



Research Methods in Sport

Mark F. Smith



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In memory of Dr James Balmer
A colleague. . . A friend. . . An inspiration

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Chapter 1

The context of sport research

Learning Objectives

By linking your understanding of sport in practice to sport-related research examples, this chapter is designed to help you:

- explain the nature of sport research and describe the characteristics of a scientific approach;
- outline the building blocks of research and establish which approach would link to particular sport-related research questions;
- identify the importance of a research strategy to the overall research framework.

Introduction

Research is the gateway to new discoveries. Discoveries such as new technology to improve the speed of a cyclist around a track, novel training programmes to enhance swim start performance or creative initiatives that evaluate children's enjoyment in sport. Research provides us all with the chance to learn more and acquire new knowledge to help ourselves and others.

This opening chapter of the book *Research Methods in Sport* will provide a brief, but important starting point to help examine the very nature of research within a sporting context. It will introduce the concept of research and provide an important review of the underpinning philosophy to scientific inquiry. By examining a range of sport-related research questions the chapter will uncover the role that the philosophy of science plays in shaping the framework in which we view our sporting research and how such understanding may lead us to the selection of our research strategy.

By further reviewing this research framework, a clear link will be made between the very nature of our sporting problems – that is the questions we wish to answer – and the ways in which we can begin to answer them. By highlighting the need to select the right design and method in the quest to solve our problems, this chapter is considered essential reading before embarking on future chapters throughout the book.

It is not the intention of this chapter to outline the research process in detail or explain how to write your research project. Rather this opening chapter will provide you with an all-important starting point that will help you to understand research methods and their value and then, if you progress to undertaking your own research project, assist you in selecting the most appropriate

research strategy. To outline a discourse on the debate about the structure of science or the nature of knowledge is outside the scope of this book; however, where appropriate, you will be made aware of how such debates may impact on your own research activities. It is acknowledged that in simplifying models and examples used to outline approaches to scientific inquiry, terminology may not be aligned with those from a natural and social science background and, therefore, for more in-depth and thorough accounts the reader is directed to the text by Grix (2002).

The nature of sport research

Sport, as an area of study, is unique. In how many other disciplines would you cover as many different subjects as you do in sport? Ranging from the natural sciences such as physiology, chemistry, mathematics and physics to the social sciences such as social psychology, philosophy, pedagogy and coaching, politics, economics and sociology, the study of sport requires a tremendous appreciation of so many different things. By adding to this ergonomics, technology, research methods and all the practical elements involved in studying sport, a wonderfully diverse picture can begin to be painted that highlights the interconnected nature of sport.

With the continual growth of sport from both a participatory and academic study point of view, there is little doubt that to be able to appreciate the complex web of connections researching in sport offers, a plethora of information that informs understanding and builds knowledge must be sought. Whether examining the way the human body responds to physical work in order to develop new strategies to improve athletic performance, evaluating the role sport plays in bringing communities together, or describing how sport has given many people hope and belief following times of personal suffering, it can be liberating for all involved.

This thirst for understanding about sport and its impact on our lives has led to a significant advancement in our knowledge over the last 100 years. From both a natural and social science perspective, the pursuit of knowledge through sport-related research has led to our current level of understanding acted out in the lectures we attend, practical sessions we perform in, journals and textbooks we read and internet pages we scan through.

Reflection Point 1.1

Scientific discoveries allied to sport began in early civilisations through the practices and writings of ancient Greek physicians, such as Herodicus (5th Century BC). With early discoveries relating to physical training and nutrition influencing inquiry through research practice, the emergence of educated scholars keen to develop new knowledge in the area of sport flourished over the course of the next two millennia.

The pursuit of sporting excellence has led to the emergence of important developments through research to assist athletes and exercisers in their own sporting activities. If we journey

back over the last decade or so alone, we can begin to identify, for example, how the appliance of science to sport has enhanced athletes' capabilities to perform. Take the following, for example:

- Training methods, such as hypoxic training, to enhance physiological capacity.
- Pre-event acclimatisation strategies to ensure the athlete's capability to perform in a range of environment conditions.
- Techniques such as ice-bath submersion to aid post-event recovery.
- Differentiated coaching practice that maximises athlete development and optimises performance.
- Technological developments in bicycle design and swimsuit composition to reduce drag and allow the athlete to travel faster.
- Psychological skills training packages (i.e. visualisation and imagery) that can be implemented to prepare athletes for competition.
- Training aids, such as heart rate monitors, ergometry systems, performance profiles, to support advanced preparation for competition.
- Nutritional strategies that offer the exerciser pre-, during and post-exercise fuel supplements to support training and event performance.

