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## Editorial



Welcome to the winter edition of *In Touch* which is all about aspects of sport and exercise. Our articles aim to deliver relevant, evidence-based content that can be applied in our clinics. As ever, this edition is only possible thanks to the generosity of our authors, all of whom are experts in their various fields; literally, in the case of our lead article on cricket fast bowlers.

Having recently had physiotherapy students shadowing me at work, I have been reflecting on the career path of the private physiotherapist. There is no manual on “how to become a great physiotherapist”, and there is no end point or holy grail of great physiotherapy. Of course we can attend courses and conferences, and stay informed by reading up-to-date clinical studies, but how do we explain and demonstrate our expertise to our peers and the public?

Even Louis Gifford, one of the great clinicians in our profession, struggled at times to make sense of “physiotherapy”. He went to work on a building site for a couple of weeks before returning to the profession and embarking on his journey to explain pain. For many of us, owning and running a thriving physiotherapy practice is accolade enough, but does this prove to your peers and the public that you are a good physiotherapist, or an expert in your field?

For me, the road to being considered an expert physiotherapist is in embracing a mixture of different approaches; in not focusing on one narrow aspect of what we might think physiotherapy is, but rather in understanding that every component, from our academic knowledge to our hands-on skill, to our awareness of the role of communication and of life-long learning, all contribute to what it means to be considered an expert physiotherapist. For our peers, the public and our marketplace, Physio First members are in the unique position of having the opportunity to prove the efficacy of taking such an open and inclusive approach to all aspects of private physiotherapy practice. Through our own data collection tool, we can now not only demonstrate our individual quality but also, by maximising the range of skills contributed by colleagues in our clinics, this proof can be extended to achieving Quality Assured Clinic (QAC) status.

As for this edition of *In Touch*, I believe that it reflects the range of aspects that can help towards being an expert physiotherapist, the practical aspects of rehabilitation for elite and amateur sports players, the different methods of obtaining all-important adherence to treatment programmes, and in raising the awareness of the benefits of exercise and activity in our communities. We hope you think so too.

Until next time.

**TOBIAS BREMER** | MSc MCSP | EDITOR

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# The curse of being a cricket fast bowler: low back injuries and pathomechanics

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Low back injuries are common in the cricket fast bowling population. Inertial sensors, a novel technique for “in-field” fast bowling biomechanical analysis, have been employed to study the pathomechanics of such injuries, and have shown those studied to have exhibited limited range of spinal rotation or lateral flexion, and softer back foot impact at the start of their delivery stride which may lead to compensatory and potentially damaging motions in order to generate ball release speed later in their bowling. Excessive lumbar extension at the later stage of bowling may place undue compression on the vertebrae. Strategies to address these risk factors without compromising performance are described in this article.

## LEARNING OUTCOMES

TO SUPPORT PHYSIO FIRST QAP

- 1 Recognise that low back pain is prevalent in cricket fast bowlers.
- 2 Review advances in on-field measurement of sport motion capture.
- 3 Describe alterations in bowling patterns associated with back pain.
- 4 Understand how altered motion sharing can help preserve performance and reduce back pain risk.

## Introduction

Some morphological and pathological findings are common in the spines of cricket fast bowlers. A stress reaction in the pars, or stress fracture of the pars is very common, with a prevalence of up to 67% (Johnson *et al* 2012). The long recovery times often reported for such injuries can have a profound impact on the players and teams involved. It has, therefore, long been the desire of coaches, clinicians and researchers to solve the pathomechanics responsible for such injuries.

In-vitro studies demonstrated that repetitive extension loading, causing compression of the pars, is the likely culprit (Green *et al* 1994). In addition, as side flexion creates “unilateral extension loading” for the unilateral pars, it is likely that this motion can result in pars injury, as would the combination of these two motions. Despite this, early theories have suggested shoulder counter rotation as being one potential mechanism of the bowling action linked with the prevalence of lumbar stress fracture (Foster *et al* 1989) but, with the development of more sophisticated motion analysis equipment, excessive side flexion towards the non-dominant side has also been proposed (Ranson *et al* 2008). The mechanism here is one of “slamming down” into left side flexion (for the right-handed bowler) resulting in significant extension and compressive loading of the left pars. Indeed, it is the pars on the non-dominant side most often damaged (Engstrom & Walker 2007).

Furthermore, Quadratus Lumborum (QL) on the dominant side has also been shown to be more developed and larger, resulting in asymmetry presumably to

act as a brake working eccentrically to slow the rapid left side flexion (Engstrom & Walker 2007). In individuals with poorly developed right QL, there is a greater likelihood of demonstrating a pars stress reaction on the left, suggesting that QL asymmetry (development of hypertrophied right QL) is protective for the non-dominant side pars.

This hypothesis is, however, firmly focused on identification of pathological change measured by imaging, not on pain. It is well known that pars defects can exist pain free, and it is also clear that time missed in cricket fast bowling is often due to complaints of pain (Millson *et al* 2004). The question of what links the pathomechanics of fast bowling to lower back pain (LBP) therefore remains.

## Measuring the bowler

Measuring technique related to identifying the fast bowling “factors” linked to LBP is not trivial. Current methods for analysing spinal kinematics involve systems such as optoelectronic motion analysis, i.e. reflective markers with multiple cameras, e.g. Vicon which, despite being

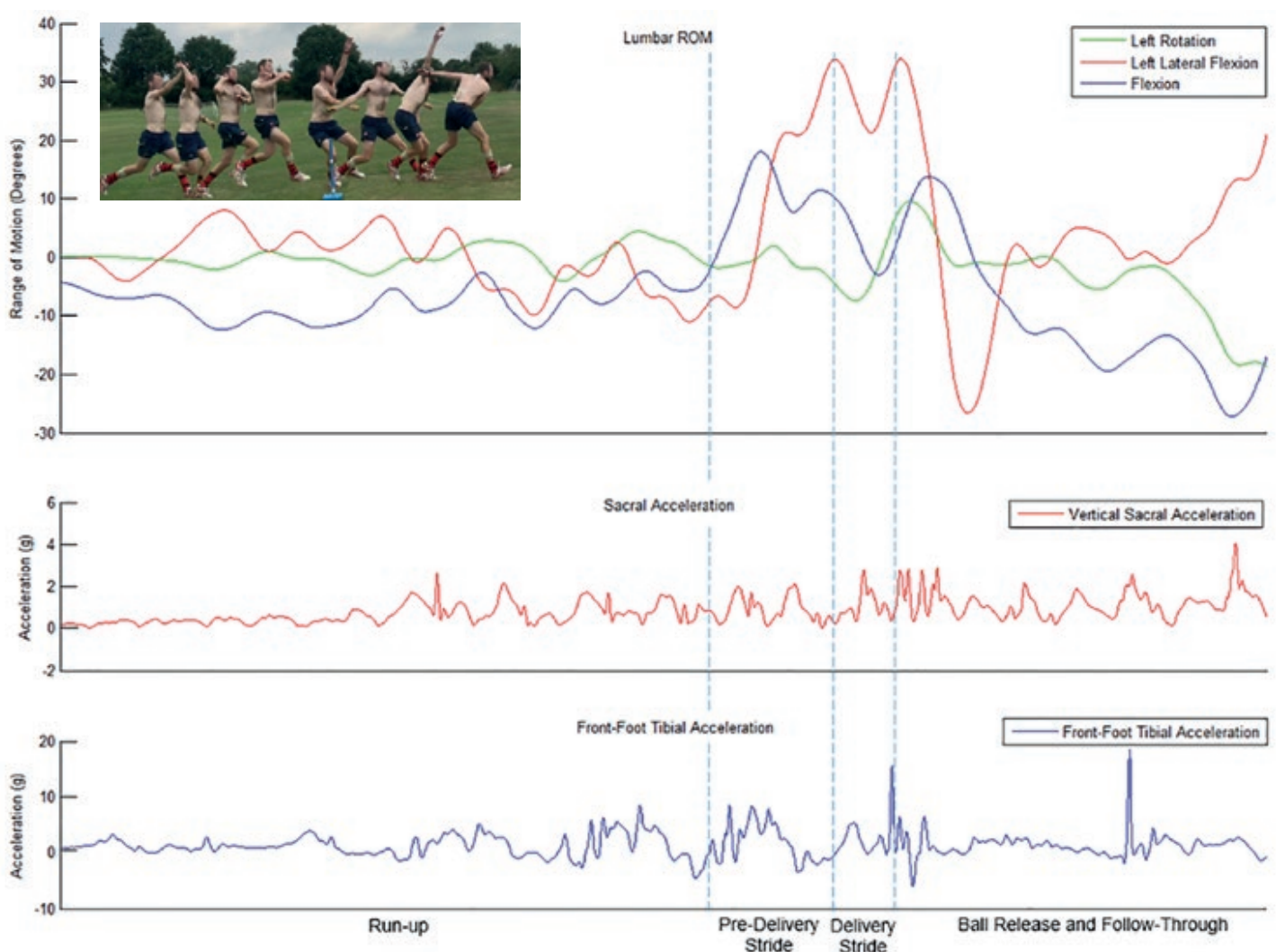
## “MINIATURE DEVICES SUCH AS INERTIAL MEASUREMENT UNITS AND ACCELEROMETERS ENABLE US TO EVALUATE THE ON-THE-FIELD ACTION OF THE CRICKET FAST BOWLER”

expensive, require a defined space large enough to accommodate the bowler's run up, or electromagnetic systems such as Fastrak that require the bowler to wear a reference sensor that will be subject to large movement during the ballistic bowling action. It is therefore difficult to measure the “on the field” real-time spinal motion of a cricket fast bowler. To overcome this our own experimental work employed miniature inertial measurement units (IMUs). Such devices have been successfully employed to measure hip and lumbar motion (Saber-Sheikh *et al*

2010; Williams *et al* 2014) within clinical environments, but our group were the first to employ them to measure cricket fast bowling. Previously we have shown that IMUs are both valid, compared to gold standard (Saber-Sheikh *et al* 2010; Senington 2018) and reliable (Williams *et al* 2013), and we have successfully employed them to measure spinal kinematics during other sporting applications, such as rugby scrummaging (Swaminathan *et al* 2016). They therefore provide a viable option to measure real-time cricket fast bowling.

