

Supplementary material. Systematic search

The systematic search was performed in accordance with the reporting requirements of the PRISMA statement [1]. The search strategy was used to determine the proportion of quartile one (Q1) ‘sports science’ articles in 2019 sharing data and/or code.

Method

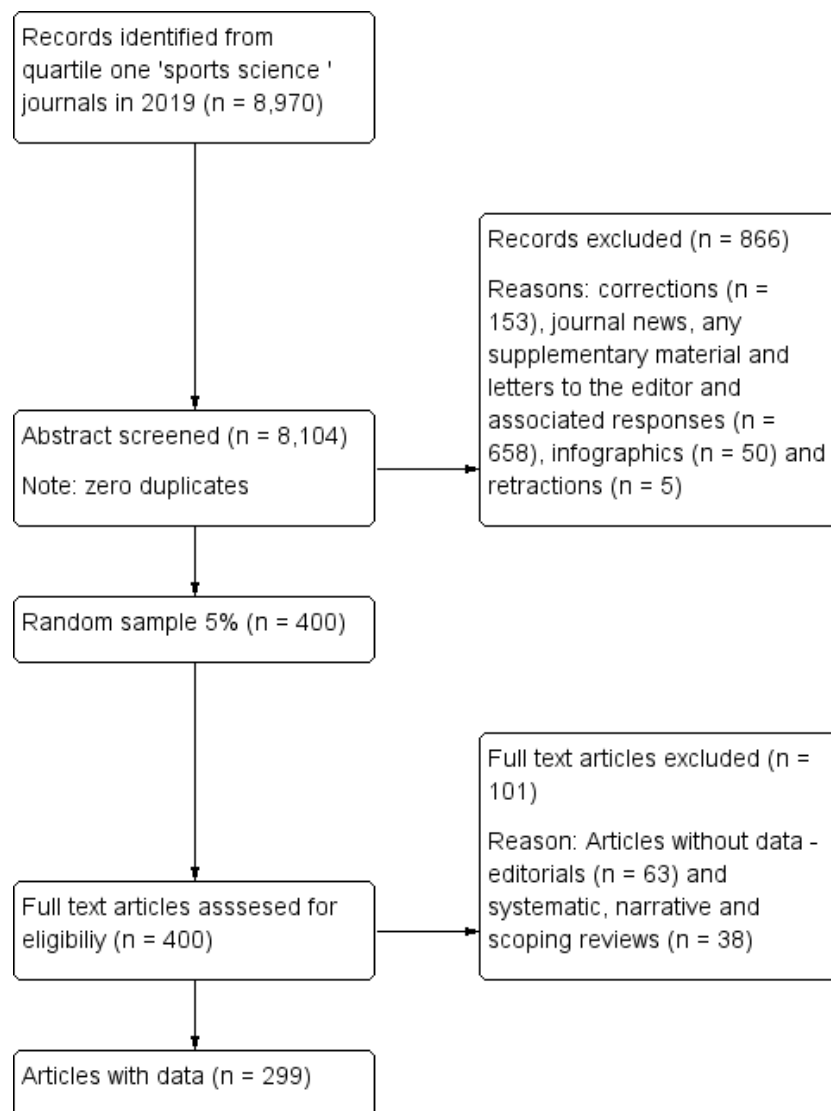
Articles published in Q1 journals for the category of ‘sports science’ in 2019 were studied. A list of Q1 journals was sourced from Scimago [2] and all 2019 articles from these 31 journals were exported from Scopus [3]. All articles with data were considered, including meta-analyses where values were transcribable from forest plots. Of the articles identified for full text screening, 5% were sampled, at random, for survey. Data extraction included: (a) whether data was shared; (b) the release of code/syntax; (c) the inclusion of a data available upon request statement; and (d) the type of statistical software used for the analysis. A data availability statement was considered not applicable for articles sharing data. Findings are reported as the proportion and 95% confidence interval (CI). Confidence intervals were calculated using the Clopper-Pearson method for the binomial distribution [4] via the ‘binom’ package [5] in R (version 3.5.0).

Results

A total of 8,970 articles were initially extracted (Figure 1). Of the 400 articles selected at random, 299 included data (Supplementary Figure 1). Because the 31 journals publish research across multiple subdisciplines, the 299 eligible articles were classified as belonging to sport and exercise science (including physiology and exercise physiology), sports medicine or rehabilitation (Supplementary Table 1). The proportion of articles sharing data was 4.3%, with an additional 1.7% including a data available upon request statement (Supplementary Table 1). Of the articles that shared data, most (8/13) were meta-analyses. No surveyed articles shared code/syntax. These results were similar across the subdisciplines of sport and exercise science and sports medicine (Supplementary Table 1). The preferred software was Statistical Package for the Social Sciences (SPSS). Approximately one-fifth of the surveyed articles failed to report the software used for analysis (Supplementary Table 1).

