

# Unit 4: Research Methods for Sport and Exercise Sciences

<b>Unit code:</b>	<b>M/600/0041</b>
<b>QCF Level 3:</b>	<b>BTEC National</b>
<b>Credit value:</b>	<b>10</b>
<b>Guided learning hours:</b>	<b>60</b>

## ● Aim and purpose

The aim of this unit is to enable learners to explore data collection analysis techniques, the research process and the way in which research can be applied in a sport and exercise context.

## ● Unit introduction

In recent years, there has been a rapid growth in the level of academic interest that the domains of 'sport', 'exercise' and 'health' have attracted.

Sport and exercise scientists have played a key role in the development of this interest, their work is used in numerous areas including sports performance, exercise adherence and the health of the nation.

Research is the collection and analysis of data. Sport and exercise scientists need to know how to collect and analyse data effectively for their research to have value; therefore, it is essential that they have knowledge and understanding of the appropriate research methods for each given situation.

Learners will start this unit by looking at the key issues in research methods. From this base, learners will progress to acquiring key skills in both qualitative and quantitative research.

These skills will be used later in the unit through the application of data collection and data analysis techniques to practical situations, allowing 'learning through doing'.

The emphasis of the unit, in the latter stages, will be around the practising and refining of research skills. As with other skills, research skills need to be practised in order for learners to use them autonomously, and learners will be given the opportunity to practise in a number of laboratory and field-based settings.

Throughout the unit, learners will have the opportunity to build information technology into their work and will be expected to develop appropriate information technology skills to prepare for the research project. This unit is intended to prepare learners for the vocational roles that sport and exercise scientists fulfil.

## ● Learning outcomes

**On completion of this unit a learner should:**

- 1 Know key issues in research methods for the sport and exercise sciences
- 2 Know data collection techniques for the sport and exercise sciences
- 3 Know qualitative data analysis techniques for the sport and exercise sciences
- 4 Know quantitative data analysis techniques for the sport and exercise sciences.

# Unit content

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## 1 Know key issues in research methods for the sport and exercise sciences

*Research:* quantitative research, eg generally deductive, designed to establish differences, relationships or causality; qualitative research, eg generally inductive, designed to explain differences, relationships or causality

*Key issues:* validity; reliability; accuracy; precision

## 2 Know data collection techniques for the sport and exercise sciences

*Types of data:* primary; secondary

*Qualitative techniques:* interviews, eg transcribing interviews, interview techniques; focus groups, eg transcribing focus groups; observation, eg participant observation and non-participant observation, recording observational data; benefits and limitations of each type of data collection method

*Quantitative techniques:* questionnaires, eg types of questionnaire, questionnaire design; laboratory-based data collection; field-based data collection; benefits and limitations of each type of data collection method

*Classifications of data:* discrete; ordinal; continuous; interval; ratio

*Research designs:* eg experimental, cross-sectional, case study, longitudinal, comparative

*Ethical and legal issues in research:* British Association of Sport and Exercise Sciences (BASES) code of conduct, eg ethical clearance, informed consent, confidentiality, data protection, safety of the participants, acting with due regard for equality and impartiality; importance of ethical and legal issues, eg ensure the welfare and safety of participants and the researcher, ensure that researchers only work within area of expertise, preserving and developing the reputation of the sport and exercise sciences; implications of not working within ethical and legal guidelines, eg tribunals, legal or civil action, measures to stop future research

## 3 Know qualitative data analysis techniques for the sport and exercise sciences

*Stages of data analysis:* data reduction (coding – open coding, axial coding, selective coding); other techniques, eg non-numerical unstructured data indexing, searching and theorising (NUD\*IST, ATLAS/ti); displaying data, eg network diagrams, venn diagrams, radial diagrams, cycle diagrams; drawing conclusions and verifying data, eg triangulation, member checking

## 4 Know quantitative data analysis techniques for the sport and exercise sciences

*Data analysis:* parametric tests, eg ANOVA, t-tests, MANOVA, Pearson Product Moment Correlation Coefficient ( $r$ ); non-parametric tests, eg Wilcoxon matched pairs signed ranks test, Chi Squared, Mann Whitney U, Spearman rank-order correlation; explanations of tests; selecting tests; degrees of freedom; ICT-based techniques, eg Statistical Package for Social Sciences (SPSS), Microsoft Excel