Measuring only spinal kinematics may not offer the whole picture, however. Impact and loading at the front foot impact (FFI) phase of fast bowling has also been widely investigated by utilising force plates, and most authors agree that there is, to date, no relationship between FFI and spinal injury, but this assertion hasn't been extended to any relationship to “back pain”. The task of measuring front foot impact in cricket is, again, not a trivial one with most researchers opting for force plates within a laboratory setting which makes it difficult for routine use “in the field” to provide real-time feedback. Our group, therefore, developed an alternate method with the use of accelerometers.

Accelerometers have been used extensively for measuring impacts to the head to establish safety applications such as helmet design (O'Connor *et al* [▶](#))



**FIGURE 1:** Example outputs from inertial measurement units that may be used to monitor bowlers

2014), where the accelerometer detects the “arresting” acceleration of a “head” with and without protection. A similar concept has been applied to the tibia, with tibial mounted accelerometers used to quantify impact associated with running and jumping. In our previous work we developed an impact accelerometer capable of detecting differences in surface properties (Senington 2018), and for impact profiles during running wearing various types of shoe (Williams *et al* 2016). However, we have also used the tibial mounted accelerometer to quantify back and front foot impact in real-time during live fast bowling (Senington 2018). Although this measurement represents the accelerations experienced at the tibia, but not the ground reaction force of the foot, it is a strong surrogate method of the latter (figure 1).

The use of such miniature devices could inform medical staff, therapists and coaches of the spinal motion and tibial impact employed to achieve the bowling action, providing valuable quantification of bowling action in real-time.

As mentioned previously, the literature suggests excessive shoulder counter rotation or excessive side flexion is linked to stress injury, but what about pain? What can this new method of measuring fast bowling tell us about the mechanisms behind back pain in fast bowlers? To answer this our group looked at those with a history of LBP (retrospective) as well as those bowlers who went on to develop LBP (prospective).

### **Retrospective analysis: what did we learn from the bowling action of those with a history of back pain?**

Retrospective analysis involved measuring spinal kinematics during bowling in those reporting a history of back pain, compared to those without a history of back pain in the preceding season. Both the seniors and juniors with back pain showed a lack of “wind-up”, characterised by a reduction in right thoracic rotation in right-handed junior

bowlers, and a lack of right lumbar side flexion in right-handed senior bowlers. It is proposed that this movement away from the direction of delivery serves to generate the bowler’s momentum and pace. A reduction in the contribution from the “wind-up” may result in alternate methods being used to generate pace which ultimately stress the spine differently. This then poses the question of why not use this wind-up? Could the answer be because it is painful? As mentioned previously the literature suggests that pathological changes in the spine of fast bowlers are on the non-dominant side, and no bowlers reported pain at the time of data collection, therefore it seems unlikely to be a mechanism of avoidance. The reduced thoracic contribution suggests that juniors with a history of pain demonstrate different patterns of “motion sharing”.

The findings of the tibial impact data were similar in both the juniors and seniors with a history of LBP. Both groups demonstrated a reduction overall in tibial impact at back foot impact (BFI), and an increased overall tibia impact at FFI. It is proposed that BFI may serve as a preliminary “break” in the forward transition of the bowler and thus begin the process of deceleration. With this mechanism impaired it is possible that the bowler proceeds without this key pause in run up to prepare for the delivery stride.

### **WHAT DOES THIS SUGGEST FOR TREATMENT?**

It is difficult to suggest treatment as we don’t yet know if these altered patterns of kinematics and impacts are adaptive or maladaptive in nature. If we take the assumption of these differences being “impairments” in function, then in juniors we should work on lumbo-thoracic dissociation and the enhancement of (right) thoracic rotation during the delivery stride. For seniors, methods to enhance the use of right lateral bending at the BFI stage of the delivery stride would be indicated. This is proposed to have the effect of reducing subsequent left lateral bending, as there will be more available range to “brake” or arrest the rapid left lateral bending seen at FFI.

With regard to the impact findings, the coaching intervention proposed would be to encourage greater impact at the BFI phase of the bowling delivery stride. Our work seems to suggest a BFI: FFI ratio close to 2:3 as this was observed in both juniors and seniors without a history of LBP.

### **Prospective analysis: what did we learn from the bowling action in those bowlers who went on to develop back pain?**

None of the juniors went on to develop LBP in the follow-up season, therefore no prospective analysis was possible. There were, however, some lessons to be drawn from the senior bowlers as those who went on to develop LBP demonstrated larger lumbar extension at BFI, over twice that of the group who did not develop pain. In addition, they also used larger amounts of lumbar flexion at FFI, thus demonstrating greater overall sagittal range than those who did not develop LBP. Why? Well, it is possible that this increased “wind-up” in the sagittal plane is a compensation of a lack of lateral bending wind-up, again serving as a mechanism to generate bowling pace.

The overall magnitude of tibial impact and the rate of tibial loading were reduced in those individuals who went on to develop LBP. This suggests a mechanism to lessen the overall loading. Large differences were clear at BFI, with those that developed back pain displaying half the overall tibia impact

**“ON RETURNING TO THEIR SPORT, FAST BOWLERS SHOULD BE ENCOURAGED TO PERFORM A STRONG AND SHARP FOOT STOMP AT THE BACK FOOT IMPACT PHASE”**

compared to those who did not develop pain, suggesting that this is a potential mechanism for reducing load associated with this moment of the delivery stride.

These findings suggest that approaches to alter the motion sharing coupled with “extension” might be indicated. In fast bowlers it is possible that the posterior shift of shoulders relative to hips is required for “wind-up” and generating pace. This can be achieved through a number of mechanisms, with one example being lumbar extension. However, this wind up can also be achieved through thoracic extension, which was noted to be reduced in this group of bowlers who developed LBP. Therefore, techniques to enhance thoracic extension and then make “use” of this movement during bowling could be indicated.

Thoracic extension is, however, anatomically limited, therefore as an alternative, or in addition to this use of movement, facilitating hip extension to bring the shoulders behind the pelvis would enhance the contribution of the hip to the motion and result in wind-up without the excessive lumbar extension motion. Techniques to enhance hip extension and to use that extension through lumbo-hip dissociation, ultimately integrating into the bowling stride would, therefore, be indicated. Once a bowler begins to return to their sport, encouraging them to perform a strong and sharp “foot stomp” at the BFI

phase may assist in how they arrest the forward momentum of their delivery (figure 2).

## Removing the curse by “motion sharing”

The concept of motion sharing is not new, although its nomenclature has changed and continues to evolve. Often referred to by clinicians as lumbopelvic rhythm, or by researchers as phase angle, the foundation of the concept is how two or more anatomical regions contribute to the overall global motion. From the perspective of the spine, then, “backward bending” with the aim of shifting the shoulders posterior to the pelvis, is very common both in sport and in daily life. When such a motion is achieved through lumbar extension the level of tissue stress is increased as the motion moves towards the end of the anatomical range of the lumbar spine. Repetitive bending of the pars is known to result in its failure, so sub failure is likely to result in irritation or soreness in these pain-sensitive structures.

## Considerations for the bowler’s performance

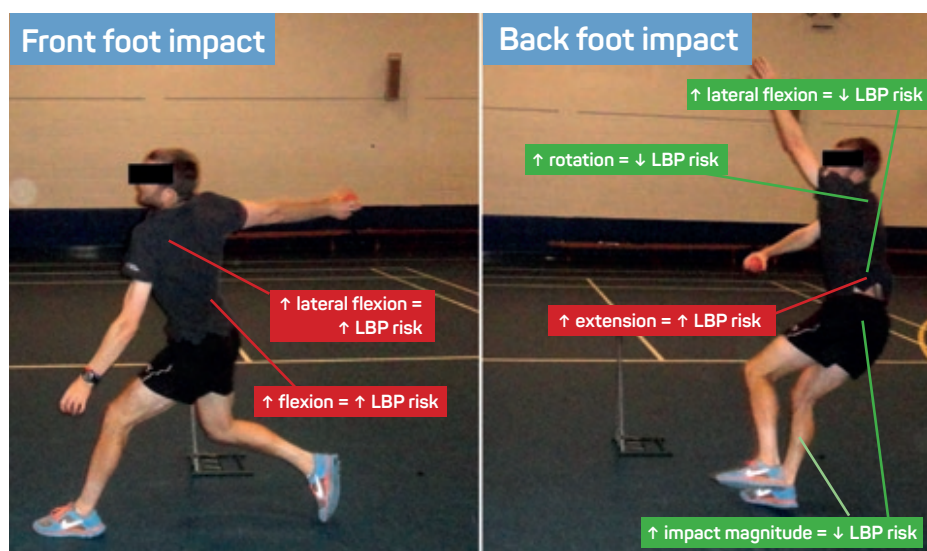
It is important to consider the recommendations on motion sharing in the context of the performance of the fast bowler. If their performance deteriorates due to modification in motion sharing kinematics or loading, this may affect their willingness, and the willingness of their coach, to adopt such modifications.

