**Title:** The translation of sport science research to the field: a current opinion and overview on the perceptions of practitioners, researchers and coaches

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**Authors:** Hugh H.K. Fullagar1,

Alan McCall2

Franco M Impellizzeri1

Terry Favero3

Aaron J Coutts1,

**Institutions:** 1 Sport & Exercise Discipline Group, Faculty of Health, University of Technology, Australia

2 Arsenal Football Club, London, United Kingdom

3 Biology Department, University of Portland, United States

**Corresponding author** 1 Hugh Fullagar

Sport & Exercise Discipline Group, Faculty of Health, University of Technology Sydney, Australia

Email:

Hugh.Fullagar@uts.edu.au

Phone: +61-2-95145240

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**ABSTRACT**

Evidence-based practice (EBP) is the collated integration of practitioner expertise, athlete values and research evidence aimed to optimise the decision-making process surrounding sport performance. Despite the academic interest afforded to sport science research, our knowledge of how this research is applied in elite sport settings is limited. This current opinion examines the existing evidence of the translation of sport science research into the field, with a tailored focus on the current perceptions of practitioners, researchers and coaches. Recent studies show that practitioners and researchers report they ascertain sport science knowledge differently, with coaches preferring personal interactions compared to coaching courses or scientific journals. The limited peer-reviewed research shows that coaches perceive their knowledge is greater in fields such as tactical/technical areas, rather than physical fitness or general conditioning. This likely explains coaches’ greater perceived value in research dedicated to technical and tactical expertise, as well as mental training and skill acquisition. Practitioners place a large emphasis on the need for research in physical fitness areas, which is likely due to their occupational focus. There are many perceived barriers of sport science research application including funding, time, coach/player/staff ‘buy in’ and research questions which may not apply to the setting. We contend that researchers and practitioners may benefit in producing research, ascertaining knowledge and disseminating findings in alternative methods which better align with coaches’ needs. In addition, educational strategies which focus on real-world context and promote social interaction between coaches, practitioners, organisational personnel and researchers would likely benefit all stakeholders.

**Key points:**

* Coaches perceive value in research dedicated to technical and tactical expertise, as well as mental training and skill acquisition; whereas practitioners and researchers prefer research examining fitness and recovery.
* Understanding behavioural contexts, preferred information sources and perceived barriers of sport science research application (e.g. funding, time, coach/player ‘buy in’) may help to develop research questions and strategies applicable to performance.
* Increased focus on coaching education/science exposure in academic settings (i.e. university courses) may benefit students’ (i.e. future practitioners) ability to understand context surrounding coaches’ perceptions surrounding research application.

**1. Introduction**

Sport science research aims to assist coaches and athletes with the goal of intending to deliver positive performance outcomes, when translated into practice [[1](#_ENREF_1)]. However, whilst sport science research continues to grow [[2](#_ENREF_2)], our knowledge of how this research is applied in elite sport settings is limited. For example, although empirical evidence is lacking, many recognise there remains a gap of translating research into practice with key stakeholders (i.e. coaches and athletes [[2-5](#_ENREF_2)]). This may be considered unsurprising given the complexity of studying and translating human performance outcomes in the elite environment [[6](#_ENREF_6)]. As such, multidisciplinary approaches to sports performance research and support are proposed to provide optimised performance solutions [[7](#_ENREF_7)]. These holistic approaches can benefit both scientific and applied stakeholders, as well as the enhancement of the sport science programme itself on an ongoing basis [[1](#_ENREF_1)].