*Organising data:* eg range, rank order distribution, simple frequency distribution, grouped frequency distribution

*Displaying data:* eg graphs, histograms, bar charts, cumulative frequency graphs, normal distribution, positively skewed curves, negatively skewed curves

*Measures of central tendency and variability:* eg mean, median, mode, identification of outliers, standard deviation

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
<b>P1</b> describe qualitative and quantitative research		
<b>P2</b> identify key issues that affect research in sport and exercise sciences [IE2, IE4, IE5, IE6]	<b>M1</b> explain key issues that affect research in sport and exercise sciences	<b>D1</b> analyse key issues that affect research in sport and exercise sciences
<b>P3</b> outline the types, techniques, and classifications of data that are common in research in the sport and exercise sciences		
<b>P4</b> describe two ethical and legal issues associated with research in sport and exercise sciences [IE3, IE4, IE5]	<b>M2</b> explain the implications of not working both ethically and legally when conducting research in the sport and exercise sciences	<b>D2</b> analyse the implications of not working both ethically and legally when conducting research in the sport and exercise sciences.
<b>P5</b> describe the three main stages of qualitative data analysis in the sport and exercise sciences	<b>M3</b> justify, for a selected research-based example, the most appropriate research design and techniques for qualitative data collection and data analysis	
<b>P6</b> describe two contrasting quantitative data analysis techniques used in the sport and exercise sciences.	<b>M4</b> justify, for a selected research-based example, the most appropriate research design and techniques for quantitative data collection and data analysis.	

**PLTS:** This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

<b>Key</b>	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

## Essential guidance for tutors

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### Delivery

This unit is designed to inform learners about key issues in research methods and give them a grounding in the techniques needed to be able to progress to *Unit 5: Research Project in Sport and Exercise Sciences*. Much of the unit content underpins the Research Project unit, and as such it is recommended that this unit is delivered prior to *Unit 5: Research Project in Sport and Exercise Sciences*. The delivery of the unit should focus on applying theory to practice and should be as practically based as possible and should be delivered in the first year of study.

The first sessions should focus on establishing learners' knowledge and understanding of key issues in research methods. Technical terminology should be introduced. Learners should be encouraged to provide practical examples of the key issues stated in the *Unit content*.

Particular attention should be paid to the suitability of data collection methods for different situations. Learners should then be given the opportunity to collect data using a variety of techniques in a variety of situations, as part of their 'learning through doing'. This will benefit learners by developing their ability to select appropriate data collection techniques for different research-based situations.

So that learners can practise using appropriate data analysis techniques, a variety of practical situations from which they can collect and analyse data should be presented. The focus should be on learners analysing the data collected so they are effectively working with their own interview transcripts, questionnaires or their own 'numbers', as opposed to being given sample data sets. This kind of delivery strategy will allow learners to gain a feel for the whole research process and will also give them ample opportunity to provide evidence for achievement of the assessment and grading criteria. The unit should feel like a practical research experience rather than a maths lesson!

Throughout the unit, delivery should enable learners to start thinking about topics they would be interested in researching, partly in preparation for *Unit 5: Research Project in Sport and Exercise Sciences*. Learners should be encouraged to consider a range of interests which could be researched using a qualitative or quantitative approach.

## Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan demonstrates one way in planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and/assessment
Introduction and overview of the unit.
<b>Assignment 1: Know Key Issues in Research Methods for the Sport and Exercise Sciences (P1, P2, P3, M1, D1).</b> Tutor introduces the assignment brief.
Describe qualitative and quantitative research: case study work, presentation of a variety of examples of each type, including fitness testing data, physiological measurement, practical skills measurement.
Experimental design – to illustrate key issues of accuracy, validity and precision, learner led discussion and derived examples.
Define key issues – learners to design a code of conduct for an imaginary organisation using British Association of Sport and Exercise Sciences (BASES) as a starting point.
Tutor-led introduction and practical activities for learners to explore qualitative and quantitative data collection techniques.
<b>Assignment 2: Code of Conduct (P4, M2, D2).</b> Tutor introduces the assignment brief.
Principles of data collection – tutor-led examples of range and extent of data that may be ethically collected 1: fitness testing data. Learners to collect benchmark data and subsequent test results for a battery of fitness tests (possible link to <i>Unit 8: Fitness Testing for Sport and Exercise</i> ).
Principles of data collection – tutor-led examples of range and extent of data that may be ethically collected 2: psychological assessment by interview. For example, learners to collect data on stress levels in sporting performance to yield qualitative data.
Principles of data collection – tutor-led examples of range and extent of data that may be ethically collected 3: performance of a motor skill in a practical setting (to yield quantitative data).
Outline the types and classifications of data that are common in research in the sport and exercise sciences: highlight main types of data. Classroom discussion focused on experimental design and usefulness of data.
Consequences of non-compliance with ethical/legal guidelines – case studies, research and present.
Describe the main stages of data analysis in the sport and exercise sciences – learners presented with a variety of data and asked to plan a method for data analysis.
<b>Assignment 3: Sport and Exercise Research Methods Report (P5, M3, P6, M4).</b> Tutor introduces the assignment brief.
Interpretation of data 1 – case study data, devised by tutor: learners to draw conclusions/analyse data using accepted methods, statistical tests, correlation tests etc.
Produce own mini project proposal – learner suggestions and discussion of ideas of main interest in sport and exercise sciences.
Review of reflective practice of unit and assessment.

## Assessment

Assessment strategies should be geared towards the progression from theoretical understanding to placing information into the required context.

For P1, learners must describe qualitative and quantitative as the two main types of research.

For P2, learners must identify validity, reliability, accuracy and precision as key issues in research methods.

For P3, learners must outline primary and secondary data as the main types of data, as well as describing discrete, ordinal, continuous, interval and ratio as the different classifications of data. Learners will also need to outline qualitative and quantitative data collection techniques. Criterion P4 requires a description of two ethical and legal issues associated with research in the sport and exercise sciences.

For P5, learners should provide a description of the main stages of qualitative data analysis. For P6, learners will need to describe two contrasting quantitative data analysis techniques; one being a parametric test and the other being a non-parametric test.

Grading criterion M1 builds on P2, and requires learners to expand on pass level work by explaining and analysing (D1) the key issues. They should consider here the different types of validity, eg internal validity, external validity. Relevant examples should be provided to support their work.

Grading criterion M2 requires an explanation and analysis (D2) of the implications of not working ethically and legally when conducting research. In their analysis, learners should consider the implications of not working ethically and legally, and say how they are related and how each one affects research in the sport and exercise sciences. Learners should provide examples where appropriate to support their analysis.

Where justification is required, learners will be expected to explain why a particular research design and technique is suitable for a particular practical qualitative (M3) or quantitative (M4) research-based example. Learners will be expected to have identified specific areas or topics within the sport and exercise sciences that they could research using a qualitative perspective and areas they could research using a quantitative perspective.

It is recommended that a range of assessment methods are used throughout this unit. The use of presentations, written reports and tutor witness statements/observation records are all strongly advised.

## Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, M1, D1	Know Key Issues in Research Methods for the Sport and Exercise Sciences.	You are working in a sports science laboratory and are planning to undertake research in the sport and exercise sciences. In preparation you decide to explore the practical application of qualitative and quantitative research.	Presentation. Witness statement.
P4, M2, D2	Code of Conduct	Your planning continues and you consider the ethical and legal issues for conducting research in the sport and exercise sciences.	Training leaflet/video/presentation. Witness statement/observation record.
P5, M3, P6, M4	Sport and Exercise Research Methods Report	You report to the committee of a sport and exercise organisation on the suitability of a selected research design and technique.	Written report.

