Call for open science in sports medicine

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A NEED FOR GREATER INTERNATIONAL COLLABORATION AND TRANSPARENCY

Advances in science, and how it is performed, has evolved in recent decades. Science has moved from individualistic approaches, to a worldwide integrated process. This has been optimistically termed a ‘global college,’ with international collaboration now the standard.1 Scientific advances, most noticeably in computing power and data collection, have created quantities of data that would have been previously inconceivable.2 Sports medicine care has continued to evolve, but there is further clear opportunity to improve care decisions and provide trustworthy information, for our athletes.3 Concerted efforts to create an open science environment, can leverage the resources at our disposal, helping athlete health and performance. Open science enables data to be findable, accessible, interoperable and reusable to independently assess, reproduce and perform to permit new independent research.4 This editorial aims to contextualise the value of open science, specifically sharing data publication and distribution, to sports medicine clinicians and researchers and its contribution to evaluating the quality research.

AGGREGATED CLINICAL FINDINGS HAVE ADDED SOME VALUE BUT FURTHER PROGRESS IS NEEDED

For decades, the medical literature has been regarded as having generally poor methods,7 leading to inadequate conclusions.5,6 Systematic review and meta-analysis are assumed to provide the highest level of evidence to inform decisions. Although some practical questions have been answered, the majority of the meta-analyses have not come to identifiable conclusions. The information provided by a (well-conducted) meta-analysis is inevitably limited when the quality of the included studies is low (eg, due to poor data reporting and high risk of bias). Sports and exercise medicine has demonstrated a propensity for selective reporting, data dredging and under-powered analyses.7 Additionally, the ‘file drawer’ (bias towards publishing ‘significant’ findings) has further hampered the scientific literature. Concerted efforts have been initiated to help control these issues, including, individual participant data (IPD) meta-analyses and evidence-based guidelines for authors.8 However, the lack of author response and the barriers to obtaining IPD have hampered developments.5,6 Similarly, new publishing formats such as registered reports have been created to reduce publication bias, p-hacking and HARK’ing (hypothesising after the results are known). Unfortunately, registered reports are not allowed in most sports medicine journals.9

A CALL FOR OPEN SCIENCE

To remove barriers hindering research quality and athlete care, the sports medicine community needs to foster an open science environment. Open science is a process promoting transparency and accessibility that involves the entire research cycle, including open protocols, hypotheses, processing, data storage and publication. Open science also involves creating accessible data warehouses, open access codes and international cooperation where data sharing is standard practice.2 Open code and data has gained traction in physical and biological sciences, where open and accessible code and data are now a fundamental requirement.3 However, these scientific fields do not have to contend with protecting patient medical information.2,3 Recent requirements by the National Institute of Health and Wellcome Trust for researchers to provide open data demonstrate the importance and applicability in medical science,2,3 with specific strategies enacted to create open and accessible medical data in both private industry and academic institutions (table 1).2,4

PARTICULAR SPORT REQUIREMENTS NEED TO BE ACCOUNTED FOR

While general medical research has its competition and considerations,2 sports and exercise medicine has particular environmental and cultural concerns. Within elite sport, the pressure to win is substantial. The culture created around the fear of losing a competitive advantage leads to excessive secrecy. The competitive nature of sport must be accounted for, or open science uptake will not succeed. Particular organisational secrets, such as specific training or restoration techniques, scouting focused phenotypes or tactical plans, should not be shared. Greater care must be taken for data deidentification and redidentification, as many of these athletes are identifiable due to media coverage and fandom. However, basic athlete demographics, agreed on clinical tests and measures (eg, strength and range of motion) and athlete exposure data can be shared without relinquishing a competitive advantage, protecting athlete anonymity, and still providing a more robust understanding of athlete care.

THE VALUE OF OPEN SCIENCE FOR THE PRACTITIONER

The high stakes in elite sport make well-controlled experiments very difficult. Consequently, most sports medicine research has relied on observational studies from limited data sets. These studies not only lack the sample size needed to answer relevant research questions but also lack methodological rigour, increasing the risk of both type 1 and 2 errors. An open science framework can allow the reanalysis and combining of data, increasing sample size and external validity.

CONCLUSION

Open science in sports medicine gives medical researchers and practitioners a path forward to improve research transparency and athlete health. Open and accessible code and data allow fellow scientists to understand how data is structured, evaluate errors and update...
knowledge. Open science can improve evidence synthesis and accelerate research processes leading to reliable information that can improve patient/athlete care. Until a collaborative open science environment is integrated into sports medicine and embraced by sports organisations, we will continue to limit sports medicine’s potential.

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