This was an area we also investigated in our research. By exploring which of the variables we measured were associated with bowling speed, we determined a strong correlation between bowling speed and vertical sacral loading rate at BFI, suggesting that increasing vertical sacral loading would increase bowling speed. The mechanism for increasing vertical sacral loading rate was in facilitating a “stiff legged” approach to BFI. As mentioned earlier, increasing BFI also reduces the risk of LBP and these additional investigations have shown that, when BFI is completed with a stiff leg, it enhances bowling speed. The stiff leg approach serves two functions; firstly, it minimises the attenuation or absorption of shock / load through the joints, especially the knee, ensuring momentum is transferred and not “absorbed” or lost. Secondly, it maintains the height of the bowler, offering a longer fulcrum for transfer of momentum.

In addition, thoracic side flexion was strongly correlated to bowling speed, again suggesting increasing range of motion of thoracic side flexion increases bowling speed. This was evident at the FFI stage suggesting that side flexion into the direction of bowling is important for generating bowling speed. None of the other kinematic or impact related variables that we measured were linked to bowling speed, thus suggesting that the recommendations above for minimising LBP would not have any significant impact on bowling speed. However, while these recommendations may be appropriate for the bowlers used in our studies, the complex nature of the skill and natural physiological and technical variation between bowlers is likely to mean alternative solutions that address the same (or similar) underlying pathomechanics may be required. As such, a “case by case” approach is recommended.

## Conclusion

The prevalence of LBP in cricket fast bowlers is high and seems to be linked to a lack of “wind-up” through right thoracic rotation in (right-handed) juniors, and a lack of right lumbar side



**FIGURE 2:** Fast bowling factors that may increase or decrease risk of LBP

flexion in (right-handed) seniors. Other factors include reduced tibial impact, and an increased lumbar extension at BFI, and increased lumbar flexion at FFI. Treatment that is directed at altering motion sharing may modify the risk factors without compromising the bowler's performance.

## About the authors

Having studied in the UK and Australia, Jonathan Williams is a prominent researcher in the field of physiotherapy and biomechanics and is passionate about the fusion of physiotherapy with engineering and the use of engineering principles to solve biomechanical and clinical problems. He has applied this interest to the creation of novel measurement solutions for motion analysis for various regions of the body.

Billy Senington has taught across a range of undergraduate and postgraduate degree programmes and has worked with elite athletes from a variety of sports, on their performance and rehabilitation. Billy's PhD research highlighting the biomechanical risk factors for lower back pain in elite junior and senior cricket fast bowlers has been disseminated internationally as conference proceedings and in journal articles.

Raymond Lee is responsible for the development and implementation of global engagement strategies for Faculty of Technology at the University of Portsmouth. His PhD in Bioengineering was received from the University of Strathclyde and, in winning a Fellowship to the Association of Commonwealth Universities Development, Raymond was able to undertake research

at King's College London. Specific research interests include spine biomechanics, aging and osteoporosis, and engineering methods in the study of the mechanisms in underlying spinal disorders to quantify clinical outcomes. Raymond is currently studying how exercise and mechanical loading may influence musculoskeletal health, and the risks of vertebral fractures in older people.

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# Designing meaningful experiences: a point of view on clinical reasoning

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Consultant in Performance Innovation



Evidence and scientific paradigms of reasoning are important elements of physiotherapy. These paradigms are based on the premise that a “reality exists” and that this reality can be measured to reduce the uncertainty around decision making. This article explores a topic that is less easily measurable as it sits in the subjective domain; the area of designing meaningful human experiences, and the relevance of experience design to clinical reasoning, patient management and behaviour change. Addressing context and perception to clinical problems is important, and the development of professional expertise in this area may help move the patient experience from the ordinary into the realm of the most meaningful.

## LEARNING OUTCOMES TO SUPPORT PHYSIO FIRST QAP

- 1 Understand the importance of science and evidence to clinical reasoning, while recognising that what can be measured isn't necessarily the same as what is meaningful.
- 2 Be aware of the potential value of experience design as a part of professional development, and as a valuable outcome for the patient and therapist.
- 3 Recognise the importance of experience design to clinical reasoning, outcomes, problems of perception, and patient compliance and behaviour change.

## Introduction

*“I’ve learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel” (Maya Angelou<sup>1</sup>)*

Since its origins in 1894, the evolution of the physiotherapy profession has been largely guided by the principles of care, effectiveness and efficiency. In its infancy, these constructs served the purpose of differentiating the profession from the dubious massage

related scandals of the time (Callaway & Burgess 2009). Through emphasising an alignment with high academic standards and a medical model of training, the profession set a course for respectability and credibility (Callaway & Burgess 2009).

The early alignment to high academic standards and the medical model led to the generation of theoretical frameworks for clinical reasoning through which practitioners could reference and defend their actions and improvise clinically around what was deemed to be the sound principles of the time.

In general terms, a main feature of the early days of the profession's evolution was its reliance on craft, professional wisdom and experience of both the practitioner and the patient. This did not exclude reference to the scientific theories of the time, but there appeared to be a tolerance that it was acceptable for practitioners to merge this practical wisdom with the context of the patient's situation and values, to create bespoke meaningful management programmes. Anecdote and stories appeared to dominate over research evidence (Wallis & Prasas 1999).

The rising demand for evidence of effectiveness coupled with the expression of this being aligned to

scientific methods, largely objective and reductionist in the first instance (Roberts 1994), proved to be a major driver for the current paradigm of physiotherapy practice. Emphasis shifted from anecdote and patient experience or satisfaction to a quest for research and evidence. Scientific reasoning now sits at the heart of all current physiotherapy practice (Kerry *et al* 2008).

The need for evidence that is valid, reliable and sensitive is critical to the future of the profession in order to reduce the likelihood of harm and to maximise the effectiveness for the patient of any intervention (Iles & Davidson 2006). The practical challenge is using research methods that measure what they claim to, that measure what is relevant, and measure in ways that embrace the context of the situation, and that can find an effect if it is really there.

One of the daily evidence-based challenges that practitioners face is having to clinically reason when there is an absence of research evidence, or where evidence is deemed to be of lower value. For example, my daily work is with UK Olympic and Paralympic athletes and coaches, a relatively small cohort of around 2,000 who are at the extreme end of what is humanly possible sport-wise

## "A DAILY CHALLENGE FOR PHYSIOTHERAPISTS IS HAVING TO CLINICALLY REASON WHEN THERE IS AN ABSENCE OF RESEARCH EVIDENCE"

and for whom context specific scientific evidence is sparse to say the least. The chance of finding a control group for a gold medal winning athlete is almost impossible.

There is therefore a difficult decision flux between the craft of the profession (the art) and the evidence for effectiveness (the accuracy). Often evidence-based practice discussions tend to centre around the "art vs accuracy" dilemma as seen in the current evidence-based medicine renaissance movement (Greenhalgh *et al* 2014).

Practitioners work through the "art vs accuracy" tension on a daily basis through the process of clinical reasoning, which can be defined as "an inferential process used by practitioners to collect and evaluate data and to make judgments about the diagnosis and management of patient problems" (Higgs & Jones 2008). In essence, practitioners collect information, make their own sense of it in clinical terms, create degrees of belief relevant to the pathology and patient, and then propose the optimal strategy to benefit the patient and do so in ways that are preferably holistic with progress measured using subjective and objective markers.

If we shift focus for a minute from important questions relating to the hypothesis/diagnosis, evidence-based management approaches and outcomes, to a focus on the patient, their experiences of us and their context, and think of how we might design the most meaningful experience that we can in relation to the patient's values, we come to an interesting and sparse area in terms of evidence and clinical reasoning. This is the consideration of how we can make sense of different patient experiences and then how we can create (design),

with the patient, the most meaningful experience and ultimately consider how might we measure this?

This article presents a point of view related to the clinical reasoning process that has arisen from my observations and thoughts from experience, studies and research in the world of art and design. Due to the conceptual and provocational nature of this article, the style will be more illustrative and descriptive than "scientific". This is deliberate in order to promote thoughts rather than evidence for or against.

The term "point of view" is used to propose a framework for ideas and to see where this takes the readers' thoughts. I am not stating that this is what should be, or failing to acknowledge work in this area that already exists, but rather wondering whether, if we thought of things in another way, where might it take us?