Whatever the area of interest, the process of looking back through time and identifying key research milestones presents an opportunity to celebrate the significant impact research has played in the advancement of sport! By doing this it is clear to see that changes in the way sport has been perceived in society and its value to all those that participate has occurred not through chance or luck, but through systematic investigation to discover new knowledge and push the boundaries of what we know.

The importance of research to the area of sport, therefore, is fundamental not just to the advancement of our discipline, but also to our own personal and professional development. Sport provides us with a sense of freedom and release, not bound by the day-to-day hectic lives we now live. We lose ourselves in sport, embracing the rollercoaster of emotions that sport always delivers us. What draws us back to sport time and time again is the need for that fix. Being able to develop and change, improve and compete, offers us the motive to want to continue. Undertaking research as a student should provide us with the same exhilaration, leading us on the same emotional journey, allowing us to develop, change and improve knowledge for the greater good.

Why is research in sport of value?

We are constantly bombarded with research all the time, whether through books, newspapers, television programmes, advertising boards or university lecturers. The discovery of many new things can occur through research and their findings can help make sense of the world. We have all at some point undertaken research, trying to solve problems by working through them in a logical step-by-step fashion. It is often the case, however, that we do not actually recognise the process of finding a solution as research and often take this approach for granted. It is only when we stand back and examine our approach or it's located in a different context, do we begin to identify what research involves and the value it can bring.

It is not uncommon to often use the term 'research' very loosely. Those new to research often perceive that all tasks involve some kind of research; and to some extent this may be true. Many view the mere *gathering* of facts or information as research! By simply reading a few book chapters, a couple of webpages and a vaguely relevant journal article, a conclusion is made that some research has taken place and something new was discovered! An alternative conclusion drawn by many is that the actual practical pursuit of collecting data constitutes research. Asking people about the success of a newly opened sports centre, recording heart rate response during a hockey match or observing a coaching session and noting down negative behaviour alone may be considered research. This process of 'collecting data', carried out in a systematic and accurate way can certainly be viewed as an important part of research, but does not in itself constitute research.

Research allows for the undertaking of information-finding activities; establishing facts and reaching new conclusions. Undertaken in a controlled, critical manner, research allows questions to be asked and then attempts to solve them in a systematic scientific way. Research is about thinking strategically and logically, not haphazardly or irrationally. Research requires planning and organisation, constant reflection and assessment. Creativity and innovation will lead to novel and original approaches, whilst the ability to draw accurate conclusions will show an awareness and attention to detail.

Key Point 1.1

Research has been defined as:

Diligent and systematic inquiry or investigation into a subject in order to discover facts or principles. (Blaxter et al., 2001, p5)

The formal, systematic application of scholarship, disciplined inquiry, and most often the scientific method to the study of problems. (Fraenkal and Wallen, 2003, pG-7)

Systematic inquiry that is characterised by sets of principles, guidelines for procedures and which is subject to evaluation in terms of criteria such as validity, reliability and representativeness. (Hitchcock and Hughes, 1995, p5)

When the term research is used then, the assumption is made that a systematic process has been undertaken that allows for the development and testing of a question in order to arrive at a new conclusion. By reflecting on experience alone, and arriving at some conclusions may not therefore be sufficient enough to be called research. Instead, research aims to combine both experience and reason to create a method of rational inquiry. It is when experience is combined with logical reasoning that the foundation of scientific inquiry is born.

Key Point 1.2

Characteristics of research include:

- a controlled, critical approach conducted in a systematic way;
- information finding that establishes facts and generates new conclusions that are open to public scrutiny and criticism;
- the combination of experience and logical reasoning to generate new facts and principles.

The scientific inquiry of knowledge

Science in its most basic definition is a way of investigating nature and discovering reliable knowledge about it. The scientific approach to discovering new knowledge is distinct from other ways in that it seeks to generate reliable knowledge that is justifiably true. According to the advocates of the scientific method of inquiry other methods of acquiring knowledge, such as personal experience, intuition or authority, may provide what is believed to be true but it may not be justified or reliable. In our own sporting pursuits, we acquire new knowledge through our own sensory experiences, agreement with our team-mates, experts' opinion on television sport shows or by logically reasoning things through.

Although each will provide us with a sense of new knowledge, can we really be confident that the knowledge acquired through these ways is complete and accurate? How do we know that the football pundits are right, or our own sensory experiences are actually complete? Can our own logical reasoning be based on false premises from the start and therefore produce unreliable knowledge? Relying on knowledge that is untrue or unjustified may lead to inappropriate actions. It is therefore thought that by undertaking the scientific method of inquiry, a higher degree of certainty can be gained about knowledge that can be deemed both reliable and justifiably true.