Conclusion

The proportion of surveyed articles published in Q1 'sports science' journals in 2019 sharing data was extremely low. Worryingly, 4.3% may be an overestimate, as the majority of articles sharing data were meta-analyses, where data was transcribable rather than supplied. None of the sampled articles shared code. Notably, this finding could be explained by the click-and-press nature of researchers preferred statistical software, SPSS. Although data availability statements were also uncommon, it does not necessarily mean that authors were unwilling to share data/code if contacted. The review findings show that the vast majority of sport science publications do not share data and/or code. The failure to share these materials is a substantial barrier to transparency and reproducibility in sport and exercise research.



Supplementary Figure 1. Flowchart of the article search and inclusion.

Supplementary Table 1. The proportion of 2019 articles published in quartile one ‘sports science’ journals sharing data and code, or indicating data availability upon request, and the types of statistical software used in these articles. Proportions are also reported for the subdisciplines of sport and exercise science, sports medicine and rehabilitation.

Discipline/ subdiscipline	All eligible articles (n = 299)	Sport and exercise science † (n = 148/299)	Sports medicine (n = 137/299)	Rehabilitation (n = 14/299)
<i>Analytical material</i>				
Sharing data	13/299 4.3% [2.3 to 7.3]	8/148 5.4% [2.4 to 10.4]	5/137 3.6% [1.2 to 8.3]	0/14 0.0%
Sharing code	0/298 0.0%	0/148 0.0%	0/136 0.0%	0/14 0.0%
Data available upon request ‡	5/286 1.7% [0.6 to 4.0]	2/140 1.4% [0.2 to 5.1]	3/132 2.3% [0.5 to 6.5]	0/14 0.0%
<i>Statistical software</i>				
R	25/298 8.4% [5.5 to 12.1]	10/148 6.8% [3.3 to 12.1]	15/136 11.0% [6.3 to 17.5]	0/14 0.0%
SAS	18/298 6.0% [3.6 to 9.3]	4/148 2.7% [0.7 to 6.8]	13/136 9.6% [5.2 to 15.8]	1/14 7.1% [0.2 to 33.9]
SPSS	127/298 42.5% [36.8 to 48.3]	72/148 48.6% [40.0 to 57.0]	52/136 38.2% [30.0 to 47.0]	3/14 21.4% [4.6 to 51.0]
Stata	19/298 6.3% [3.9 to 9.7]	6/148 4.1% [1.5 to 8.6]	7/136 5.1% [2.1 to 10.3]	6/14 42.9% [17.7 to 71.1]
Other §	46/298 15.4% [11.4 to 20.0]	29/148 19.6% [13.5 to 26.9]	15/136 11.0% [6.3 to 17.5]	2/14 14.3% [1.8 to 42.8]
Not stated	64/298 21.4% [16.9 to 26.5]	27/148 18.2% [12.4 to 25.4]	35/136 25.7% [18.6 to 33.9]	2/14 14.3% [1.8 to 42.8]

Note. Proportions are reported as the mean and 95% confidence interval. SAS = Statistical Analysis System; SPSS = Statistical Package for the Social Sciences.

† Includes research in the subdisciplines of physiology and exercise physiology.

‡ Data availability statements were considered not applicable for articles that shared data.

§ Other: BioEstat, Excel, EasyMedStat, GraphPad Prism, Jeffreys's Amazing Statistics Program (JASP), JMP from SAS, Linear Structural Relations (LISREL), MATrix LABORatory (MATLAB), meta-analysis software (e.g., Review Manager; RevMan), MLwiN, MPlus, NVivo, online calculators or spreadsheets, Python, SigmaPlot, Spike, Statistica and WinBUGS.

References

- [1] Moher D. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *Ann Intern Med.* 2009;151(4):264–269.
<https://doi.org/10.7326/0003-4819-151-4-200908180-00135>
- [2] Journal Rankings on Sports Science. Accessed March 2020. Available from:
<https://www.scimagojr.com/journalrank.php?category=3699&year=2018>
- [3] Scopus. Journal Rankings on Sports Science. Accessed March 2020. Available from:
<https://www.scopus.com/sources>
- [4] Clopper CJ, Pearson ES. The use of confidence or fiducial limits illustrated in the case of the binomial. *Biometrika.* 1934;26(4):404–413.
<https://doi.org/10.1093/biomet/26.4.404>
- [5] Dorai-Raj S. binom: Binomial confidence intervals for several parameterizations. R Package ‘binom’ version 1.1-1. 2014. <https://cran.r-project.org/web/packages/binom/binom.pdf>