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Stability, Sport and Performance Movement is sponsored by the Society for the Study of Native Arts and Sciences, a nonprofit educational corporation whose goals are to develop an educational and cross-cultural perspective linking various scientific, social, and artistic fields; to nurture a holistic view of arts, sciences, humanities, and healing; and to publish and distribute literature on the relationship of mind, body, and nature.

First published in 2008 by Lotus Publishing
Apple Tree Cottage, Inlands Road, Chichester, PO18 8RJ and North Atlantic Books
P O Box 12327
Berkeley, California 94712

Illustrations Amanda Williams
Technique photographs Joanne Elphinston/CMD
Sportsperson photographs istock 47, 53; Sporting Heroes/George Herringshaw (all cover photographs), 16, 20, 28, 29, 51; Scanpix 16, 17, 42, 43, 45, 48, 94
Text and Cover Design Richard Evans
Printed and Bound in the UK by Scotprint

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British Library Cataloguing in Publication Data
A CIP record for this book is available from the British Library
ISBN 978 1 905367 09 2 (Lotus Publishing)
ISBN 978 1 55643 746 5 (North Atlantic Books)

Library of Congress Cataloguing-in-Publication Data
Elphinston, Joanne.
Stability, sport, and performance movement: great technique without injury / joanne elphinston.
p. cm.
Includes bibliographical references and index.
RC1235.E47 2008
612'.044--dc22
2008013790
Preface

During the years that I have been sharing my work through teaching and consultancy, I have met hundreds of enthusiastic and committed people. Included amongst these are athletes, coaches, fitness professionals, sports medicine and sports science personnel. I have enjoyed the challenge of working with all of these groups, and greatly appreciate what I in turn have learned from them.

I have finally sat down and written this book because I am constantly being asked by participants during my seminars for a resource that can support and enhance their understanding of functional stability and its relationship to movement. They are often caught between the exercise books that present the “how” but not clearly the “when”, the scientific papers that tell us the “what” but not necessarily the “how”, and the anatomy books which tell us about body structures but not necessarily the relationships between those structures as they occur in movement. So, I have set about putting together the practical information that I’ve been developing, working with and teaching over the years.

Some of you will use all of it, and others will dip into certain chapters. Most things are best explained in simple terms, so I have tried to remove the language barrier between athlete, coach, and medical professional where possible in order help you to communicate with each other.

I believe that simple things done well win the day. I believe that we should use our common sense. I believe that we should know our bodies and respect them. We should also be kind to them and listen to them, even though at times we must push them to their limits. I also think that we can all move beautifully and effortlessly if we make it a priority.

Joanne Elphinston, Cardiff, 2008
Acknowledgments

Although I had intended to write this book at some stage, it may not have come about when it did had it not originally been commissioned by SISU Idrottsböcker of Stockholm, and guided into life by Catarina Arfwidsson for the Swedish sports community. For the first two years of its life it existed only in Swedish, until Jon Hutchings of Lotus Publishing had the vision to produce it in English.

There are many people without whom this book would never have been written. The athletes who have challenged me to look for solutions, and who have taken responsibility for themselves and their training; the coaches who have applied the principles with their athletes and upheld my belief in raising the bar for coach education; the sports scientists who have been willing to share in the multidisciplinary process, and the physiotherapists and other sports professionals who have so kindly shared their enthusiasm for simple specific concepts and who have spurred me on with their support.

There are some individuals who must be thanked personally. Sarah Hardman, Heather Watson, Jackie Zaslona, Susie Morel and Karen Fuller kindly shared their thoughts on the text. Karen’s attention to detail led her to personally perform every exercise in the book: no author could hope for greater commitment to the cause!

Danielle Nichols, Rob Ahmun, Kent Fyrth, Nick Jones and Leah Cox gave their time to be models and for this I am very grateful. Jo Thomas-Kemp of Esporta Cardiff very kindly lent her support by making space available for photography.

Richard Evans was the most tolerant and good natured of book designers an author could hope for.

Finally, I must thank my husband, Kent Fyrth, without whose unfaltering support I could not do what I do.

Introduction

In every sport there are athletes who represent true technical excellence. We recognise them instinctively, as their efficiency is expressed through the beauty of their movement and the effortless ease with which they seem to perform. This technical mastery requires a physical structure that supports the sport’s biomechanics, the neuromuscular coordination to correctly sequence the movement, the psychological skills to focus effort without unnecessary tension and the physiology to sustain the movement pattern until the event is completed.