Evidence-based practice (EBP) is the collated integration of practitioner expertise, athlete values and research evidence aimed to optimise the decision-making process surrounding sport performance [[1](#_ENREF_1)]. EBP in sport may improve training and performance outcomes (e.g. reduce injuries or inappropriate training) and integrate athlete and coach preferences into optimised decision making (Figure 1). Indeed, the dynamic between sport science practitioners, researchers and the coach is viewed as important as it can influence player welfare, athlete/team success and a healthy workplace [[3](#_ENREF_3)]. An important responsibility of coaches in sport is to deliver a programme which guides their athletes/teams through their careers toward success [[8](#_ENREF_8)]. Practitioners and researchers support this goal by applying scientific principles and techniques to assist coaches and athletes to ultimately improve their processes surrounding preparation and performance. Unfortunately, practitioners have lamented the lack of implemented research evidence into practice citing reasons such as a lack of research directed at applied environments [[4](#_ENREF_4), [9](#_ENREF_9)], perceived dysfunction in collaboration between science and practice [[10](#_ENREF_10)], new integration of staff and/or coach relationships [[11](#_ENREF_11)] and research questions that do not align with coaches’ needs [[12](#_ENREF_12)]. Such disconnect suggests that stakeholders may benefit from an increased understanding of factors that affect acquisition of knowledge, the use of research, and how best to apply it in practice to improve performance.

INSERT FIGURE ONE ABOUT HERE

The aim of this opinion piece is to examine the evidence of the perceptions of: i) applied support personnel – practitioners and researchers and ii) sports coaches on the characteristics surrounding the use of sport science research in applied practice. Herein, an analysis of preferred methods of sourcing information and sport science research, the perception of research topics and their importance, and the needs and barriers to implementing research into practice are explored for both groups (e.g. applied support personnel vs. sports coaches). Understanding these issues may promote productive and cohesive working relationships between these groups and producing a collaborative environment towards prioritising player health and welfare. For the purpose of this manuscript a practitioner is considered an ‘on the ground’ member of the performance support staff within a sporting organisation (e.g. sport scientist or strength and conditiong coach [[13](#_ENREF_13)]), and researchers are defined as academic members of staff within a university. Since these two parties can cross over (e.g. one can act and be employed as both concurrently), they are presented together as such herein. These personnel will be compared to sports coaches, whom are defined as head coaches or managers within their sport.

**2. Practitioners’ and researchers’ perceptions of the application of sport science research**

**2.1 Preferred sources of information for practitioners and researchers**

Part of the role of a sport science practitioner and researcher is to continually seek opportunities to learn new information which may benefit the performance of his/her organisation [[3](#_ENREF_3)]. Indeed, the first step to successfully transferring evidence-based information to practice, is the acquisition of knowledge [[9](#_ENREF_9)]. Williams and Kendall [[14](#_ENREF_14)] surveyed 125 nationally registered sport science Australian researchers on their preferred methods of ‘keeping up with the latest developments’ in their sport. The researchers reported preference for reading scientific articles, networking and attending conferences [[14](#_ENREF_14)]. Indeed, journal articles have been shown to be the preferred method of dissemination for researchers, whereas practitioners report preferences for alternative methods such as one-on-one and/or small group conversations [[2](#_ENREF_2)]. Given researchers and practitioners both report workplace time constraints [[2](#_ENREF_2)], it is likely each group utilizes sources of information that are most time efficient, they are most comfortable with, and/or carries the greatest respect/reward in their domain [[14](#_ENREF_14)].

The methods by which researchers and practitioners attain information and knowledge are of interest as they can influence the subsequent knowledge transfer to coaches (i.e. new information to optimise a training program). Unfortunately, researchers have reported disagreements with coaches regarding the statement ‘coaches need sport science knowledge’, likely due to a number of researchers not working directly with coaches (or vice versa) and are unsure of how coaches perceive the importance of research knowledge [[14](#_ENREF_14)]. Nonetheless, the majority of surveyed coaches believe that sport science can contribute to coaching (explored further in section 3 [[4](#_ENREF_4), [9](#_ENREF_9)]). Indeed, it was reported that coaches entrust the practitioner expertise around them, before relying on conversations with practitioners to make informed decisions surrounding their player or team [[15](#_ENREF_15)]. Thus, it is possible that practitioners may benefit from learning from different sources to improve the practitioner-coach dynamic. For instance, since coaches tend to seek new ideas about tactical strategy and mental training and preparation [[9](#_ENREF_9)], practitioners could attend tactical coaching courses or spend additional time in team meetings (i.e. opposition analysis) to develop their ability to transfer sport science knowledge to the areas coaches view as most important. Furthermore, increased focus on coaching education/science in academic settings (i.e. university courses) may benefit students’ (the future workforce) ability to interact and build relationships with coaches in the future.