The building blocks of sport research

Our perception of reality, that is to say how we view the world, influences how knowledge is characterised and ultimately legitimised through our research endeavours. The view a researcher holds will have an impact on how research is planned, conducted and evaluated. Therefore, as a junior researcher wishing to undertake a research project in sport, having awareness as to the predominant models provides a foundation for effective practice.

Take the two examples of a sports physiotherapist and a mountain explorer. Some researchers operate in the same way a sports physiotherapist would. The therapist is in possession of some detailed knowledge about the anatomy and physiology of the body, knowing where to find a problem if one occurred. They would know what they were looking for based on facts, know where to look for it and what to expect once they found it. Like the sports physiotherapist, these researchers would work in a linear, step-by-step logical fashion.

In contrast, some researchers more closely resemble that of a mountain explorer, trying to map uncharted territory with little or no prior knowledge of the landscape. They would have the skills to explore but would not know what they were looking for or what to expect if they found something. Whereas the main aim of the sports physiotherapist would be one based on discovery, analysis and prediction, the explorer's main task would be based on exploration, discovery and description.

Key Point 1.3

The steps in scientific research (adapted from Cohen et al., 2003):

- Step 1 – Identify a problem, have a hunch, or develop a question.
- Step 2 – Formulate a tentative solution or hypotheses associated with the question or problem.
- Step 3 – Conduct practical or theoretical testing of solutions or hypotheses.
- Step 4 – Eliminate or adjust unsuccessful solutions to evolve or support theory.

These two approaches in some part begin to explain the varying positions researchers take when attempting to discover new knowledge. Different views of social reality in the pursuit of true and reliable knowledge has been discussed and debated for millennia. These philosophical positions sit right at the very centre of any research that is undertaken, because the way reality is viewed dictates the approach taken to answer the research question. It is these philosophical approaches to research that should form the very building blocks to effective research practice.

Paradigms of research

Philosophy, quite simply, is an individual's or group's belief about something. In the case of research, it concerns the belief of what knowledge is and how it is acquired. How reality is viewed by the researcher shapes their approach to research. In other words, the rules by which they work and the strategies that fit within the rules and beliefs they subscribe to. Because of the diverse nature of sport and the wide range of natural and social science disciplines encountered when sport is studied, it is no surprise that researchers will view reality differently and, depending on the philosophical position they hold, the pursuit of new knowledge through research will take different forms. In other words, the fundamental building blocks of their research will be different.

One way of understanding each philosophical position is to view them as different sets of sunglasses. Each set has different coloured lenses and therefore when put on, the same thing is seen but just in a different way. In essence, when research is conducted, the researcher's philosophical position (that is to say the type of sunglasses worn) will govern the way they view reality. By having awareness as to the different views that exist, the researcher is able to:

- establish a personal philosophical approach to their research;
- understand that of others and recognise the type of arguments being made, and;
- assess each position's influence on a research question and understand its wider social impact.

The philosophy of how social reality is viewed is known as *ontology*. This is the very starting point of all research. For the natural scientist, and those undertaking research in the areas of sport physiology, biomechanics or exercise biochemistry for example, social reality would be viewed from an *objectivist* perspective. Objectivists believe that all social phenomena exist independent of any social influence. Researchers from this ontological position look at 'social facts' for reliable and justifiable truth.

For the social scientist, researching in areas relating to social psychology, sociology of sport or historical aspects of exercise for example, reality would be viewed from a *constructivist* position. They would assert that social phenomena are not independent of social influence, rather are in a constant state of revision and are socially constructed. They search for 'social meaning', being aware that reality is in a state of flux and revision.

It is clear to see, therefore, that from these two competing ontological standpoints, each will impact differently on the way in which the researcher conducts their research. Such world-view, or ontology, has an impact on how we go about discovering knowledge. The act of formulating a research question and then undertaking a process to discover an answer is bound very tightly within an ontological view of reality. Although the student researcher may not be aware, the way in which research is undertaken is governed by a set of fundamental principles about how reality is viewed. For the effective student researcher, linking the question with a philosophical position will enable more constructive debates to emerge, recognising others' point of view, and defending one's own position. Table 1.1 provides clear definitions that show distinctiveness in these key terms.