With its ability to move through multiple planes in complex combinations, the body is capable of extraordinary movement diversity. This makes an enormous range of sporting endeavours possible, but this versatility can become our greatest challenge to technical proficiency. It permits unwanted movements, which then require increased muscle tension to try to control them. It allows deviation from the most effective line of motion, compromising efficiency. It allows variability in joint angles, timing and movement sequencing which gives us many movement options, but can also amplify control problems under conditions of increased complexity, fatigue, speed, agility, endurance or technical demand.

In closed skill sports such as swimming, pole vaulting or sprint kayak, performance depends upon an ability to accurately reproduce a movement with minimal variation. These athletes hone their movement skill to progressively narrow the window of variability. This does not limit their adaptability however. Their fundamental technical consistency allows them to make small but accurate adjustments if their environment requires it in order to deliver their best performance. In open skill sports such as tennis, football and alpine skiing, athletes must be able to move in a variety of ways and adapt to rapidly changing situations, but still produce accurate and effective movement by controlling the forces acting on them. Their challenge is to widen the diversity of their skills but to control their variability. They aim to develop more movement options with reliable results.

Even at world-class level we can observe differences in movement economy and control. Some athletes compensate for their technical limitations by maximising other assets, such as an astounding natural physiology or a combination of strength and determination. They may achieve success, but using this method is somewhat like taking a jigsaw puzzle with a missing piece and trying to make up for it by making the other pieces bigger. You may cover the space, but the picture will not be as coherent as it might have been with the missing piece in place. The question is not how athletic success was achieved, but how much more might have been possible with all systems optimised.

The building blocks of stability, mobility, posture, body awareness, symmetry and balance provide the foundation for sporting movement development and injury resistance. These elements work in combination to ensure that physical restrictions, imbalances and inefficient muscle recruitment patterns do not hold you back from meeting your technical movement goals. The right muscles firing at the right time in the right sequence can increase your chance of achieving your physical potential.

The purpose of this book is to promote effective movement, rather than to develop “core stability”. “Core stability” has been defined as the capacity for the trunk to support, control and withstand the forces acting upon it, so that the body structures can perform in their “safest, strongest and most efficient positions” (Elphinston and Pook, 2000). The core muscles are usually identified as those involved in force transfer between the limbs and trunk, as well as the muscles of the trunk itself.
Core stability has been transformed from a concept into an industry, and great claims are made for its potential effects despite a lack of consistent evidence in the scientific literature to support them. Part of the problem is that it has been taken out of context.

When stability is perceived to be a separate fitness marker like speed or power, athletes start to look for exercise regimens that activate “more core”. Some professionals advocate instability activities such as Swiss Ball exercise and others argue in favour of Olympic lifts for developing “core stability”. Both in fact stimulate the trunk in different ways and for different purposes. Research to determine the amount of trunk activity involved in different activities sometimes compares loaded with unloaded activities. Unsurprisingly, researchers find that there is more activity in the trunk when the body is loaded (Hamlyn, N., Behm, D.G. & Young, W.B., 2007). This is then taken as evidence that the loading approach is more effective.

If our objective is movement efficiency, then “more” is not necessarily desirable. Certainly if you are squatting with a heavy weight, you will require an increase in trunk activity to support your spine against that resistance. You will be training a response to a predictable, loaded, symmetrical movement, and this may be appropriate to certain specific sporting demands. However, you will not have trained for unpredictability, change of direction, control through different motions or at the low levels of continuous muscle activity needed to optimise whole body movement over extended periods. These conditions require a different set of neuromuscular responses. It is a matter of what is appropriate for your functional requirements.

Core stability cannot independently optimise movement availability and control. The moving body in sport requires a complex sequence of activation and timing appropriate to the activity that you are performing. This sequence is known as a functional motor pattern, and it requires an interplay between your musculo-skeletal system and your nervous system from the soles of your feet through your whole body to your head.

The programme presented in this book develops this interplay by integrating core stability concepts with posture, balance, mobility and neuromuscular control to provide you with a physical platform for fluent, trainable movement. Once you have this movement, you can then train to make it faster, stronger and more powerful.

There are top athletes who have all of this working naturally. There are others who don’t realise that there are elements which could improve, because no one has ever looked. There are many who are unaware that they have lost elements due to injury, and wonder why they just can’t seem to make a successful comeback. Then there are those of us who are just trying to find the natural athlete within ourselves.

This book is for anyone interested in developing their own sporting movement, or who deals with athletes and athlete development at any age. It has been crafted in response to the needs of coaches, sports trainers, therapists and athletes who aim to develop sound, efficient movement in their sport, and is based on many years of experience in solving technique and injury problems across a wide variety of sports.