**2.2 Researchers’ and practitioners’ perceived importance of research areas**

The perceptions of the most important research areas for practitioners and researchers are critical as these can influence the topics researched, the allocation of time and resources, and the translation of findings to practice [[2](#_ENREF_2)]. Researchers place greater emphasis on the benefit of research compared to coaches, with the improvement of technical efficiency of athletes, development of recovery techniques and helping athletes peak for competition ranked the most important research topics [[14](#_ENREF_14)]. Interestingly, in a survey of 222 Australian National Olympic sport coaches and 125 registered sport science researchers, the majority of research areas of ‘benefit to the coach or researcher’ were different between coaches and researchers [[14](#_ENREF_14)]. Similarly, Malone et al. [[2](#_ENREF_2)] examined the perspectives of 93 researchers and practitioners (predominantly from Europe and Australia/Oceania) on collaborative research within team sports. Both groups considered research which focused on ‘application to performance’ of greatest importance. However, studies conducted within academic facilities were perceived to be invasive and less important [[2](#_ENREF_2)], whereas research embedded within a club/organisational setting was considered more applicable to performance [[15](#_ENREF_15)]. Indeed, embedding research staff/students within a club may provide additional expertise to answer relevant research questions and support with training and preparation. Such an approach can be used to assist with the translation of research findings, an element that both researchers and coaches agree is highly desirable [[14](#_ENREF_14)]. However, the real-world limitations of this process should be acknowledged when embedding students and staff. These can include, but are not limited to: the level of experience and expertise of the students and relevant supervisors, differences in background (mono-disciplinary vs multidisciplinary), and organisational culture [[16](#_ENREF_16)]).

Club- or organisation-embedded research is generally considered to have greater impact on professional practice, whereas laboratory studies lay the foundation of evidence-based practice in many areas of sport science [[1](#_ENREF_1)]. For instance, well-controlled randomised trials produce a much higher level of evidence than applied investigations conducted in the field [[17](#_ENREF_17)] however the former has reduced ecological validity. Field based investigations have been reported as difficult to implement in high performance settings [[18](#_ENREF_18)], due to experimental-control requirements, training interference and randomisation issues [[1](#_ENREF_1)]. Indeed, balancing the need for efficacious research (i.e. does the intervention work?) with effective research (i.e. does it work in practice?) is paramount [[19](#_ENREF_19)]. In addition, due consideration needs to be given to the efficiency of such measures (cost vs. benefit [[19](#_ENREF_19)]). Practitioners and researchers also need to consider that the organisation or club will prioritise a competitive advantage over research dissemination. Although difficult, it is important for sport scientists to strive for appropriate scientific design where possible when performing research in applied settings (recommendations regarding this issue are offered in section 5). Such optimised design may increase the rigour and subsequent uptake of sport science research, which in turn will influence the areas researchers’ and practitioners’ view as important. Ideally, if better quality research is designed and conducted this will strengthen the evidence from which applied sport science practice is based [[3](#_ENREF_3)].

**2.3 Researchers’ and practitioners’ perceived barriers to sport science application**

Once an area of knowledge has been learnt and the available evidence has been critically evaluated, researchers and practitioners then aim to implement appropriate, valid and applicable findings to practice (Figure 1). However due to various factors, several barriers can impede this process. For example, practitioners report a gap between research and translation into practice for reasons such as a lack of ‘applied research’ [[4](#_ENREF_4), [9](#_ENREF_9)], perceived dysfunction in collaboration between science and practice [[10](#_ENREF_10)] and research questions which do not align with coaches’ needs [[12](#_ENREF_12)]. Due to expectations of university outcomes, academics/researchers may often focus on research for publication which can limit the relevance and application to performance for the individual or team [[13](#_ENREF_13)]. Other possible barriers are that practitioners work in a fast-paced environment which is often time-demanding, limiting their ability to disseminate research effectively to the applied setting [[1](#_ENREF_1)]. To alleviate this issue, professional sporting organisations could adopt research and development (R&D) departments to provide scientific expertise in assessing long-term performance solutions, as well as build new ideas which promote player health and welfare [[20](#_ENREF_20)].

