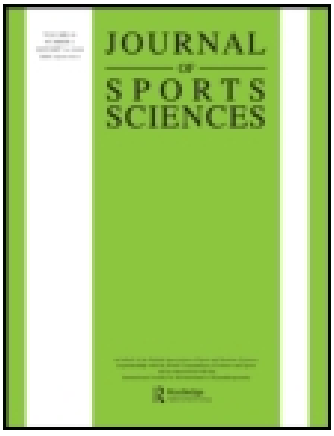

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Editorial

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Editorial

Chaos in the brickyard revisited: On research integration, accumulated knowledge and evidence-based practice in the exercise and sport sciences

There has never been greater interest and activity in the exercise and sport sciences than now, particularly in research. This can partly be attributed to external pressures, such as research grading exercises in British universities, but it may also reflect greater recognition of the importance of scientific knowledge in physical activity. Whatever the reasons for such quantitative advancement, it raises some important issues for those involved in exercise and sport sciences research. I will address the issues of research integration and accumulation and how this might be related to evidence-based practice.

As a postgraduate student of sport psychology, I was introduced to the famous 'chaos in the brickyard' concept in research methods. This suggests that we have piles of disorganized bricks (individual research studies) but few solidly built brick walls (theories, consensus, etc.). With the increase in research output in the exercise and sport sciences, the need for more order in the brickyard has never been greater. Without this order, we shall fail to convince others that we have knowledge 'that works'. A parallel can now been seen in health-related and medical research. In times when budgets are closely scrutinized, those responsible for purchasing health and medical 'knowledge' want to know: (a) does the intervention make a difference? and (b) is the recommended intervention more cost-effective than alternative interventions or treatments? To provide satisfactory answers in our field, we need better research integration and accumulation of knowledge, and a move towards evidence-based practice in the field.

I propose that some steps are now required to bring better order to the exercise and sport sciences brickyard. First, researchers should be much more rigorous in how they locate and select studies for review. Particularly in review papers, search and selection criteria should be specified. How were the papers located and which databases were searched? What criteria were used to select papers for review? In some areas of medicine, only randomized control trials are accepted, although this is not always practical in field-based areas of research in exercise and sport. What research designs do we accept, either singly or across many studies, and when do many studies pointing in the same direction, but using 'weak' designs, give us sufficient confidence to answer the main question?

Having found and selected studies on clearly defined criteria, how can research be better organized? How can we build the pile of bricks into a wall? Consensus conferences and publications can help, but only if the publications specify search and selection criteria properly, or the papers written to provide a consensus are scrutinized properly through peer-review and open discussion. Public and private agencies should only accept our research consensus if it is based on sound evidence or, as a fall back, our 'best shot' given inadequate evidence.

One way to provide a sharper focus on consensus is through meta-analysis. While not all researchers are in favour of this form of integration, it is a set of methods that has become increasingly important. The traditional subjective voting method in narrative reviews, while still having a place in areas using disparate methods or relatively few studies, has major weaknesses in comparison to meta-analytic methods. For example, it is quite possible that a researcher will conclude that a particular psychological factor has no effect on performance if 70% of studies show no significant effect. However, it is equally possible that the combined effect, across studies, could be large and that this effect could be explained by key moderator variables (Hunter and Schmidt, 1990). This also calls into question our over-reliance on significance testing (see Schmidt, 1996).

By using some of these strategies, we might be better placed to arrive at a research consensus. This is not new in our field. Several 'consensus' books (e.g. Bouchard *et al.*, 1994) and journal issues (e.g. *Research Quarterly for Exercise and Sport*, 1996, **66**(4)) have now been published, often with accompanying summarized consensus statements. These should be grouped into 'what we know' and 'what we need to know' statements.

Consensus meetings, publications and statements have advanced our field, particularly in terms of their potential for affecting practice. However, this has mainly occurred in health-related areas. For example, where is the consensus in sport psychology? There are very few meta-analyses (Biddle, 1997) and no mention yet of evidence-based practice, although Hardy *et al.* (1996) have moved some way towards this. However,

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we have some way to go in the exercise and sport sciences before we bring acceptable order to the brickyard. This requires us to give more consideration to search and selection criteria, research accumulation and integration, possibly through meta-analysis, and evidence-based practice. These are major challenges for all of us.

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