

What Is Evidence-Based Practice in Strength and Conditioning?

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ABSTRACT

As the field of strength and conditioning (S&C) continues to grow, there are noticeable increases in jobs, salaries, research, and media coverage of malpractice; it is therefore prudent to define evidence-based practice (EBP) for S&C coaches. In line with clinicians and medical practitioners, this will help guide best practice and inform stakeholders on the design process of the various training and testing interventions implemented, to improve the physical capacity of athletes. Thus, the aim of this article is to define EBP in S&C, and in doing so, the following definition was provided: *In strength and conditioning, evidence-based practice involves integrating scientific research with coach expertise such that the individual needs of athletes are met in terms of physicality, values, preferences, and constraints.*

INTRODUCTION

Evidence-based practice (EBP) is a term that has been popularized within the medical field. It is seemingly driven, at least in part, by the fact that practitioners of its various disciplines operate in highly litigious environments, where the consequences of malpractice can be life-changing, if not fatal. Equally of course, central to its motive is ensuring clinicians provide the best standard of care to patients. In

medicine, EBP is described as “*integrating individual clinical expertise with the best external evidence*” (6). Here, Sacket et al. (6), suggest that *individual clinical expertise* refers to the proficiency and judgment that individual clinicians acquire through clinical experience and clinical practice (which includes the compassionate consideration of each patient’s predicament). Conversely, *external clinical evidence* is patient-centered clinical research, which examines the accuracy and precision of diagnostic tests, the power of prognostic markers, and the efficacy and safety of therapeutic, rehabilitative, and preventive regimens. It is suggested that doctors who engage in EBP will identify and apply the most efficacious interventions to maximize individual patients’ longevity and quality of life. Importantly, the authors conclude that relying solely on individual clinical expertise or the best external evidence is insufficient.

The American Psychological Association assigned a task force to define EBP in their field, which offered the following definition: “*the integration of the best available research with clinical expertise in the context of patient characteristics, culture and preferences*” (3). It was felt that this definition affirmed the importance of attending to multiple sources of research evidence and that good psychological practice was also based on clinical expertise and patient values (3). Again, one can note the significance placed on research and expertise (and thus experience), within the context defined by the patient at

hand. It was felt that by having an agreed-upon policy statement for EBP, guidance could be provided on how best to use the available evidence to design services that will benefit patients and assure the public and health care system that psychologists are providing best practice (9). Finally, Levant and Hasan (3) also differentiate between EBP and empirically supported treatments; the former starts with the patient and asks what research evidence will assist the clinician, whereas the latter starts with the treatment and asks whether this treatment works for a certain disorder or problem under specified circumstances.

As strength and conditioning (S&C) continues to grow, there are noticeable increases in jobs, salaries, research, and media coverage of malpractice, thus it seems prudent to define EBP for S&C coaches. In line with the clinicians and medical practitioners described above, this will help guide best practices and inform stakeholders on the design process of the various training and testing interventions implemented to improve the physical capacity of athletes. Thus, the aim of this article was to define EBP in S&C.

KEY WORDS:

expertise; framework; model; system; coaching; research

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TYPES OF EVIDENCE

PEER-REVIEWED RESEARCH

It is logical to start this journey by first defining the term evidence, followed by its available guises; this will serve as the focus of this section before the subsequent section discusses their application. The Oxford Dictionary defines evidence as “*the available body of facts or information indicating whether a belief or proposition is true or valid.*” Although much is known about the biological principles that govern exercise performance (which is typically taught through education programs and reading textbooks), our understanding of how these may be manipulated (through various training interventions) is constantly evolving, and as such, peer-reviewed research articles (or scientific evidence) would

seem to provide the best (and most current) source of facts and information. Of note, for S&C it is equally viable for a coach to consider a research hypothesis starting with how an athlete may respond to certain types of intervention, as it is to consider how an intervention may affect certain types of athlete. The Table identifies the hierarchy of clinical evidence and briefly describes each (4,5).

In summary, scientific research can highlight interventions that show promise, how they should be implemented, and the mechanistic adaptations consequent to them. Well-designed research studies can also show how data can be collected, monitored, and interpreted to ensure effectiveness and efficiency. Equally, research can highlight ineffective

interventions despite logical inference or case study examples. All that said, it is important that an S&C coach can appropriately interpret the research, appreciating the quality of the methods and data analysis applied, and how applicable the findings of the research sample are to their athletes. Research studies are of varying quality; thus, these research-based skills are fundamental to the successful integration of research to practice.

Finally, in S&C, there will be numerous times where, despite our motivation to consult the research, there will be little to none that directly affects our practice. For example, plenty of research may support EBP in male soccer, but little in female soccer. Consequently, assumptions and inferences must be made by the S&C coach, causing them

Table
Ranking and description of research-based evidence (4,5,7)

Rank	Evidence type	Description
1	Systematic review and meta-analysis	The studies involve the screening of all databases to find all relevant research, which are then vetted for their rigor, leaving only the articles presumed to be the most valid pertaining to the focused research question. Particularly with meta-analyses, attempts are made to resolve conflicting reports by combining specific outcome measures statistically, so as to reach a final level of significance of intervention effects.
2	Randomized control trials (RCTs)	These draw a sample from the target population and then divide them randomly into 2 or more groups receiving specific interventions. Central to the design of the traditional RCT is the concept of blinding the groups to which form of treatment is being received (although this is not always possible in sport). This approach is designed to equal out across groups, all confounding variables that could affect results. RCTs determine intervention effects upon groups of participants rather than the individual.
3	Cohort studies	These are either observational or experimental study designs, whereby in the latter, the absence of an intervention defines the groups (which may not be randomly assigned nor engage in a cross-over design). In the former, the investigator does not intervene and only observes and assesses the strength of association between dependent and independent variables over time.
4	Case control studies	This type of study compares groups of athletes who can be predefined from the outset based on a variable of interest. Data are then collected retrospectively to define the cause of the difference.
5	Case series/reports	These present what actually occurred in practice as a descriptive report of the intervention, of either an individual or groups of athletes. Although unable to use null hypothesis significance testing, they emphasize the individual effects, which may generate hypotheses for further research.