Practitioners report ‘funding’ and ‘time to dedicate’ as the two greatest barriers to research collaboration in team sports, compared to researchers who considered ‘staff buy in’ and ‘manager buy in’ the two most critical barriers [[2](#_ENREF_2)]. These authors highlight potential issues with research collaboration with practitioners potentially being marginalized [[21](#_ENREF_21)], possibly due to their self-perception of inferior knowledge compared to academics [[2](#_ENREF_2)] or the over-emphasized importance that researchers may place on the contribution of sport science to success [[22](#_ENREF_22)]. Open collaboration through the implementation of R&D departments or collaborations with universities could help optimise research streams (i.e. validating scientific methods, long-term performance analysis) and provide a stronger application, rigour and uptake from coaches [[20](#_ENREF_20)]. Within this process, it is recommended that research questions are first established and prioritised by key stakeholders within the sporting organisations themselves. Then, together with research components linked either embedded into the organisation or separately with a university, a research strategy can be formulated that can best answer that question within the context and constraints of practice. A feasibility assessment including a cost:benefit ratio (time, energy, monetary investment) provided to the organisation can allow them to assess whether or not this is a priority to continue (i.e. level of investment).

**3. Coaches’ perceptions of the application of sport science research**

**3.1 Preferred sources of information for coaches**

The method by which a coach acquires knowledge forms the basis for their personal and social competences, their implementation and evaluation of planning and support of players and staff during practice and competition [[23](#_ENREF_23)]. It was reported that coaches prefer to attain their information through personal contact and experiences, with coaches rating ‘conversations with players’, ‘observation of players’ and ‘conversations with other coaches’ as their top three methods of acquiring knowledge [[5](#_ENREF_5)]. Similarly, when coaches want to gain specific sports science knowledge, the majority of football coaches prefer conversing with a sport scientist compared to other sources such as websites, journals or conferences [[5](#_ENREF_5)]. In addition, 336 Portuguese coaches from 22 sports reported ‘working with expert coaches’ as their most preferred method for learning, with ‘national coaching certification programs’ among their least preferred methods [[24](#_ENREF_24)]. Similarly, Stoszkowski and Collins found 55% of 320 coaches from 26 different countries and 30 different sports reported ‘coach/colleague interactions’ as a preferred method (peer discussion [[25](#_ENREF_25)]). Taken collectively, it is clear coaches prefer to learn from each other since they acquire this information relatively quickly and efficiently compared to formal approaches (i.e. coaching course) [[4](#_ENREF_4), [9](#_ENREF_9), [25](#_ENREF_25)]. Therefore, formulating informal learning approaches for coach education to creating greater practical context, as well as promoting social interaction (i.e. past coaches as presenters in coaching courses) may be beneficial. In contrast, there may be benefit in considering academic educational settings as formal coach education strategies [[24](#_ENREF_24)].

There are also cultural backgrounds to consider when understanding the source from which coaches prefer to receive their information. For instance, Dutch football coaches prefer access to applied journals, books, television, online social networks and YouTube [[5](#_ENREF_5)], while national coaches in Australia prefer attending workshops, networking and reading sport-specific magazines to keep up to date with the latest developments in their field [[14](#_ENREF_14)]. In addition, accessibility and use of resources may influence coaches’ preference for gathering information. Interestingly, given the vast differences in monetary budgets in sports globally [[15](#_ENREF_15)], coaches perceive that a ‘greater budget/monetary expenditure’ may improve access to educational resources and in turn increased learning [[5](#_ENREF_5)]. This could include increased staff to streamline capacity, better equipment to improve efficiency and increased education for development. Whilst speculative, this would be consistent with literature in health care [[26](#_ENREF_26)] and environmental sciences [[27](#_ENREF_27)]. However, the authors also argue that increased expenditure should not replace good science nor should it be assumed that this investment results into knowledge translation. Notwithstanding, improving the resource support provided to coaches across sports and levels of professional staff would presumably benefit education surrounding the implementation of sport science research into applied practice.

