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## AN HOUR NEEDS FOR A SPORTS SCIENCES

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### ABSTRACT

*Sports Science is about the use of a scientific approach to achieve optimal athletic performance. Sport science is concerned with applying the study of movement/science to sporting activities. The main purpose of sport science is to assist an athlete in maximizing his potential with the least possible risk of injury. The importance of sport science is the prediction of an individual's ability relating to the sporting world, the individualization of training programs according to specific needs and to identify possible strengths, weaknesses and prevent future injuries. Sport science focus on the scientific testing of athletes during off season, pre-season and competition season. Fitness components that are focused upon include aerobic capacity, anaerobic capacity, muscle power, strength, endurance, agility and speed. Sport specific tests are used, areas of concern are identified and worked upon, fitness levels are monitored and recovery techniques are incorporated. Important components in the program include volume, intensity, duration and progression. Follow-up sessions are strongly recommended in order to achieve the fitness goals.*

**KEYWORDS:** *Physiology, Biomechanics, Psychology, Sports Science.*

### INTRODUCTION

Sports science may have been invented by the ancient Greeks who were interested in improving the health, strength and fitness of Olympic Athletes over two thousand years ago. They realised the importance of having a good diet, of training the muscles and of improving cardiovascular fitness.

Sports science covers a broad range of fields including human physiology, psychology and biomechanics, and their relationship to sports performance, health and well-being. Anatomy and physiology aim to develop knowledge and understanding of the basic structure and function of the human body. Exercise at any level requires a well balanced diet to maintain good health and successful sporting performance. This knowledge is obtained through our performance nutrition.

Biomechanics makes it possible to calculate the most efficient or the least harmful patterns of movement in sporting movements and techniques, which is an important consideration when designing and exercise programme. Psychological factors may contribute to whether an individual achieves success and optimal performance in sport, and may also affect whether individuals choose to engage in exercise.

Sports science covers any kind of scientific study that can be used to explain and improve sporting performance. This could include everything from technique, to training, to what athletes ought to have for breakfast. Sports scientists and performance consultants are in high demand to help professional sportsmen and sportswomen to achieve the best results.

Scientists today measure the abilities of athletes under different conditions, to find out the importance of things like hydration (whether they've had enough to drink), temperature and humidity

(whether they're in a warm, moist climate), how much fat and muscle they have, the size of their lungs and hearts and even whether they've taken performance enhancing drugs (many of which are illegal).

Scientists can even come up with new ways of training, such as altitude training which takes athletes to a high-altitude environment with very little oxygen in order to improve their breathing and circulation so that they can get oxygen to their muscles more efficiently. Sports science as a subject is comprised of all these elements, with a focus on physical activity, health and performance. This helps to give an overall picture factors that may improve, and ultimately limit, human sporting performance at the highest level.

## BRANCHES OF SPORTS SCIENCE

### 1. Physiology 2. Biomechanics and 3. Psychology

1. Physiology is all about how the body works and why. It is used by scientists who support athletes to devise new ways of training, like altitude training to improve their breathing and circulation. Understanding the physiology of individual athletes can help create a training programme that achieves the best results for them. Physiology can also explain why certain body types are best for particular sports – for example, why good lung capacity is so important in cycling and rowing.
2. Biomechanics is another element of sports science. This is basically the physics of sports, and would consider things like thrust, gravity, pivots, momentum and aerodynamics. This could help work out the best golf swing, for example.
3. Psychology is also important for athletes. Coaches sometimes focus on four main qualities that they hope will enable their athletes to perform better: concentration, confidence, control and commitment. While not the only factor involved – luck and hard work probably come into it somewhere – science and technology play a critical role in developing sporting performance, explains Dr Dominic Southgate, of Imperial College London. "The margins between podium places are getting narrower in elite sport and coaches are looking at all the options to find improvements. This means looking at highly technical aspects such as aerodynamics, which require specialist Stem skills to be able to measure, interpret and improve them."

There is little argument that coaches need to stay abreast with the latest developments in technology and training methods, if they are to optimise and maximise the performance of elite athletes. There is also little argument that those advancements in technology and training methods are, in large part, underpinned by sports science research. Yet despite this contribution from research there has been a long held perception amongst some coaches and scientists that research has often been conducted in areas of little interest to coaches and that the results of research are presented through forum inappropriate for coaches.