This point of view is based on the following five assumptions/propositions:

- The current trend is to value the measurable over the meaningful
- Viewing physiotherapy from a design perspective may add significant value to the paradigm through which physiotherapy is understood and evaluated
- As human beings our lives are a collection of experiences. We can design many of these experiences and the role that these experiences play in the lives of others
- We should focus less on the reductive aspects of clinical reasoning and more on the meaningful experiences we can design through our actions
- Experience is about transformation, by linking experience to behaviour change and transformation we may significantly increase the impact of our work.

Ultimately, the aim is to significantly boost the emphasis on the design of meaningful patient experiences which incorporates research evidence, would add value to the clinical reasoning process and increase the impact of physiotherapy.

### The fuzzy concept of experience

Linking the terms "meaningful experience" to the evidence-based paradigms that govern practice poses significant challenges. The terms are constructs and lack clarity and precision and as such have no singular definition (Berridge 2007).

In an attempt to narrow down the term experience, what is referred to in this article is not that related to the knowledge or skill acquired over a period of time, i.e. professional experience, but rather that related to the following Cambridge Dictionary definitions of experience:

- something that happens to you that affects how you feel
- the way that something happens and how it makes you feel.

Using these definitions, we can re-express the term experience to represent transformation related to thinking, sensing, feeling and acting in a particular context. In so doing we take the discussion of experience deeply into the area of emotion and human values that may be argued to be primal at their very heart (Barrett 2017).

Because thoughts, feelings and actions are the foundation of behaviour change strategies (Armitage & Conner 2000) and feature strongly in psychosocial models of care (Bogart & Delahanty 2004), it might appear that this article is simply referring to what already exists. After all, the patient's feelings and experiences lie at the heart of physiotherapy. The proposition is however that while we should clearly continue to value the importance of the patient's feelings and experiences and understand them, more emphasis should be placed on developing the discipline of how we design more meaningful experiences ➤

and acknowledge these as valuable outcomes measures.

It is possible that certain treatment / management strategies are effective because they create, through changes in perception, beneficial experiences such as certainty, control, or independence, to name but a few. This is obvious if we consult papers relating to the psychological and placebo effects of treatments (Miller & Kaptchuk 2008); however, how can these factors be used to create the “end goal” of a meaningful patient experience?

Diller *et al* (2006) illustrated the principle of meaningful experience in a non-patient context. They surveyed 100,000 people from around the world about their most important and meaningful life experiences. Table 1 contains 15 of the meaningful experiences that most frequently emerge from their research.

While there are many more experiences captured that don’t appear in Table 1, the generic value in this research lies in how designers and the commercial world reference and use it for inspiration to build these experiences into their products and user experiences in order to enhance value and, through this,

influence or change behaviours. The premise behind this approach is that a very powerful way in enhancing value is by changing perception through experiences; things are not simply what they are but what people think they are (Sutherland 2019).

The value of transferring the work of Diller *et al* (2006) to physiotherapy might be in developing a similar list relating to context specific patient experiences both of their conditions and their desired future state. With such a list we could then explore, discover and develop management strategies that have the end goal of delivering those patient experiences. For example, we might design a return to play strategy for an athlete based on creating the experiences of security, control and certainty. So, instead of viewing treatment benefits as simply being functional, i.e. increase in range of motion or being able to run faster with less pain, the emotional benefit is valued and amplified in the management approach.

**Meaningful experiences and behaviour change: an example from sport**

Behaviour change is useful to illustrate the importance of an experience-based

approach. It is a critically important area given the link to patient compliance (Campbell *et al* 2001) and is an area that is growing in attention and support in the clinical research literature (Fortune *et al* 2019; Freene *et al* 2017). There are many behaviour change models but in the clinical world the Behaviour Change Techniques Taxonomy v1 (BCTTV1) is growing in use and value (Michie *et al* 2013).

As a Consultant in Performance Innovation, I illustrate the link between experience and behaviour change with a model that has been developed from the field of behavioural economics (Wendel 2014) and advertising (Ferrier and Fleming 2014) and modified on the basis of empirical evidence and experience.

Innovation, rather like clinical work, has three main components:

**Stage 1 – The idea**  
Developing an idea that is new and presenting it in a compelling way as a solution to a particular problem. Clinically, this is equivalent to the diagnosis / hypothesis and then recommending a course of action to the patient.

**Stage 2 – Adoption**  
Presenting the idea in a way that maximises the likelihood that someone will adopt the idea and “give it a try”. Clinically, this is the stage of, for example, giving a patient an exercise programme. The hope is that they are receptive to the idea and will carry it out.

**Stage 3 – Positive difference**  
The idea is adopted and makes a positive difference by adding value. Clinically, this is the patient experience of improvement.

The idea, without adoption or difference, is an invention without user value.

Adoption and difference are all about changing behaviour; to do something new for it to make a difference. Innovation, therefore, is all about behaviour change.

In terms of creating a meaningful

| EXPERIENCE     | EXPLANATION                                                                                            |
|----------------|--------------------------------------------------------------------------------------------------------|
| Accomplishment | achieving goals and making something of ourselves                                                      |
| Beauty         | appreciating qualities that give pleasure to the senses or spirit                                      |
| Creation       | the sense of having produced something new and original                                                |
| Community      | the sense of unity with others around us and a general connection with human beings                    |
| Duty           | the willing application of oneself to a responsibility                                                 |
| Enlightenment  | clearly understanding through logic or inspiration                                                     |
| Freedom        | the sense of living without unwanted constraints                                                       |
| Harmony        | the balanced and pleasing relationship of parts to a whole whether in nature, society or an individual |
| Justice        | the assurance of equitable and unbiased treatment                                                      |
| Oneness        | the sense of unity with everything around us                                                           |
| Redemption     | atonement or deliverance from past failure or decline                                                  |
| Security       | the freedom of worry about loss                                                                        |
| Truth          | a commitment to honesty and integrity                                                                  |
| Validation     | recognising oneself as a valued individual worthy of respect                                           |
| Wonder         | awe in the presence of a creation beyond one’s understanding                                           |

TABLE 1: The 15 most meaningful experiences, with explanations. Adapted from Diller *et al* 2006

experience to maximise the likelihood of behaviour change, the first stage may be called “understanding the audience”. In practical terms this means understanding the thoughts, feelings, actions, desires and values of a person / patient in a particular context. This is critical as the design of the experience for change should be based on the person’s values and not be an imposition of your values on them.

Once this understanding has been achieved then the experience of change is designed around the following pragmatic research-based principles.

## First principles

Based on the work of Fogg & Hreha (2010), the three core elements of behaviour change suggested are:

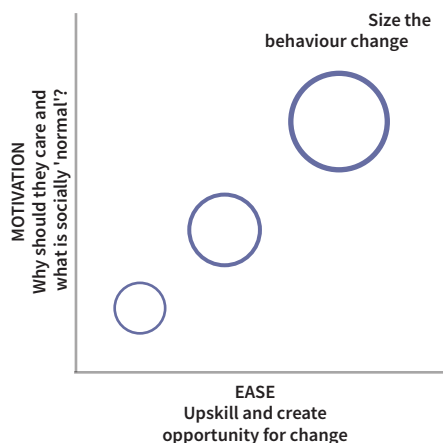
1. Motivation; the person needs to care enough to want to change
2. Ease; the behaviour change has to be as easy as possible
3. Trigger; find the trigger for the new behaviour.

Ferrier & Fleming (2014) expand on these three principles and present an approach with components called action spurs that are useful to use as a basis to design an experience for change (figure 1).

1. Motivation; the two main factors in this component are that the individual has to want to change, and that the social norms significantly influence the motivation to change
2. Ease; the behaviour change must be as easy as possible to achieve
3. Size the behaviour; identify the magnitude of shift from the current behaviour to the desired behaviour.

Ferrier & Fleming (2014) also present a list of approaches that may be useful in designing an experience that may either increase the motivation aspect of behaviour change (table 2) and / or make the behaviour change easier (table 3).

At the Rio Olympic and Paralympic games, a project with the aim of getting athletes to increase handwashing in order to help reduce the risk of illness



**FIGURE 1: Action spurs for designing the experience of change. Adapted from Ferrier & Fleming 2014**

perfectly illustrates how the approaches presented by Ferrier & Fleming (2014) and Wendel (2014) can be used in practical terms to create an experience that maximises the possibility of behaviour change.

The approach to increasing handwashing started by understanding the audience through identifying the athletes’ current behaviours, attitudes and values related to handwashing. Barriers to changing the frequency and persuading the athletes to increase their handwashing included time, ease and also perception on importance; many didn’t care enough to change their behaviour.

To increase motivation towards more frequent handwashing, a series of experiences were created using the

following approaches, based on motivation spurs illustrated in tables 2 and 3.