**3.2 Research areas of interest to coaches**

The challenge of translating sport science research into practice with coaches is widely recognised [[2-5](#_ENREF_2)]. Part of this challenge is understanding what research areas coaches believe are important because they will more likely implement these findings into practice [[14](#_ENREF_14)]. Approximately half of surveyed coaches believed that there is relevant research in their specific sport; however these perceptions are influenced by their academic background, with high levels of education perceiving relevant research being undertaken compared to lower levels of education [[28](#_ENREF_28)]. Brink et al. [[5](#_ENREF_5)] surveyed 75 professional football coaches from the Union of Professional Coaches in the Netherlands on the sport science needs and barriers to sports science application. They found that coaches’ ratings of their perceived knowledge of ‘physical’ and ‘mental’ skills were lower than their ‘technical’ and ‘tactical’ knowledge. Therefore, coaches seek research associated with mental preparation and improvement of technical efficiency [[28](#_ENREF_28)]. Indeed, mental preparation and improvement of technical efficiency were two research areas of perceived importance to National Level Olympic coaches [[14](#_ENREF_14)]. For instance, out of ten research areas of benefit to the coach, mental preparation was the only research area reported by coaches with a greater importance than researchers [[14](#_ENREF_14)]. In a survey of 321 Turkish coaches, ~84% of respondents either *agreed* or *strongly agreed* that the research area of ‘mental training and preparation’ contributes to coaching in their sport [[28](#_ENREF_28)]. Similarly, 205 Canadian coaches report ‘tactical/strategy’ and ‘mental training and preparation’ as the two most likely areas they would look for new ideas [[9](#_ENREF_9)]. Collectively, these findings show that it is clear coaches across sports and cultures seek more research related to tactics, strategy and mental training. Therefore, investigations pertaining to these topics are pertinent for future research [25, 26].

When translating findings to practice, one needs to consider that coaches’ preferences are likely to be context specific, which can incorporate factors such their background, sport and level of competition. Thus, we propose an increased focus towards clearer definitions of sport science, how it is perceived and defined between different groups of stakeholders (coaches, players, researchers and practitioners). Interestingly, less than 1% of surveyed coaches reported ‘sport science’ knowledge as necessary to be a better coach [[25](#_ENREF_25)]. Indeed, there may be changes in what coaches’ questions want answered in sport science. For instance, if a coach has experience collaborating with researchers they will likely yearn for different information compared to a coach who has little background or knowledge of what sport science research can offer. Ultimately, the coach is responsible for altering a positive behaviour change in an athlete and performance outcomes. Thus, practitioners and researchers should adopt methods and educate coaches on research areas that can elicit positive behaviour change to improve performance.

**3.3 Coaches’ perceived barriers to sport science application**

Since the coach is ultimately responsible for the preparation and performance of the individual or team, they are often responsible for the implementation of research or knowledge to practice. Integrating research into practice is difficult with numerous factors to consider which can influence implementation [[2](#_ENREF_2), [29](#_ENREF_29), [30](#_ENREF_30)]. For instance, experience and level of competition can influence implementation with higher level coaches perceiving the translation of sport science into an applied coach setting as more difficult than their lower level counterparts [[28](#_ENREF_28)]. In addition, conservatism (i.e. opposition to change or innovation) can hinder sport science application, in addition to the culture or the country or sport played [[5](#_ENREF_5)]. Although often ignored, ‘spoken language barriers’ are listed as the most frequently answered additional barrier to sport science application in the Turkish coach population [[28](#_ENREF_28)]. Another major issue is the direct access to scientific articles which may hinder acquiring knowledge. Developing resources for the applied community (i.e. podcasts, infographics and case study reports) are methods which may alleviate some of these issues. Other common challenges include lack of money [[5](#_ENREF_5)] and/or time [[29](#_ENREF_29)], with these predictably more of an issue with lower level coaches and clubs, where financial support, personnel and/or time present impediments to implementing sport science strategies [[28](#_ENREF_28)]. Taken collectively, many coaches perceive research is commonly not applicable to the performance of his/her team, which impedes its ability to be translated into practice [[31](#_ENREF_31)]. Thus, it is important for practitioners and researchers to align research questions with their organisation, set a list of clear expectations and elaborate the usability of outcomes into practice [[31](#_ENREF_31)].