Fundamental to the practical application of sports science research into coaching practice is the method or process by which research topics/questions are determined. It's true to say that in the past researchers have done themselves a disservice by conducting research that has been of interest to just themselves. However, the trend over the last decade has been one of consultation and collaboration with industry partners (including coaches) in order to meet client and 'end-user's' needs, and dare I say it, secure funding. An equally important part of the research process is informing interested parties of the results of the research. The methods by which researchers disseminate their findings have come under criticism. It is perceived that researchers resent their findings through scientific forums (journals and conferences) in a language that is little understood by non-scientists, though there is no empirical evidence to support this perception.

Both coaches and researchers acknowledged the importance of research, and coaches and researchers believed that they (the coaches) need to had, an appropriate knowledge of sports science. However both groups also acknowledged that coaches can't possibly be expected to keep up to date will all aspects of sports science and that it is the role of sports scientists to inform coaches of the latest and most

pertinent findings in their respective disciplines. Equally so, coaches and researchers agreed that coaches must continue to stay abreast with the principles and terminology of sports science.

Physiology and biomechanics were the scientific disciplines most often researched by scientists, and used by coaches, when preparing their athletes. However coaches indicated that they required more research in the area of 'mental preparation of their athletes' as this was an area they did not "have a handle on".

Developments in sports science and related fields such as biomechanics or physiology have gone hand in hand with rapid advances in technology over the past few decades, adds Dr Mark King, senior lecturer in the school of sports, exercise and health sciences at Loughborough University. "If you think about how computers have developed in the past 20 years, as they've developed so has our ability to capture and analyse movement in sport."

Within our research group for sports psychology we've developed a number of psychometric tools that psychologists can use to better understand athletes' and coaches' behaviour, A lot of the knowledge we generate can be used to measure behaviour – such as anxiety, resilience and motivation – but it also influences policy and the way coaches are being trained and educated.

The benefits of this are clear for elite athletes, but it also has the potential to benefit the wider sporting community, helping coaches work effectively with their charges or showing parents how to positively influence child athletes. All this knowledge is being filtered down, it will benefit competitors at all levels.

I think it's important to have more Stem skills in sport: everyone can agree that there's a lot of scope for more and better research. How quickly can a person run? Will there be a time when the 100m record can't ever be broken again; will we reach the limit of human function? We might never know. But science can help. And there's so much empirical evidence showing that sport is good for everyone, and for that reason it's something that benefits society. A healthier society is more productive, so sport science is important.

### NEED & IMPORTANCE OF SPORTS SCIENCE

1. They provide a methodological and systematic approach for coaches, athletes and teams seeking to improve performance at all levels of participation.
2. Physical activity is extremely important to the health of the nation; knowing what activity to promote and how to encourage safe participation requires an understanding of the scientific basis for these activities.
3. Scientific literacy is becoming increasingly essential for an understanding of the many technological and ethical questions posed by contemporary society. The sport and exercise sciences not only address some of these directly but are an ideal vehicle to develop and exercise a broad range of scientific and critical thinking skills.
4. The sports science and physiology programme gives us a solid foundation in each of the sports science disciplines yet allows one to develop a greater depth of understanding of pure and applied physiology as a core life science discipline.

### CONCLUSION

Whilst sports science researchers are, in large part, targeting the research needs of coaches, there is a perceived need for more research in the area of mental preparation of athletes. There is also a need for researchers to disseminate their findings through forums more suitable to coaches, namely sports specific magazines as well as coaching conferences and workshops. To this end, research funding bodies such as the UGC, CSIR and state institutes/academies of sport, should mandate that funding is conditional on research findings being presented through coaching forums. On the other side of the ledger, coaches need to keep abreast with the terminology and principles of sports science and communicate their needs in a collaborative manner. Research will help in the further understanding of elite sport, but the knowledge

gleaned from this will ultimately reach the population at large through developments in teaching and coaching methods. "Hopefully that ensures that young athletes or players will get better, with a stronger basis to their technique, thanks to research done at a higher education level."

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