- Reframing and evocation – the benefits of regular handwashing were amplified, and the potential impact that illness would have on the athletes’ performance dream was highlighted
- Collectivism, ownership and modelling – athletes were involved in deciding what should be done to help minimise the risk of illness. Those athletes who already demonstrated ideal behaviours were used as an example to create social norms and talismanic, high-profile athletes were used to model best behaviours
- Play – a lighthearted video was produced to convey the main messages and UV light boxes were distributed to gamify the process
- Ease – hand foams were made available to all athletes with simple instructions for use. Hand foam dispensers were also installed in certain areas of high risk, i.e. food halls, and applied to everyone who entered the hall.

On the assumption that all patient encounters involve some element of behaviour change, be it in thoughts, feelings or actions, creating the optimal “conditions” for change through the application of designed experience/s increases the likelihood that the desired change may occur. ➔

| APPROACH     | EXPERIENCE AND EXPLANATION                                                |
|--------------|---------------------------------------------------------------------------|
| Reframing    | frame the behaviour in a different, more appealing way: focus on benefits |
| Evocation    | stir powerful emotions to motivate behaviour                              |
| Collectivism | align change to what others think and do                                  |
| Ownership    | ask people to be involved, what do people think should be done            |
| Play         | make the desired behaviour enjoyable                                      |
| Utility      | offer additional benefits to encourage the behaviour                      |
| Modelling    | use a high profile, credible person to inspire or inform the behaviour    |

**TABLE 2: Motivation spurs. Adapted from Ferrier & Fleming 2014**

| APPROACH             | EXPERIENCE AND EXPLANATION                                                                                |
|----------------------|-----------------------------------------------------------------------------------------------------------|
| Skill up             | make it easier for people to achieve the behaviour that you want; developing the skills needed for change |
| Eliminate complexity | remove as many behaviours as possible to achieve the behaviour change                                     |
| Commitment           | increasing commitment is an important first step for behaviour change                                     |

**TABLE 3: Ease spurs. Adapted from Ferrier & Fleming 2014**

## Conclusion

There is a need for an increase in attention on, and emphasis in, designing meaningful patient experiences. What is proposed is a shift in thinking where what can be measured is expressed in terms of what is meaningful. To do this requires acceptance that creating the best experience for the patient, based on their values and beliefs, while at the same time respecting the need to use evidence-based approaches is a valid framework for clinical practice.

In more general terms, we live in an era of an experience-based economy where, given the large number of products and services choices available, people can select the ones they perceive will give them the best experience (Pine II & Gilmore 2011). For example, many cities have several private physiotherapy clinics, so the experience the individual receives from the one they choose to visit is a major feature underpinning that choice. Interestingly, research into experience design indicates that first contact, for example the phone call to book an appointment, or the encounter with the receptionist, can significantly influence the patient's value in the whole experience; perception is strongly linked to value judgment (Khairizam *et al* 2013).

We can all recall and share stories about the meaningful experiences in our lives and, at the end of the day, we will live on in stories about these experiences but promoting experience design as a clinical topic may be a bold step. Taking this approach into the clinical world, where science with all its value, has an obsession of solving problems of reality, poses many challenges.

Many of these challenges will require a paradigm shift in thinking from the emphasis on problems relating to "scientific reality" to those related to context and perception. In this vein, therefore, the challenge I propose is for the reader to investigate how to develop and deliver the knowledge and craft of context and perception to help move the patient experience from the ordinary into the realm of meaningful.

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Glenn is a Chartered Physiotherapist and, for the past 13 years, has been a consultant in performance innovation at UK Sport and the English Institute of Sport with the aim of identifying and delivering new ideas that help to maximise the success of British athletes at the winter and summer Olympic and Paralympic games.

Glenn holds masters' degrees with distinction in both science and art and design, and his main areas of interest and research lie in the design of experiences. He writes and teaches in the areas of innovation, behaviour change and experience design.

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# How important is muscle strength and are we training it correctly?

**CLAIRE MINSHULL** PhD PGCHE BSc (Sports Science)

Director, Get Back to Sport, Principal Researcher RJAH Othopaedic Hospital



Muscle strength is of fundamental importance for dynamic joint stability, function and quality of life. Over the past few years, a new set of terminologies have emerged to describe muscle strength performance, which can be confusing to the non-strength and conditioning coach and threaten the efficacy of rehabilitation endeavours. Adaptation of muscle strength, the maximal force generation capacity of a muscle in a single contraction, is unlikely to be optimal with generic exercise prescriptions such as three sets of 10. Much heavier loads and fewer repetitions are likely to be more efficacious and offer the rehabilitation professional, and patient, an opportunity for improved efficiency, i.e. greater gains for the time and effort invested.

## LEARNING OUTCOMES

### TO SUPPORT PHYSIO FIRST QAP

- 1 Understand what muscle strength is and its role in dynamic joint stability, function and quality of life.
- 2 Understand how to focus rehabilitation interventions to optimally train muscle strength.
- 3 Be able to critically evaluate the methodological approaches of rehabilitation research studies that have described a muscle strengthening intervention.

## Introduction

If you were to ask a room full of your colleagues “what is muscle strength?”, do you think you would all come up with the same answer? Chances are there would be several different replies, but is this a problem and why is it relevant for therapy?

Over the past few years, we’ve seen the emergence of a new set of terminologies to accompany the development of training and coaching strategies. If one were to Google “strength”, it is likely that terms such as functional strength, strength-endurance, agile strength, explosive strength, maximum strength, etc. would be listed.

While in certain and very specific settings the individual nuances of each of these may be understood, and be a part of the regular vocabulary, for non-strength and conditioning specialists the different terminologies and definitions of “strength” can be confusing and, more importantly in therapy, threaten the efficacy of resistance-based rehabilitation interventions.

These sub-definitions also appear conflicting. For example, if one appreciates the physiologic events and determinants of different aspects of muscle performance, it seems at odds to term something strength-endurance. Either it’s endurance (repeated sub-maximal muscle contractions over a period of time), or its strength (maximal force produced in a single contraction).

For the purpose of this article, muscle strength is defined as *the maximum amount of muscle force that can be produced in a single contraction* (Kraemer & Ratamess 2014; ACSM 2017). It likely represents the first definition from which others have been derived and from the subcategories of strength it is “maximum strength”.

In the interests of simplicity and efficacy it would make sense, too, for the rehabilitation professions as a whole

to have a common understanding of what strength is so to facilitate an inter- and intra-profession standardised approach to strength rehabilitation and conditioning. Given the points highlighted previously, the term “maximal strength” would probably be most useful here.

## The importance of muscle strength: dynamic joint stability

A conceptual model for dynamic joint stability describes the interaction of the osseous geometry, the ligaments, tendons, menisci etc. and the surrounding musculature. During strenuous activities such as executing directional changes at high speeds or on landing from a jump, mechanical loading of the knee joint can often exceed the tensile capacities of the “passive” non-contractile structures (Johansson *et al* 1991). Greater reliance is placed on the protective capabilities of the surrounding musculature in order to maintain joint stability (Blackburn *et al* 2008).

In the judgment of when it’s appropriate to return to sport following rehabilitation, or when evaluating risk of injury, the muscle performance is assessed and the information derived contributes to the final decision. However, how well the joint musculature

is performing or has rehabilitated is determined by the measurement of a range of neuromuscular parameters, which invariably includes muscle strength (Lepley 2015). Note here that in the associated research literature, muscle strength is also defined as the maximal force produced in a single contraction.

If we take the knee joint as an example, many studies agree that the majority of soft tissue injuries are non-contact in nature and occur during sudden deceleration and / or landing manoeuvres (Dai *et al* 2012). While speed of force production is an important parameter for injury avoidance (Minshull *et al* 2012; Blackburn *et al* 2018), having sufficient strength to overcome and shield the tissues from the forces that exceed body mass several-fold is important. If we consider that it takes on average around 300ms to produce maximal force during a maximal voluntary contraction (Hannah *et al* 2015) and that anterior cruciate ligament (ACL) injury occurs around 50ms after foot contact (Krosshaug *et al* 2007), it's apparent that the muscle response must be sub-maximal. However, sufficient force must be produced within that time frame to maintain joint integrity. If we view strength as voluntary capacity, or the fuel tank, i.e. the fuller the fuel tank, the greater capacity, the more everyday tasks such as standing up out of a chair or landing from a jump become sub-maximal.

When applied to sport, weaker athletes will draw on more of their capacity and produce more maximal force for a given sub-maximal task, making injury avoidance a more challenging task.

These conceptual models have reinforced our historic intuition for incorporating strength training into rehabilitation programmes, but is it effective? Many studies that have screened and monitored injury in athletes pre-season have subsequently reported that weaker athletes may be at greater risk. For example, pre-season weakness of shoulder external rotation and supraspinatus strength was associated with in-season throwing-related injury

that resulted in surgical intervention in professional baseball pitchers (Byram *et al* 2010). However, there is evidence, such as Al Attar *et al* (2017), that eccentric hamstring training can attenuate the incidence of hamstring injuries, with some of the reduced risk being attributed to increased strength at longer muscle lengths.

Much of the prospective, prophylactic intervention research for the ACL is multi-faceted, incorporating a multitude of different types of exercise and making it difficult to attribute any change in risk to a single parameter. Interestingly, a recent strength training study (Czasche *et al* 2018) showed that eight weeks of strength training influenced tibiofemoral joint loading during landing. The strength training promoted a lateral to medial shift in tibiofemoral force, which is consistent with a reduction in valgus loading. An interpretation of this data could be that strength training of the lower limb may help to prevent injuries that are due to abnormal knee loading such as ACL ruptures, patellar dislocation and patellofemoral pain. However, to confirm this, clearly prospective randomised controlled trials (RCTs) must be performed.