The usability of research outcomes (i.e. the development of a tool or process) is crucial to successful implementation in high performance sport environments. A study of 55 rugby union coaches and staff personnel responsible for implementing training monitoring found 96% of respondents agreed there is no currently available monitoring protocol which is cost-effective, time-efficient and non-aversive to the players [[29](#_ENREF_29)]. Differences between coaches’ and practitioners’ perceptions of training load monitoring in soccer have shown coaches prefer their ‘coach perception’ compared to practitioners [[30](#_ENREF_30)], who prefer more data-driven methods such as global positioning systems or objectively monitoring strength and conditioning adaptations (i.e. force and power). Although limited by a lack of empirical evidence, it has been suggested coaching practice is often centred on tradition and historical context rather than research [[25](#_ENREF_25), [30](#_ENREF_30)]. Therefore, practitioners should seek to understand a coaches’ view of sport science research as well as context surrounding their personality to assist with research translation into practice [[30](#_ENREF_30), [32](#_ENREF_32)].

**4. Practical recommendations**

The relationship between the coach and practitioner may be the most critical and the most challenging barrier to fully implementing EBP in sporting environments, even if enough resources exist and the challenges of conservatism have been removed. For instance, the common impediment to implementing EBP may be poor communication between coach and the practitioner [[33](#_ENREF_33)]. In addition, an often-overlooked aspect of the coach-practitioner dynamic is the overarching role and directive of the management (i.e. organisational heads, CEO’s). A management’s direction can create an environment that positively (or negatively) drives this dynamic to promote better interaction among practitioners/researchers and coaches. A practical example of this is a well-chosen ‘Head of Performance’ who can be the link between researchers, coaches, players and the organisation. Ideally, this person should possess expert content knowledge, extensive practical experience, strong leadership and communication qualities as well as post-graduate qualifications and evidence of alignment with relevant industry standards.

It is the authors’ opinion that to first achieve a common goal, an aligned strategy should be established by the organisation. From this, a clear understanding of each stakeholder’s role can be developed. Coaches and practitioners should then be clearly communicated on their role, the expectations and methods involved and how each other’s information is being communicated and received. For instance, coaches may use psychological characteristics such as resilience and mental toughness to describe attributes that may not easily translate into EBP. Interestingly, practitioners and coaches have been found to have similar viewpoints regarding perceived qualities valued in an elite coach or sport science practitioner such as ‘good rapport with athletes’ and ‘practicality of research’ conducted [[14](#_ENREF_14)]. From a practical perspective, identifying the coaches preferred communication method (oral and/or informal communication, written reports, case studies, simplified graphs [[34](#_ENREF_34)]), building trust and identifying the coaches preferred methods of engagements are key elements in bringing EBP into the elite setting (see Tables 1 and 2 for summary). In addition, it is noted postgraduate training in the applied setting should be conducted with adequate support (i.e. supervisory, mentoring, financially). Additionally, providing students within these settings an appropriate framework and guidance should help to develop their technical and non-technical skillset, sustainable work habits and a desire for ongoing professional development. Researchers can also play a key role within this process by providing additional resources and knowledge to validate method implementation and decision making.

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**5. Future research recommendations**

Appropriate research questions must be developed that are consistent with the coach and organisational needs and perspectives. In addition, our field must strive for more suitable research designs in applied settings. For instance, studies which lack experimental control should be presented as case reports and resist from inferences outside general observations. Given the widely reported barriers to applying sport science research into the field, more studies on implementation strategies are required. Furthermore, training studies which are applicable in real settings and not in laboratory settings are advisable. Since the primary aim of EBP is to improve player performance, incorporating perspectives of players into research would likely be beneficial. Such information would then guide the development of strategies to suit players’ needs and create more effective EBP implantation within the sporting organisation. For instance, such a process has been conducted previously for the perceived use and importance of recovery strategies in collegiate athletes [[35](#_ENREF_35)]. From an academic perspective, universities, research and governing frameworks may benefit from encouraging multidisciplinary research which focuses on ‘real world impact’ (i.e. societal change) as an alternative to typical metric based-systems (i.e. citations).