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Sport and Exercise Sciences sector suite. This unit has particular links with the following unit titles in the BTEC Sport suite and the BTEC Sport and Exercise Sciences suite:

Level 3 Sport	Level 3 Sport and Exercise Sciences
Research Investigation in Sport and Exercise Sciences	Research Project in Sport and Exercise Sciences
Laboratory and Experimental Methods in Sport and Exercise Sciences	Research Investigation in Sport and Exercise Sciences
	Laboratory and Experimental Methods in Sport and Exercise Sciences

## Essential resources

To practice statistical methods learners will need access to word-processing, databases and spreadsheet software, as well as scientific calculators to practise statistical methods by hand.

## Employer engagement and vocational contexts

This unit focuses on the theoretical aspects of research design and is of particular benefit to those learners who progress to further study, where work of this nature is integral to most undergraduate degree programmes. The methods learnt in this unit should be applied to *Unit 5: Research Project in Sport and Exercise Sciences*.

It would be useful for centres, where possible, to link delivery of this unit with colleagues in Higher Education Institutions, for example partner institutions or university research teams. Where possible, learners studying this unit could become subjects for undergraduate research, and in doing so, would develop knowledge through experience, as viewed from the perspective of a subject.

## Indicative reading for learners

### Textbooks

Gratton C and Jones I – *Research Methods for Sport Studies* (Routledge, 2003) ISBN 9780415268783

Silverman D – *Doing Qualitative Research* (Sage Publications, 2004) ISBN 9781412901963

Silverman D – *Interpreting Qualitative Data* (Sage Publications, 2006) ISBN 9781412922456

Vincent W J – *Statistics in Kinesiology* (Human Kinetics Europe, 2004) ISBN 9780736057929

### Journals

*Journal of Sports Science and Coaching*

*Journal of Sports Sciences*

*Peak Performance*

*Sports Injury*

### Websites

American College of Sports Medicine

[www.acsm.org](http://www.acsm.org)

British Association of Sport and Exercise Sciences

[www.bases.org.uk](http://www.bases.org.uk)

Human Kinetics

[www.humankinetics.com](http://www.humankinetics.com)

Sport Science

[www.sportsci.org](http://www.sportsci.org)

Top End Sports

[www.topendsports.com](http://www.topendsports.com)

## Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

Skill	When learners are ...
<b>Independent enquirers</b>	identifying key issues that affect research in sport and exercise sciences describing two ethical and legal issues associated with research in sport and exercise sciences.

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
<b>Independent enquirers</b>	researching the range and type of research applied to sport and exercise
<b>Creative thinkers</b>	relating existing studies to personal application in research design
<b>Reflective learners</b>	considering the application of a method to a published study
<b>Team workers</b>	participating in data collection
<b>Effective participators</b>	participating in data collection.

## ● Functional Skills – Level 2

Skill	When learners are ...
<b>ICT – Use ICT systems</b>	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	researching existing studies and synthesising data
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	applying effective use of statistical analysis, eg Excel or SPSS
<b>ICT – Find and select information</b>	
Select and use a variety of sources of information independently for a complex task	collating journal/web articles for research method analysis
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	accessing existing research material for reviewing methods applied to the study
<b>ICT – Develop, present and communicate information</b>	
Enter, develop and format information independently to suit its meaning and purpose including: <ul style="list-style-type: none"> <li>• text and tables</li> <li>• images</li> <li>• numbers</li> <li>• records</li> </ul>	Analysing data results
Bring together information to suit content and purpose	designing a presentation
Present information in ways that are fit for purpose and audience	designing training material for assessment designing a presentation
Evaluate the selection and use of ICT tools and facilities used to present information	using electronic format for presentation
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	recording and storing relevant research material
<b>Mathematics</b>	
Identify the situation or problem and the mathematical methods needed to tackle it	applying a data analysis tool, eg Wilcoxon matched pairs signed ranks test, Chi Squared, Mann Whitney U, Spearman rank-order correlation, ANOVA, t-tests, MANOVA, Pearson's (r)
Select and apply a range of skills to find solutions	applying a data analysis tool, eg Wilcoxon matched pairs signed ranks test, Chi Squared, Mann Whitney U, Spearman rank-order correlation, ANOVA, t-tests, MANOVA, Pearson's (r)

Skill	When learners are ...
<b>English</b>	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	discussing the ethical and legal issues concerning research in sport and exercise
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	interpreting written material for relevance concerning research method type.