

# EXERCISE PROGRAMMING SCIENCE AND PRACTICE

Anthony J. Leyland



SIMON FRASER UNIVERSITY  
PUBLICATIONS

## EXERCISE PROGRAMMING SCIENCE AND PRACTICE

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# Preface

This text presents my interpretation of decades of learning and teaching in the field of exercise. The two main goals of this text are to teach (a) the anatomy, physiology, and biomechanics required to develop effective training regimes, and (b) how to implement this knowledge in exercise program design. The text presents evidence from both scientific research and decades of trial-and-error work by strength and conditioning coaches. Wherever possible I have discussed evidence-based fitness programs. However, the text will emphasize the difficulty of obtaining research proof that one exercise regime is better than another. Therefore, by necessity, the text will also discuss programming based on physiological principles and coaching expertise. I will also emphasize the need to design exercise programs specifically targeted to each individual. Although many academics and coaches support everything presented in this text, others would dispute some of my interpretations. It is an integral part of this text that the reader keep an open, critical mind. I have tried to be very clear where there is evidence with alternate interpretations.

This text is written for university students in degree programs such as kinesiology, sports science, and physical education. Strength and conditioning coaches who desire to understand the physiological effects of exercise programming on the human body and the science behind exercise programming will also find this text a useful resource.

No one text can provide you with all the information required to program exercise for a wide variety of clients. To be an excellent fitness trainer (or even someone prescribing exercise in a rehabilitation setting), you will have to read

several texts and gain hundreds of hours of practical experience. However, this text will provide you with a great overview of the fundamental scientific principles of exercise programming.

Although the focus of this text is on the required anatomy, physiology, and biomechanics of exercise programming, I will also discuss goal setting, fitness evaluation, basic nutrition, ergogenic aids, and health effects related to designing exercise programs. The text is broad in scope; however, the main focus is on the academic research and coaching results related to the efficacy of exercise programming. As there is such an overwhelming amount of evidence that appropriate exercise improves health, this text does not focus on the effect of exercise on health. For example, I will focus more on research evaluating the most effective ways to improve aerobic endurance (also referred to as a subject's  $\text{VO}_2$  maximum) rather than the research showing the health benefits of such endurance training. That being said, those wishing to improve their health will find the programming advice in this text invaluable. The kinds of training required to perform better in life and sport are very similar and will improve health.

Some material in this text is very factual and not open to dispute. For example, the heart has four chambers, the triceps brachii muscle is an elbow extensor, and ATP is the main energy currency of cells. However, other topics, nutrition especially, can be speculative and require that you read with an open and critical mind. It is true that human beings are notoriously hard to study, and we have to be very careful of study results. This does not mean, however, we should accept that an exercise is applicable to all just because it seemed to work for some. Above all else, I hope this text gets readers thinking critically about exercise programming and sets them on the way to being a lifelong learner in the field of exercise conditioning.

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