**6. Conclusion**

The purpose of this opinion piece was to outline the current understanding and challenge that both coaches and practitioners have in EBP in sport science. Research has demonstrated that coaches most often perceive their knowledge is greater in tactical and technical areas, rather than physical fitness or general conditioning. This is understandable since coaches’ value knowledge and research dedicated to technical and tactical expertise, as well as mental training and skill acquisition. Practitioners prefer research in physical fitness areas likely due to their occupational involvement in such areas as well as formal education methods to acquire such knowledge. There are many perceived barriers of sport science research application including funding, time, coach/player/staff ‘buy in’ and poorly designed research questions. It is our opinion that researchers and practitioners may benefit in sourcing information, producing research and disseminating findings in alternative methods which better align with coaches’ needs. For instance, since coaches prefer personal interactions when ascertaining knowledge, sport scientists and academics might benefit from developing educational workshops where knowledge is shared in multiple ways. It has also been shown that there is a need for more research in the areas of tactical and technical components of the sport, mental training/preparation and skill acquisition, and research translation in the sport sciences. In addition, learning strategies which focus on real-world context and promote social interaction between coaches, practitioners and researchers would likely benefit all stakeholders.

**Compliance with Ethical Standards:**

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**REFERENCES:**

1. Coutts, A., *Challenges in Developing Evidence-Based Practice in High-Performance Sport.* Int J Sports Physiol Perform, 2017. **12**(6): p. 717-718.

2. Malone, J., et al., *Perspectives of applied collaborative sport science research within professional team sports.* Eur J Sport Sci, 2018. **[Epub ahead of print]**.

3. Bishop, D., *An applied research model for the sport sciences.* Sports Med, 2008. **38**(3): p. 253-63.

4. Reade, I., W. Rodgers, and K. Spriggs, *New Ideas for High Performance Coaches: A Case Study of Knowledge Transfer in Sport Science.* Int J Sports Sci Coaching, 2008. **3**(3): p. 335-54.

5. Brink, M., et al., *What do football coaches want from sport science?* Kinesiology, 2018. **50**: p. S1: 150-154.

6. Sands, W., J. McNeal, and M. Stone, *Plaudits and pitfalls in studying elite athletes.* Percept Mot Skills, 20015. **100**(1): p. 22-24.

7. Cardinale, M., *Commentary on “Towards a Grand Unified Theory of sports performance”.* Hum Mov Sci, 2017. **56**: p. 160-162.

8. Jones, G., *How the best of the best get better and better.* Harv Bus Rev, 2008. **86**(6): p. 123-7.

9. Reade, I., W. Rodgers, and N. Hall, *Knowledge Transfer: How do High Performance Coaches Access the Knowledge of Sport Scientists?* Int J Sports Sci Coaching, 2008. **3**(3): p. 319-34.

10. Goldsmith, W., *Bridging the gap? Now there is a gap in the bridge!* ASCA Newsletter, 2000. **3**: p. 2-4.

11. Kerr, R., *Integrating Scientists into the Sports Environment: A Case Study of Gymnastics in New Zealand.* J Sport Soc Issues, 2012. **36**(1): p. 3-24.

12. Sarmento, H., et al., *What performance analysts need to know about research trends in Association Football.* Sports Medicine, 2017. **48**(4): p. 799-836.

13. Jones, B., et al., *Accessing off-field brains in sport; an applied research model to develop practice.* Br J Sports Med, 2017. **[Epub ahead of print]**.

14. Williams, S. and L. Kendall, *Perceptions of elite coaches and sports scientists of the research needs for elite coaching practice.* J Sports Sci, 2007. **25**(14).

15. Burgess, D., *The Research Doesn't Always Apply: Practical Solutions to Evidence-Based Training-Load Monitoring in Elite Team Sports.* Int J Sports Physiol Perform, 2017. **12**(S2): p. S2136-S2141.