Branch of science	Natural science (e.g. physiology and biomechanics)	Social science (e.g. sociology)
Ontological view	Objectivism	Constructivism
<i>Belief</i>	<i>That all social phenomena (behaviour that influences or is influenced by others) and their meanings have an existence that is independent of social actors (the way in which others' actions and reactions modify behaviour) (Grix, 2002; Bryman, 2008).</i>	<i>That all social phenomena and their meanings are continually being accomplished by social actors, implying the social phenomena are in a constant state of revision and flux (Grix, 2002; Bryman, 2008).</i>
Epistemological view	Positivism	Interpretivism
<i>Belief</i>	<i>Purports to the position that everything is ultimately measurable and applies the methods of the natural sciences to study social reality.</i>	<i>Selecting strategies that respect the differences between people and the objects of the natural sciences and therefore requires a grasp of the subjective meaning of social action.</i>
Methodological view	Quantitative	Qualitative
<i>Belief</i>	<i>A deductive position that emphasises quantification in collection and analysis of data through the process of precise numerical measurement.</i>	<i>An inductive position that emphasises an understanding of human behaviour through methods such as interviews, observations, focus groups, surveys and/or case studies.</i>

Table 1.1: The branch of science can be summarised into three key hierarchical principles.

If ontology is concerned with how we view the world, *epistemology* is a further branch of philosophy that is concerned with the theory of knowledge. Put simply, epistemology focuses on the knowledge-gathering process and the underpinning assumptions that govern the methods of inquiry. As this book concerns the use of research design and methods in sport research, and recognising that our ontological and epistemological views will have an impact on our research approach, we can

start to see how knowing the building blocks of research can impact on our design and associated research methods.

Learning Activity 1.1

If a student wanted to conduct a research project based around the topic of coaching behaviour and player performance they could:

1. Collect some numerical data on coach-to-player ratio and identify whether a low ratio was associated with performance success (i.e. number of games won).
2. Plot the coach's movement patterns in metres during training games and look to identify whether it influences player movement patterns.
3. Observe and record particular phrases the coach uses when talking to the players to assess the impact on players' attitudes towards training and performance.
4. Assess the coach's non-verbal behaviour and link observations to how the players' behaviour alters throughout the session.

Examples 1 and 2 focus on establishing 'social facts', that is to say quantification through measurement of numerical data. Examples 3 and 4 concern 'social meanings', and focus on obtaining subjectivity of response. Based on these approaches, the student will have to decide on their philosophical standpoint – *objectivist* or *constructivist* – and then the corresponding epistemology (i.e. *positivism* or *interpretivism*) and then the methodological position (i.e. *quantitative* or *qualitative*). It is important to remember as a researcher that one is no better than the other; rather each standpoint will lead to a more suitable way of acquiring the knowledge, selecting the approach and drawing more meaningful conclusions.

Methodological approaches to sport research

The two broad methodological approaches to research are quantitative and qualitative. Such approaches are typically split according to whether numerical data is collected or not. Although this is certainly one aspect, there are many other differences that distinguish quantitative to qualitative research approaches. In quantitative research, hypotheses and research questions tend to be based on theories that the researcher seeks to test. Take for example the theory that if we are over-aroused as a performer we under-perform in sport. In this approach the question is derived from the theory and the objective is to test it. In qualitative research, the researcher may generate a theory following some observations or examine an existing theory from difference perspectives (i.e. different coloured lenses). This being the case, each methodology will have its own unique strengths and weaknesses that will impact on the researcher's ability to answer the research question.

Strengths

- Testing and validating already constructed theories about how (and to a lesser degree, why) phenomena occur.
- Testing hypotheses that are constructed before the data are collected. Can generalise research findings when the data are based on random samples of sufficient size.
- Can generalise a research finding when it has been replicated on many different populations and groups.
- Useful for obtaining data that allow quantitative predictions to be made.
- The researcher may construct a situation that eliminates the confounding influence of many variables, allowing one to more credibly assess *cause-and-effect* relationships (i.e. experiment).
- Data collection using some quantitative data collection methods is relatively quick (e.g., self-completion questionnaire).
- Provides precise, quantitative, numerical data.
- Data analysis is relatively less time consuming (using statistical software).
- The research results are relatively independent of the researcher (e.g., statistical significance).
- It may have higher credibility with many people.
- It is useful for studying large numbers of people.

Weaknesses

- The researcher's categories that are used may not reflect other's understandings.
- The researcher's theories that are used may not reflect other's understandings.
- The researcher may miss out on phenomena occurring because of the focus on theory or hypothesis *testing* rather than on theory or hypothesis *generation* (called the *confirmation bias*).
- Knowledge produced may be too abstract and general for direct application to specific local situations, contexts, and individuals.

Table 1.2 Strengths and weaknesses of the quantitative research approach (extracts from Johnson et al., 2004).