



Title: Injury rate and prevention in elite football: let's first search within our own hearts

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Running Head: Injury in elite football

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Research and discussions about injury rates and their prevention in elite football is one of the hottest topics in the medical and sport science literature. Over the past years, there has been an explosion of the number of publications, including surveys,¹ observational, retrospective or prospective² studies, training interventions and various types of expert opinions and commentaries.³ This array of information are likely useful to improve our understanding of what the best practices may be, and in turn, increase our ability to better prepare, manage and treat players. However, a recent survey has shown that 83% of UEFA clubs do not follow evidenced-based prevention programs.¹ It was also shown that hamstring injuries kept increasing over the last 13 years.² Taken together, those two papers may suggest that the majority of elite club practitioners likely disregard research findings¹ and may therefore be the one to be blamed for those increased injury rates.²

Making supporting staff and coaches responsible for those injuries is easy, especially when considering their perceived typical personality traits (i.e., so-called Type 2,⁴ high egos and little open-mindedness and willingness and learn – “why could they be bothered applying the new study findings?”). While this may be true sometimes, the reality is that elite club practitioners are rather often in the frontline with new treatment options and training programs. We believe therefore that there may be alternate, less naïve ways to look at those latter findings,^{1 2} which could suggest that club practitioners may not be as bad as they may appear from those papers. In fact, type 2-researchers⁴ often discard new research findings that contradict their own paradigm (confirmation bias); they may also be more prone to pursue their old research topics in the name of security and comfort,⁴ missing in turn potentially important advances in the field. Two examples highlighting how those attitudes have increased the disconnect and misunderstanding between research findings and real practice are discussed below.

1. **Are club injury prevention programs that bad?** What if practitioners were just doing differently (and maybe better) than what is restrictively ‘evidenced-based’?⁵ Survey questionnaires and Delphi consensus are often better suited for well-identified group-based approaches and generic answers to be given, where highly individual and multifactorial approaches⁶ are more difficult to be registered and reported. In fact, in real practice, people use multiple types of exercises and use variations in terms of volume and intensity; they adapt their programming as a function of player needs, profile, context, game schedule, acute loading, availability of tools on site (e.g., away game, camps), beliefs, experience and many other considerations. Some players have their own external-to-the-club physios and fitness coaches, who obviously don’t complete the questionnaires. Clubs encouraging these individual-player practices end up being classified as “non-compliant”¹ to evidenced-based programs, but does this mean that what those supporting staff do has no value? What about “best practice”? In fact, the understanding of the field context is often overlooked by research recommendations, and when it comes to train and work with elite athletes, the science doesn’t always apply.⁵ It is however worth mentioning that elite practitioners’ attitude toward innovation may be a double-edged sword; new practices (not researched yet) may also sometimes, in retrospect, turn out not to be that efficient. Finally, since randomized controlled trials are impossible to implement in an elite population, the ‘evidence’ is often based on interventions conducted in sub-elite/amateur populations. In fact, the response of both muscle strength and architecture to training is likely training-status dependent; therefore, extrapolating the research findings obtained in sub-elites to what could be expected in highly-trained players remains hazardous. This *in fine* questions the relevance of a lot of research findings, and in turn, limits their adoption by top athletes.
2. **Have injuries really increased over the past 13 years?** The 2-4% increase in injury rate² reported between the years 2000 and 2013 was established while reporting injury occurrence as a function of both training attendance and game participation, as measured by minutes/hours of training and play. First, as discussed recently,⁷ the fact that team doctors may tend to adopt now a more conservative approach to withdraw players from training when early muscle warnings are apparent (but before an injury is actually registered) may artificially increase training injury rate.⁷ Second, when the slightly

increased match injury occurrence² is reported as a function of the corresponding high-intensity running demands over the same periods (which have moderately-to-largely increased⁸) - and not simply relative to overall playing time-² it appears that match injury incidence has in fact slightly decreased (~20%) over time (Table 1)! In fact, this small but substantial decrease in injury rate over the past years lends support to the individual prevention programs and load management strategies implemented in clubs, that may turn out to be more efficient than previously thought. In other words, the individual, multifactorial, context-driven approaches implemented in those ‘evidenced-based non-compliant’ clubs may *in fine* work at decreasing injuries during matches. Using some specific running demands rather than playing time to examine injury rate (Table 1) makes actually a lot of sense given the strong association between high-speed running and injuries,³ and should probably be expanded further to the majority of epidemiological investigations in team sports.

