance will not be resolved because these are beyond the scope of the proposed umbrella review. These issues shall be discussed in other umbrella reviews or tertiary studies.

Item extraction

Items such as training parameters from systematic reviews, guidelines, and position stands, which could potentially influence training efficiency, physiological/psychological functions, other health-related variables, and replication, will be extracted by TYL. For example, if a systematic review reports that training frequency significantly influenced the participants' health outcomes such as quality of life, then the parameter training frequency will be extracted from this review. In addition, items from CERT, a previously published reporting template for exercise interventional studies, will be adapted if applicable.

Outcomes

There will be two categories of extracted data:

(1) Summary of findings and items extracted from the included systematic reviews/meta-analyses.

(2) Summary of items extracted from the included position stands and guidelines.

We will provide information collected from the included studies in text and table formats. Items from both categories will be combined with those adapted from CERT to build a reporting checklist for resistance exercise studies.

Reporting

The introduction and method of this protocol are developed according to the reporting checklist for umbrella reviews published by Onishi and Furukawa in 2016 [25], which was developed based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [26] and A Measurement Tool to Assess Systematic Reviews (AMSTAR) [27]. Preferred Reporting Items for Overviews of Reviews (PRIOR) was under development when this protocol was constructed [28]. If PRIOR is completed and becomes available while we prepare the manuscript resulting from the proposed study, we will consider

using this newer reporting guideline. Otherwise, the checklist and recommendations by Onishi and Furukawa [25] will be continued to use.

Discussion

Strengths and Limitations

- This study will construct a reporting checklist as a supplement to the existing CONSORT and CERT reporting guidelines, specifically for resistance exercise studies.
- A preferred reporting items checklist developed using umbrella review methods promises to be more systematic and provide a higher level of evidence than those developed using the Delphi technique.
- As an umbrella review, this study will include not only systematic reviews but also guidelines and position stands for item extraction.
- Only systematic reviews, guidelines, and position stands published in English will be included.

Conclusion

As an umbrella review, the proposed study will build a reporting checklist with a high level of evidence by using a systematic development process that will make future updates timelier and more feasible. This checklist is expected to improve the reporting quality of future resistance exercise studies.

Abbreviations

PRIRES: Preferred Reporting Items for Resistance Exercise Studies
CERT: Consensus on Exercise Reporting Template
CONSORT: Consolidated Standards of Reporting Trials
RCT: Randomized Controlled Trial
AMSTAR: A Measurement Tool to Assess Systematic Reviews
PRIOR: Reporting Items for Overviews of Reviews

Declarations

Ethics and dissemination

This study will conduct tertiary-level research that will involve neither human participants nor animal subjects. Thus, approval from a human/animal research ethics committee is not required. We will publish the final report in a peer-reviewed journal, preferably in an open-access format. The findings will also be disseminated through conference presentations, our lab's website in plain language, and, if possible, letters to the editor in peer-reviewed journals related to sport and exercise science.

Registration

This study is registered with the EQUATOR Network and is available at https://www.equator-network.org/library/reporting-guidelines-under-development/reporting-guidelines-under-development-for-clinical-trials/#PRIRES

The protocol is registered with the PROSPERO (CRD42021235259).

Ethics approval and consent to participate

Not required.

Consent for publication

Not required.

Availability of data and materials

None. No data have been collected.

Competing interests

None declared.

Funding

None declared.

Authors' contributions

TYL (lead author) conceived and designed the protocol of this study and is the guarantor of and person responsible for writing the protocol. TYC was responsible for study design and provided suggestions regarding the literature search strategy and the method. TMH is the adviser when there was any disagreement between the first two authors that could not be solved by discussion and was responsible for reviewing the protocol. All authors have contributed to drafting the protocol and approving the final version.

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Patient consent for publication

Not required.

Patient and public involvement

No patient involved.

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