## **The importance of muscle strength: quality of life and pain**

Muscle strength, or lack thereof, is often a focus in research with older populations, chronic conditions and those investigating pain, function and quality. One such focus is knee osteoarthritis (OA), a common and painful musculoskeletal (MSK) disorder for which there is no cure and the ultimate treatment is joint replacement. The number of sufferers of knee OA is increasing annually (Sharma *et al* 2006) and UK figures project a rise from 4.7 million in 2010 to 5.4 million by 2020 (Arthritis Research UK 2013). Given the lack of cure and the associated deficits in neuromuscular performance (Messier *et al* 2013), the need to effectively manage OA has been recognised of paramount importance to attenuate declines in function and quality of life. Patients with knee OA are characterised by decreased knee extensor strength that

is associated with limiting activities of daily living, which can be independent of knee pain (Bade *et al* 2010; van der Esch 2014). Conversely, knee extensor muscle weakness is associated with increased risk of development and progression of knee OA, knee pain and a decline in function (Culvenor *et al* 2017; Øiestad *et al* 2015). International guidelines highlight the importance of non-pharmacologic treatments for people with OA, with strengthening exercise for the knee extensor muscles being one such intervention (McAlindon *et al* 2014), but does it work?

A Cochrane review of land-based therapeutic exercise on knee OA (Fransen *et al* 2015) highlighted the marked variability across studies with respect to exercise interventions. The review identified strengthening exercises that varied from straightening the knee over a rolled towel to multiple sitting, standing and squat exercises with body weight only to strengthen multiple lower limb muscles. Each of these exercises represents a different intensity of resistance and muscular challenge, which may not all be optimal for strength gain as will be discussed later. These studies have historically clouded our interpretation of the effects of true muscle strengthening programmes on symptoms of knee OA (Minshull & Gleeson 2017). Fortunately, recent research is populated with studies that have adopted a more robust methodological approach to strengthening interventions.

The efficacy of exercise to reduce pain and disability in patients with knee OA has shown that isolated knee-extensor strength exercise was more effective in reducing pain and disability when not combined with other forms of exercises, e.g. cardiovascular training (Husted *et al* 2011). One systematic review with meta-regression (Bartholdy *et al* 2017) reported a statistically significant association between knee extensor strength change and pain, i.e. increased knee extensor muscle strength was associated with decreased pain. On balance, it seems as though muscle ➤

strength is an important determinant of pain, function, and potentially quality of life in knee OA populations.

This is just a snapshot of the available literature on the potential role and importance of muscle strength in just a few patient populations. Clearly other research avenues and patient groups have been studied, from cancer survivors to those with obesity, but if we are reasonably confident that muscle strength conveys a benefit to our patient group, then how do we rehabilitate it effectively?

## Rehabilitating strength effectively

Here is where the three sets of 10 comes in. Easy to remember, easy to prescribe and often what is already being followed in training, but why 10 repetitions rather than 12 or eight, why three sets and, importantly, what ensures that the patient stops at the prescribed number of repetitions? Is it because they've been told to, is it boredom or are they physically unable to do more? Intensity is an essential and often missing component of many strength-based rehabilitation prescriptions.

Very little of the literature evaluating muscle strengthening interventions for knee OA pays any attention to the *principles of resistance training*, which are specificity, overload and progression (Minshull & Gleeson 2017). Consideration of these principles ensures that the intervention is most likely to elicit the desired outcome. For example, if an aim of a rehabilitation programme is to enhance muscle strength, we need to ensure the prescription is optimal to make this happen. Different neuromuscular stimuli and adaptations will be produced by manipulating the number of repetitions, sets, load / intensity, and periods of rest within an exercise programme. Thus three sets of 10 knee extensions with a light resistance band will provide a very different load / intensity and elicit a very different effect (if any) in a strong 50-year-old gym-goer compared to a frail 70-year-old who struggles with the stairs. However, a busy clinician will often give

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patients with very different baseline capabilities the same exercise sheets.

Is prescribing three sets of 10 good for strength gain? The strength-endurance continuum of resistance training (Peterson *et al* 2015) prescribes how programmes using low repetitions and high resistance, i.e. three to five repetitions maximum (RMs) will elicit optimal adaptation of strength, whereas training with higher repetitions and low resistance (>12 RMs) promotes muscular endurance (Campos *et al* 2002). Importantly, RM refers to the number of repetitions that can be successfully performed and thus describes the intensity (figure 1).

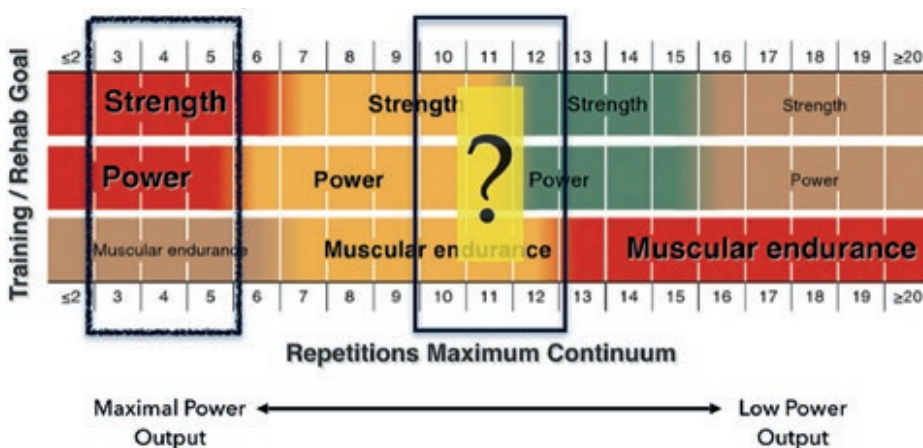
It is clear that, even if we're cognisant of the need to set the intensity of the exercise and instruct the patient to work to failure, 10-12 RMs doesn't provide an optimal stimulus for any parameter of muscle performance. That's not to say that strength gains won't be made at all with the traditional prescription, some adaptation will be made, however, if the aim is muscle strength gain it is possible to get even up to a three-fold improvement in muscle strength more quickly by optimising the prescription to 3-5 RMs (Campos *et al* 2002; Evangelista *et al* 2019).

## Conclusion

Muscle strength is of fundamental importance for dynamic joint stability, function and quality of life. It is suggested that adoption of the definition *the maximum amount of muscle force that can be produced in a single contraction* of strength will provide a consistent and specific approach to its rehabilitation across and within rehabilitation professions. Furthermore, where clinically appropriate, and where muscle strength gain is the aim, physiotherapists may want to consider exchanging the three sets of 10 for a 3-5 RM prescription as this is likely to result in much greater gains and maximise the input:output equation for time and effort invested by both the therapist and patient.

## About the author

Claire is one of the most highly respected and research active rehabilitation and conditioning specialists in the UK. She has worked in the field of sports medicine and health for 20 years as a Senior Lecturer, Researcher, Consultant and as a Practitioner. She has designed, led and managed major clinical and nonclinical research trials, supervised several PhD students, and has published more than 30 research papers in leading peer-reviewed sports medicine journals. Claire's area of expertise means that she uniquely spans the gap between the physiology of conditioning and physiotherapeutic rehabilitation. She is Principal Researcher at the RJA Orthopaedic Hospital and Director of Get Back to Sport.



**FIGURE 1:** The repetitions maximum continuum. The larger size text indicates the larger stimulus for adaptation. Adapted from Baechle & Earle (2008) and Fleck & Kraemer (2014)

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# Promoting childhood activity levels and preventing sports injuries

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For physiotherapists, the promotion of lifelong physical activity is very much on our radar. The term “lifelong” means that, even if we don’t treat children in our clinics, we should be reaching out in our communities to address the issues of childhood inactivity, taking a leading role in encouraging safe activity levels and advising on how to reduce injury incidence in children’s sports.

## LEARNING OUTCOMES

### TO SUPPORT PHYSIO FIRST QAP

- 1 Be aware of the reality of low childhood activity levels.
- 2 Understand the importance of promoting childhood activity levels for lifelong health and wellness.
- 3 Consider the need to promote injury prevention as an essential part of promoting increased sport participation.
- 4 Reflect on the role of physiotherapists in promoting increased sports participation safely.

## Introduction

The Chartered Society of Physiotherapy’s (CSP) “Love Activity, Hate Exercise” programme was rolled out last year to promote the benefits of physical activity, and play a key role in addressing the major public health issue of inactivity in our population. Physical activity offers as many health benefits for children as it does for adults and if we can ask the question whether children are active enough, highlight the benefits of activity, and address inactivity levels with our own young patients we can, perhaps, set up good habits and better health decisions that will lead to our children being healthier adults. In encouraging children to be more active, however, we must also be aware of the injury rates in childhood sports and, as a profession,

play a leading role in the promotion of safe activity levels to help reduce injury incidence.