It is a practical resource, written as simply as possible in order to establish a common language between athletes, coaches, sports scientists and medical professionals working in sport. It was written to be a bridge so that we all can make ourselves understood.

The concept of functional stability for performance is explained, and how it contributes to the control and production of force and form in athletic movement. Once you are familiar with the anatomy and behaviour of some of the muscles which provide body control, we look at how to assess them and what to do when you find areas of weakness.

The exercise programme is presented in four phases which guide you in how to order and progress your programme. Many of the exercises will be familiar. Understanding why you are doing them, what they should look like, how they should progress and what you can use as alternatives is what makes the difference.

The principles are straightforward and relevant to most sports, and can be applied to children as well as adults. A chapter is dedicated to stability concepts for movement development in children, as many coaches work with athletes across a range of ages. I believe that the movement we have as adults starts a long time before we ever start training. I don’t believe you can be too young to learn how to move beautifully, and in the computer game generation, the issue becomes ever more relevant.

This approach has been used with international-level athletes in disciplines as diverse as swimming, badminton, gymnastics, karate, judo, cycling, football, weight lifting, basketball, athletics, snow sports, golf, equestrian sports and tennis. However, it works just as well for weekend warriors and people who just want to enjoy their sport and enjoy their own movement.

Moving well doesn’t have to be complicated. The principles are based in science, but in practice you need to know what to look for, what it means and how to fix it if it isn’t what you are after. That is what this book is all about.

A note on language and expression
This resource is intended to be a bridge between athletes, coaches, and other sports professionals. Some readers will be testing and training themselves, and others will be supervising athletes. This is reflected in the language used throughout the book: mostly it is necessary to write for the person who is increasing their own awareness and capabilities, but in order for the processes described to be used in a team environment, some content is aimed at professionals trying to implement injury prevention or movement programmes with athletes. The different purposes would normally be presented in separate publications and it certainly would have been much easier for language consistency if this was the case, but it would have taken away the opportunity for those who are interested in a bigger picture to see how different perspectives fit together. As such, switches between the athlete’s perspective and that of the medical, science or coaching professional will be recognisable in the book but should enhance rather than detract from its usefulness.
**Stepping Rotations**

Having worked on isolated trunk rotation control and pelvic integration, the lower body can be added to complete the movement chain.

Stand side on to the wall a little further away than for the previous exercise. Start with your feet together. You can vary your arm position. Arm options are:

- Arms start low and rise to waist height as you rotate to release the ball.
- Arms start at shoulder height with the palms facing towards the wall.
- Arms are maintained at waist height throughout the movement.

Side step strongly towards the wall to initiate the throwing movement. Continue to rotate the pelvis and trunk over your front foot before releasing the ball. Make sure you release your back heel in order to let your pelvis rotate freely. One side will feel natural and the other side will not. Practice a few movements without the medicine ball to make sure the movement sequence is established before loading it.

What would a poor pattern look like?
- If you don’t allow your back heel to release and turn as you move, your movement becomes blocked and you will try to throw the ball using your arm instead of using the momentum generated from your lower body and trunk. Releasing the ball should feel like a whip cracking. It should not feel like you have to use a great deal of shoulder strength.

**Lunge Bounces**

This exercise increases force production and focuses on integrating your arm action with your trunk and lower body. Start with your feet together and a medicine ball in your hands. As you begin to step forward into a lunge, raise the ball above your head keeping your trunk neutral. As your front foot contacts the floor, firmly throw the ball into the floor.

What would a poor pattern look like?
- Allowing your spine to arch as you take the ball over your head means that you have lost trunk control and disconnected your arms from your trunk and lower body.

**Standing Quick Throws**

This exercise coordinates the trunk and the upper limbs with a light plyometric stimulus.

Stand with knees and hips softly bent and lower belly drawn in to help you to maintain a neutral spine. Remember to keep the back of your neck long in the balloon position. Take a light medicine ball at chest level and throw it at the wall with both hands. Catch and repeat rapidly. Focus on feeling your abdominals controlling your spine.

What would a poor pattern look like?
- Your trunk should remain upright during this movement. Some athletes try to stabilise with their back muscles instead of the abdominals by pushing their hips out behind them and deepening the curve in their spine.

**Progression**
- Perform the same exercise on single leg, maintaining a firm pelvis and trunk. Keep your pelvis level and your knee in line at all times.

What would a poor pattern look like?
- Your trunk should remain upright during this movement. Some athletes try to stabilise with their back muscles instead of the abdominals by pushing their hips out behind them and deepening the curve in their spine.