to act in a manner that may be better referred to as *theory-based practice*. Also, scenarios may exist, where we perceive that our best evidence stems from our trusted peers, who have accrued sufficient and relevant experience. In these latter examples, it would be prudent to ensure that we appraise our assumptions and the experience and anecdotes of others through the lenses of rigor-based research. If we are to accept them at face value, however, we turn our training environment into a laboratory and objectively monitor the results for ourselves. There are of course times when we will all need to do this.

COACHING EXPERTISE

Those who oppose an EBP approach generally do so because they believe research articles will quickly become the only source of credible evidence. They express concerns that research-driven practice may constrain the use of interventions and thus halt the progress of the discipline, especially as some level of creativity is required. Indeed, in S&C, scientific investigation sometimes only provides the mechanisms to explain the interventions long used by coaches, who are seemingly going from gut or intuition, driven by their experience and “in-field” knowledge. Similarly, concerns are raised given research does not take into account the uniqueness of the athlete in question or their interaction with the environment, thus should serve only as a guide or template from which coaches can manipulate accordingly. For example, research often draws inferences from student populations to elite athletes. It builds its argument from group mean data despite the array of positive and negative results experienced by its members. Furthermore, research is often overly reductionist, attempting to reduce (and sometimes seemingly ignore) structure and behavior complexities so that dependent variables can be isolated and research questions answered. Therefore, coaches must interpret externally derived research data considering their expertise to not fall prey to *ecological fallacy*

(whereby inferences regarding an individual are derived from data that examined the group to which they belonged) and *reductionism* (explaining an observation by breaking it down and often isolating its component parts).

In summary, each athlete will respond differently to any given intervention, but only coaches with significant relevant expertise can appreciably predict the possible outcomes that may prevail. Equally, when there are several apparently suitable interventions, expertise is needed in deciding which is best suited to the individual needs of the athlete. In this context, therefore, coaching expertise may be defined as having a high level of skill or knowledge in S&C, such that training interventions are chosen to suit individual athlete needs, based on their physical make-up, preferences, training constraints, and values. Expertise in coaching then is much like wisdom, combining knowledge and experience with good judgment. As such, and in keeping with Sacket et al. (6) and Levant and Hasan (3), coaching expertise is a fundamental source of evidence and the filter through which research-based evidence must pass. Finally, with expertise, the coach can start to drive research and innovation by experimenting with training interventions and volume load prescriptions, especially given that the consequences of inefficient or inappropriate exercise

programming are not normally detrimental to general health and well-being nor has significant financial repercussions (S&C coaches perhaps do not need to be as risk averse as medical practitioners).

PRACTICAL APPLICATIONS: MERGING AND APPLYING THE EVIDENCE

The application of research, through the filter of coach expertise, best defines an EBP approach. Therefore, operating under an EBP paradigm requires an open, inquisitive mindset, using research to support, challenge, and guide the provision of S&C and expertise to adapt the available scientific evidence to each athlete’s culture, constraints, and context. Adopting such an approach will facilitate greater exploration and advancement within the field of S&C. Evidence-based practice should also act to guide coaches away from the limitations of using either form of evidence in isolation (that derived through research and that derived through expert knowledge and experience), which may include operating with high confirmation bias (where coaches look for trends that support their own beliefs and perceptions), the availability bias (where coaches judge the outcome of an event by the ease with which examples come to mind), and falling prey to errors in research associated with the ecological fallacy and reductionism.

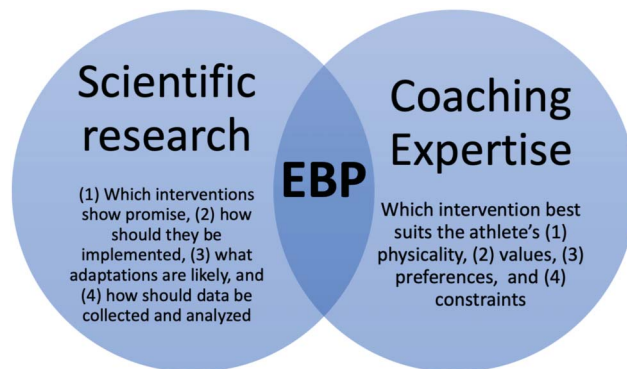


Figure 1. A model of evidence-based practice (EBP) in strength and conditioning, whereby EBP is defined as the integration of scientific research with coach expertise, with the latter able to select the correct intervention and interpret and apply data based on the individual needs of each athlete.

Finally, coach expertise is underpinned by demonstrations of compassion, in that decisions are equally based on the humanity of its participants as much as the spoils of sport (8). Potentially, emotional intelligence is central to this (2) as is the ability to traverse multiple leadership styles (1); these skills must be refined through practice within various environments, contexts, and across many very different and unique athletes. S&C coaches should also remember that when it comes to S&C programming (and much like research), there are no certainties; we are all working with probabilities. The role of the S&C coach therefore is to choose the intervention that they perceive has the highest probability of success and then edit and adapt from there. At times, expert coaches simply make better guesses. In closing, the following definition of

EBP in S&C is suggested and depicted in Figure 1.

In strength and conditioning, evidence-based practice involves integrating scientific research with coach expertise such that the individual needs of athletes are met in terms of physicality, values, preferences, and constraints.

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