Later in this article we will expand on how, in our own clinic, we have forged links with other health providers in our community that have enabled us to collaborate on initiatives for health and wellbeing promotion and open up dialogue for injury prevention programmes with parents and coaches.

## Are our children active enough?

In December 2018, Sport England published its survey, the largest of its kind, on the active lives of children and young people. The data was collected from 130,000 children in England, between the ages of five and 16, during the academic year September 2017 – July 2018. It studied the level of physical activity in children, using the Chief Medical Officer’s recommendation of 60 minutes of physical activity every day as the gold standard. The results of the survey are helpful in directing attention on the population groups that may need more input and focus in raising levels of childhood physical activity.

The findings of particular interest include:

- 17.5% of children are achieving 60+ minutes of physical activity each day
- 43.3% lead active lives, meaning they achieve on average 60+ minutes of daily physical activity, but not necessarily every day

- 32.9% of children achieve less than 30 minutes of physical activity each day
- Activity levels peak at the end of primary school age to 22% achieving 60 minutes’ activity a day, but drop to their lowest level of 14% by the end of secondary school age
- Girls achieve lower activity levels, i.e. 14% compared to boys at 20%. This difference increases as children get older, with only 10% of girls aged 9-11 achieving activity every day
- Children from less affluent families were shown, at 39%, to be more likely to achieve less than 30 minutes’ activity a day than their more affluent counterparts, where only 26% achieved low activity levels
- Ethnicity was found to have an impact on activity levels: 41% of girls from Asian and 49% from Black backgrounds were less active, i.e. achieving less than 30 minutes per day activity, compared to 32% of their white contemporaries.

From the results of this survey it is apparent there is work to be done to improve activity levels in school-age children, particularly promoting activity levels in secondary school-age girls who, it seems, are at risk of achieving less active lives. We also need to consider directing our efforts to increase physical activity involvement for children from less affluent backgrounds, and those from non-white backgrounds.

## "THERE IS WORK TO BE DONE TO IMPROVE ACTIVITY LEVELS IN SCHOOL-AGE CHILDREN"

### The benefits of an active lifestyle

Based on the extensive research into the benefits of physical activity and sports participation in childhood, there are several benefits to be gained that can often be carried over into adulthood. The benefits of increasing activity levels can be observed in three main areas; the child's long-term physical health, their mental health and cognitive function are all affected positively by physical activity and sports participation.

#### COGNITIVE FUNCTION

A review of literature (Bidzan-Bluma & Lipowska 2018) found an array of benefits that increased physical activity can have on cognition in children, including working memory, attention and language development, and executive function, i.e. motivation, the ability to set goals, and self-control. Benefits were found to be independent of the type of physical activity undertaken, whether it be community organised sport, school sports, or free play.

#### MENTAL HEALTH

A cross-sectional study (McMahon *et al* 2017), utilising a school-based survey completed by 11,110 adolescents from 10 European countries, examined how physical activity and sport participation was associated with wellbeing, anxiety and depressive symptoms. Analysis of the results revealed that more frequent physical activity and participation in sport were found to independently contribute to greater wellbeing and lower levels of anxiety and depressive symptoms in both sexes.

#### LONG-TERM PHYSICAL HEALTH

##### Bone density

McVeigh *et al* (2019) found a positive relationship between childhood participation in organised sports and bone density at age 20 in males and

females. Attainment of optimal peak bone mass in young adulthood is protective against osteoporosis in later life, so increased activity in childhood is likely to have long-term benefits for the individual's skeletal health.

##### Obesity

Organised sport and increasing activity levels in children are linked with reduced obesity and with better adult health.

Children who are obese tend to remain so into adulthood (Simmonds *et al* 2015) and, as adults, are more at risk of illness.

In a review of 37 studies, Llewellyn *et al* (2016) identified a strong positive association between a high childhood BMI and adult obesity. In addition, the same authors found a positive association between high childhood BMI and adult coronary heart disease, diabetes and a range of cancers.

In a later study of 238 adolescents (Agata & Monyeki 2018), it was found that children participating in sports had lower BMI, higher fitness levels, and received greater social support than children who did not participate in sport.

The research into these three key areas of health show that there are proven benefits to increasing the activity levels and sports participation for the child population. The fact that it has also been shown that activity levels in children are currently lower than recommended means that we, as health professionals, are well placed to play a role in encouraging childhood activity in an effort to address the potential health issues that this population is storing for the future and, in doing so, we must also ensure that any increase in activity is as safe and injury-free for the participant as possible.

### Preventing sports injury

If we promote increased activity levels,

it should follow that we must also be aware of injury prevention measures to ensure that children newly participating, or increasing their level, in sports and healthy activity, do so in a safe way. Our parallel goal to increasing activity must be in the avoidance of injury.

Intervention and prevention with regard to childhood sports injuries is driven by the data. Where there is clarity on the specific risks that apply to particular sports and particular age groups, then our goals towards sports injury prevention can be focused and relevant. Kirkwood *et al* (2018) analysed sports injuries presenting at NHS emergency departments. They looked at the sports that were being played at the time of injury, the type of injury, and the age and gender of the injured.

The results revealed that almost half (47.4%) of presentations for sports injuries to NHS A&E departments were children aged 0-19. Of these, 68% were male and 32% female. The most common age to present was 12 years in females and 14 years in males. The most common sports played at the time of injury in the males were football, rugby union and rugby league and, in the females, trampoline, netball and horse riding. The most common injuries were fracture at 22.6%, and of those fracture injuries, 43.8% were in the upper limb.

This study reveals the burden on NHS hospitals from the attendance of children and adolescents for sports-related injury, showing that there is a need for serious injury prevention work in this area. The authors of the study state: "If public health departments in local authorities

"WE CAN PLAY A ROLE IN PREVENTING POTENTIAL HEALTH ISSUES BEING STORED FOR THE FUTURE"

and schools were to adopt a strategy for the prevention of injury in high-risk activities, they should target those in the first four years of secondary school. For younger age groups, trampolines in the home warrant improved safety” (Kirkwood *et al* 2018).

In addition to the injury profile from NHS emergency departments we, as physiotherapists, often come face-to-face with many and varied sports-related soft tissue injuries. These may be due to trauma, accidents and over-use resulting in ligament sprains, cartilage damage, muscle injuries or, particularly in relation to adolescent patients, be growth conditions such as Severs and Osgood Schlatters. It is in these sport injury scenarios that we are often the primary contact for assessment and management, and it is in this environment where we can also have an impact in the area of sports injury prevention. As practitioners, we need to be aware of the research supporting injury prevention programmes and be advocates for them.

## **The evidence for injury prevention programmes**

There is growing evidence to support the development of injury prevention in sport, with studies showing the effectiveness of programmes through a variety of sporting activities. For example, developing the landing skills of junior Australian football players has led to a reduction of injury incidence (Scase *et al* 2006), while Myklebust *et al* (2003) advocated sport-specific balance training programmes in the reduction of ACL injuries for female participants in the sport of handball.

Studies into school-age soccer players suggest that conditioning training

programmes delivered either as part of post-injury rehabilitation (Jung *et al* 2002), or in advance of the playing season (Cahill & Griffith 1978), can be effective in reducing the incidence and severity of sports-related injuries and, in the case of Cahill & Griffith (1978), specifically in early season knee injuries.

A review of 21 randomised controlled trials (RCTs) and controlled intervention studies in organised sport (Rössler *et al* 2014) found that injury prevention in general, and those with a focus on specific injuries, showed significant reduction in injury incidence. Programmes that include jumping / plyometric exercises showed to have a significantly better injury preventive effect than studies that did not include such exercises.

The popular Federation of International Football Association (FIFA) 11+ injury prevention programme has been shown to lead to an impressive 30% – 70% reduction in injuries (Barengo *et al* 2014). The FIFA programme includes dynamic warm-up, core stabilisation, eccentric training of thigh muscles, proprioceptive training, dynamic stabilisation and plyometric drills performed with good postural alignment. As these programmes can be followed with no technical equipment, and in minimal time, i.e. 10-15 minutes, they can easily be adopted as a fundamental tool for coaches and physiotherapists involved in training and promoting sporting activities for children.

## **Encouraging activity**

There can be no argument that promoting activity levels and sports involvement is good for the health and wellbeing of the population, and something that should be encouraged from an early age.

We as physiotherapists need to take a leading role in advancing the benefits of sports participation and activity, while ensuring that we educate child participants, their parents and coaches on the effectiveness and ease of application of injury prevention programmes.

Having recognised this as our challenge we organised, through our West London clinic, a summer “Super Saturday of Sport” event to address the need for promoting participation in activity, and to highlight the need for injury prevention programmes. The parallel benefit to us as a clinic has been an increase in exposure in the community. Our role as organisers and sponsors of the event gave us the opportunity to develop relationships with our neighbouring sports clubs and medical facilities to whom we could promote our services in injury management and prevention. The aim is to build on these relationships with the development of new referral pathways and joint ventures with these new contacts. It has been a challenging but highly rewarding project that we hope to hold as an annual community event.