16. Banerjee, S. and C. Morley, *Professional Doctorates in Management: Toward a Practice-Based Approach to Doctoral Education.* Acad Manag Learn Educ, 2012. **12**(2): p. 173-193.

17. Ardern, C., et al., *Unravelling confusion in sports medicine and sports science practice: a systematic approach to using the best of research and practice-based evidence to make a quality decision.* Br J Sports Med, 2017. **[Epub ahead of print]**.

18. Buchheit, M., *Houston, We Still Have a Problem.* Int J Sport Physiol Perform, 2017. **12**(8): p. 1111-1114.

19. Haynes, B., *Can it work? Does it work? Is it worth it? The testing of healthcare interventions is evolving.* Br Med J, 1999. **319**(7211): p. 652–653.

20. McCall, A., et al., *Can off-field “brains” provide a competitive advantage in professional football?* British Journal of Sports Medicine, 2016. **50**(12): p. 710–712.

21. Eisenmann, J., *Translational cap between laboratory and playing field: new era to colve old problems in sport science.* Translational Journal of the American College of Sports Medicine, 2017. **2**(8): p. 37-43.

22. Halson, S. and J. Nichols, *When Failure Is Not an Option: Creating Excellence in Sport Through Insights From Special Forces.* Int J Sport Physiol Perform, 2015. **10**(2): p. 137-138.

23. Santos, S., et al., *Coaches’ perceptions of competence and acknowledgement of training needs related to professional competences.* J Sports Sci Med, 2010. **9**(3): p. 62-70.

24. Mesquita, I., S. Isidro, and A. Rosado, *Portuguese Coaches' Perceptions of and Preferences for Knowledge Sources Related to their Professional Background.* J Sports Sci Med, 2010. **9**(3): p. 480-9.

25. Stoszkowski, J. and D. Collins, *Sources, topics and use of knowledge by coaches.* J Sports Sci, 2016. **34**(9): p. 794-802.

26. Waterman, H., et al., *Facilitating large-scale implementation of evidence based health care: insider accounts from a co-operative inquiry.* BMC Health Serv Res, 2015. **15**(60).

27. Chapple, R., et al., *Integrating science into management of ecosystems in the Greater Blue Mountains.* Environ Manage, 2011. **48**(4): p. 659-74.

28. Kilic, K. and M. Ince, *Use of Sports Science Knowledge by Turkish Coaches.* Int J Exerc Sci, 2015. **8**(1): p. 21-37.

29. Starling, L. and M. Lambert, *Monitoring rugby players for fitness and fatigue: What do coaches want?* Int J Sport Physiol Perform, 2017. **[epub ahead of print]**.

30. Weston, M., *Training load monitoring in elite English soccer: A compairson of practices and perceptions between coaches and practitioners.* J Sci Med Football, 2018. **[Epub ahead of print]**.

31. Jones, B., et al., *Accessing off-field brains in sport; an applied research model to develop practice.* British Journal of Sports Medicine, 2017. **[epub ahead of print]**.

32. Akenhead, R. and G. Nassis, *Training Load and Player Monitoring in High-Level Football: Current Practice and Perceptions.* Int J Sports Physiol Perform, 2016. **11**(5): p. 587-93.

33. Buchheit, M., *Want to see my report, coach. Sport science reporting in the real world.* Aspetar Sports Med. J, 2017. **6**: p. 36-42.

34. Halperin, I., *Case Studies in Exercise and Sport Sciences: A Powerful Tool to Bridge the Science-Practice Gap.* Int J Sport Physiol Perform, 2018. **[epuh ahead of print]**.

35. Murray, A., et al., *Recovery practices in Division 1 collegiate athletes in North America.* Phys Ther Sport, 2018. **32**: p. 67-73.

**FIGURE LEGEND**

**Figure 1:** The process of developing evidence-based practice (adapted from Coutts [1]).

Key stakeholders identify relevant research questions

Available evidence is critically evaluated for validity, impact and applicability

Continual re-evaluation of evidence and assessment

The effectiveness of the new practice is assessed

Strategies are developed to implement best available evidence into contemporary practice