To conclude, those two examples suggest that injuries may in fact be better prevented and managed in clubs than it may appear from some of the research papers. Since elite environments are more complex than meets the eye, before making any recommendations, we, both as researchers and practitioners, should never oversee the importance of context. Pragmatism, use of common sense and the consideration of best practices⁴ are often to be prioritized over oversimplified research findings.

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References

1. Bahr R, Thorborg K, Ekstrand J. Evidence-based hamstring injury prevention is not adopted by the majority of Champions League or Norwegian Premier League football teams: the Nordic Hamstring survey. *Br J Sports Med* 2015;49(22):1466-71. doi: 10.1136/bjsports-2015-094826 [published Online First: 2015/05/23]
2. Ekstrand J, Walden M, Hagglund M. Hamstring injuries have increased by 4% annually in men's professional football, since 2001: a 13-year longitudinal analysis of the UEFA Elite Club injury study. *Br J Sports Med* 2016;50(12):731-7. doi: 10.1136/bjsports-2015-095359 [published Online First: 2016/01/10]
3. Gabbett TJ. The training-injury prevention paradox: should athletes be training smarter and harder? *Br J Sports Med* 2016;50(5):273-80. doi: 10.1136/bjsports-2015-095788 [published Online First: 2016/01/14]
4. Buchheit M. Outside the Box. *Int J Sports Physiol Perform* 2017;12(8):1001-02. doi: 10.1123/ijssp.2017-0667 [published Online First: 2017/11/02]
5. Buchheit M. Houston, We Still Have a Problem. *Int J Sports Physiol Perform* 2017;12(8):1111-14. doi: 10.1123/ijssp.2017-0422 [published Online First: 2017/07/18]
6. Mendiguchia J, Martinez-Ruiz E, Edouard P, et al. A Multifactorial, Criteria-based Progressive Algorithm for Hamstring Injury Treatment. *Med Sci Sports Exerc* 2017;49(7):1482-92. doi: 10.1249/mss.0000000000001241 [published Online First: 2017/03/10]
7. Eirale C. Hamstring injuries are increasing in men's professional football: every cloud has a silver lining? *Br J Sports Med* 2018 doi: 10.1136/bjsports-2017-098778 [published Online First: 2018/01/25]
8. Barnes C, Archer DT, Hogg B, et al. The evolution of physical and technical performance parameters in the English Premier League. *Int J Sports Med* 2014;35(13):1095-100. doi: 10.1055/s-0034-1375695 [published Online First: 2014/07/11]

Table 1. Evolution of injury occurrence as a function of playing time and running demands.

	2006/2007		2012/2013		OR (2012 vs 2006)	Quantitative descriptor
	Incidence / 1000 match hours	Distance or actions / 1000 match hours	Incidence / 1000 match hours	Distance or actions / 1000 match hours		
Total distance (m)	4.44	7120000	4.74	7250000	1.05	<i>trivial</i>
High-speed distance (m)	4.44	593000	4.74	767000	0.83	<i>small decrease</i>
High-intensity actions (n)	4.44	79000	4.74	117000	0.72	<i>small decrease</i>
Sprint distance (m)	4.44	155000	4.74	233000	0.71	<i>small decrease</i>

Injury rates for both periods are estimated from Fig 3 in Ekstrand et al.² using a 1.1% increasing annual trend. Running demands for both periods are estimated from Barnes et al.⁸ High-intensity distance: distance covered >19.8 km/h. Sprint distance: distance covered >25.2 km/h. Note that while injuries relate to 32 UEFA Champions league and 18 Tippeligaen clubs,² running demands are only representative of the English premiere league (EPL),⁸ which is a limitation of the present analysis. We nevertheless believe that the overall trend seen in the EPL may reflect what occurred in the other leagues (Ligue 1 and Liga data, personal analysis). OR: odds ratio for the rate of injury during the 2012/2013 to be greater/lower than during the 2006/2007 season. Magnitudes of the OR were set in accordance to Hopkins (<http://www.sportsci.org/resource/stats/effectmag.html>)