## **Super Saturday of Sport: a case study**

In the summer of 2019 we held our Super Saturday of Sport with the vision of encouraging the children in our area – and beyond – to increase their activity levels and sports involvement, with a view to improving their health and, by extension, leading to improved lifelong activity levels and wellbeing.

More than 30 of our local sports clubs and health and fitness representatives supported the event by offering on the day free sports taster sessions, and information about childhood health, wellness and injury prevention. Our clinic team worked hard in planning the event; local businesses with an interest in sport and wellness were invited to participate and help fund it and, having secured their commitment, we emailed contacts from our network of parents, coaches and sports clubs who, having

**“CHILDREN AGED 0-19 YEARS MAKE UP ALMOST HALF OF THE INDIVIDUALS PRESENTING AT A&E WITH SPORT RELATED INJURIES”**

received an explanation of our concept, were keen to come onboard.

On the day, children were encouraged to try as many of the offered sports and activities as possible, with the added reward of participation stamps, which were entered into a prize draw, giving them the chance to win activity and sport-related prizes and vouchers.

The activities available included football, cricket, tennis, judo, taekwondo, jiu-jitsu, rowing, basketball, skateboarding, rugby, American football, table tennis and gymnastics (figures 1-5). In recruiting sport clubs, we looked for those with a range of sporting activities that would offer all children a way into a new activity, whatever their tastes and preferences.

Free advice and yoga and Pilates sessions were available from health and fitness clinics for both adults and children, and physiotherapists, GPs, and

#### CONTACT DETAILS

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Pilates instructors were on hand for free assessments. Local gyms also joined us to showcase their health and fitness services.

The feedback from families who attended the day was very positive. One mother of a 10-year-old boy said: *"My son has never been one of the football lads. He loves being active but never felt ball sports were his thing. At Super Saturday he was able to try Parkour ([www.parkour.uk](http://www.parkour.uk)) and has been blown away. He is completely passionate about it. We were able to sign him up for weekly classes through the club at Super Saturday, and he is already stronger, more active, and more confident physically. Amazing."*

And from a dad of two girls: *"... the younger one has always loved*

*football. At Super Saturday we found our local girls' football team, which she has joined, and she is super happy to be in a proper club, to be getting good coaching and playing every week. We are so pleased."*

Another parent who had never considered that their son might be interested in rowing said: *"At Super Saturday one local rowing club brought in four rowing machines, and he was able to get a taste for rowing and is now keen to continue. I wouldn't have known how to introduce him to this sport otherwise"*

#### Conclusion

Our introduction to activity to our local area was an incredible success. Around 2,000 children and their families had a great time sampling sports and learning about health and wellness. Having physiotherapy clinics involved in the day emphasised how we, as physiotherapists, can encourage healthy activity for all ages, and play an important role in ➤

## Super Saturday of Sport



FIGURE 1: Taekwondo display



FIGURE 3: Silent spin class



FIGURE 2: Kitted out for American football



FIGURE 4: Warming up for Kung-fu



FIGURE 5: Gymnasts performing back arches

helping the public to maintain a healthy lifestyle and avoid injury.

From this initiative we are anticipating a stronger connection with many local sports clubs and sports coaches. We have opened up the dialogue for injury prevention programmes and injury management strategies and we are planning to offer workshops and seminars to further promote the benefits of active participation, together with the need for injury prevention in children.

We believe that, at a time when physical activity levels in children are lower than recommended, it is up to our profession to highlight the potential impact this will have not only on the physical, mental, and cognitive wellbeing of our younger generation, but also how it will affect that population into adulthood. With innovative events and profile-raising activities, physiotherapists can have a major role in educating our communities and involving them in improving their participation in physical activity and being aware of how to prevent injury.

## About the author

Sarah is a private practitioner physiotherapist in London. She owns and runs OneBody Clinic in Notting Hill Gate and Chiswick. Her career experience includes working in elite sports, teaching at university and, now, working to build a private practice that will have a strong reputation in the treatment and rehabilitation of injury and has a voice in her community through the support of local health and wellbeing initiatives.

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# The psychology of patient buy-in: why do patients struggle?

**SERENA SIMMONS** CPsychol  
Chartered Psychologist



A patient comes to you for a programme of rehabilitation that will help them with an ongoing issue or injury. The home exercises you prescribe will undoubtedly help them, and yet again and again they fail to adhere to the programme and do the work. Why? Adherence is an important issue when it comes to achieving successful patient outcomes. As Glenn Hunter discusses the design and meaningful human experience of behaviour change on p10, this article explores, from the psychologist angle, the research and theory behind reasons for lack of self-motivation and adherence and considers practical solutions that can be implemented by clinicians to help achieve results.

## LEARNING OUTCOMES TO SUPPORT PHYSIO FIRST QAP

- 1 Deepen theoretical understanding regarding patient lack of adherence.
- 2 Overview interventions currently available and the issues associated with their use.
- 3 Learn what can be implemented to significantly impact greater adherence and ultimately patient outcomes.

## Introduction

Physiotherapists often see their profession as one that is over-burdened. Many juggle management roles, administrative duties and developing improvements in patient care alongside their hands-on patient therapy.

New therapies and improved ways of treatment are continually being developed and forged into practice. However, these are arguably of no benefit if the patient has difficulty adhering to the programme they are given. This issue of adherence is of routine concern to physiotherapists and one which it is often a struggle to address. When it comes to the considerations of how we may best

support patients in adhering to an exercise or treatment programme, there is such a plethora of advice, research and training available that navigating this can seem like a minefield.

The purpose of this article is to help deepen our understanding of some of the common explanations for lack of adherence and to present some solutions and pragmatic actions that physiotherapists can take to help address this issue.

## The problem

Home exercise programmes (HEPs) are a standard part of a package of care when prescribing ongoing physiotherapy. They allow for a reduced need for direct clinic interventions and are also likely to positively impact treatment outcomes for the individual (Taylor 2007).

That said, a lack of adherence to rehabilitation therapies and prescribed home exercise programmes is commonplace for both public and private physiotherapy models across the UK, with the research consistently indicating that approximately 70% of patients are non-adherent (Sluijs *et al* 1993).

Lack of adherence is not unique to the UK. Research conducted in countries with similar healthcare systems, such as New Zealand, also report that up to

65% of patients are “non-adherent”, or “partially-adherent”, to their home programmes, with a further 10% of patients failing to complete their course of physiotherapy at all (Bassett 2003).

For the practitioner, lack of patient engagement is often difficult to understand, not only because it can be an issue for the physiotherapist’s day-to-day practice, but because failing to engage with prescribed rehabilitation programmes prevents the patient from the direct and positive benefits that can be achieved across a broad range of conditions and on outcomes for pain relief, function and quality of life (Taylor *et al* 2007).

## Barriers to adherence

Research over the past two decades has attempted to shed light on the barriers to adherence. Addressing all known issues and influences in detail is beyond the scope of this article but, in summary, the rationale for lack of adherence seems to fall into two broad areas: environmental factors and personal factors.

**Environmental factors:** can include a feeling of poor social support, and a lack of positive feedback (Jack *et al* 2010; Sluijs *et al* 1993).

**Personal factors:** include feelings

of helplessness, depression, anxiety, increased pain with exercise, and the patient's own perception of what is stopping them from carrying out a prescribed exercise programme.

Personal factors also include the well-researched topic of self-efficacy (Jack *et al* 2010; Sluijs *et al* 1993), i.e. the patient's belief in their ability to perform a task (Bandura 1977). Patients with low self-efficacy can manifest in an apparent lack of motivation to achieve specific goals, refusal to complete tasks and tend to dwell on deficiencies. Patients with high self-efficacy typically present more positively (table 1), they are proactive in setting personal goals, maintain their commitment to the task and quickly recover after a setback (Picha & Howell 2018).

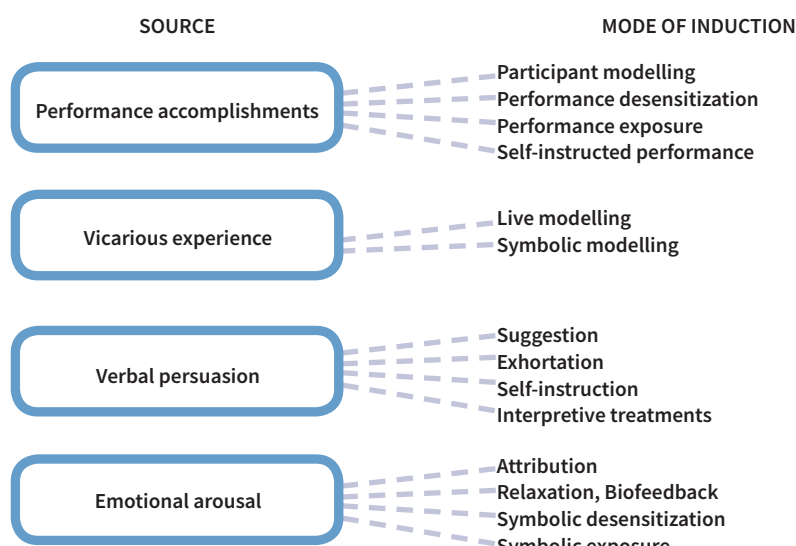
What is clear is that patients will present with varying levels of self-efficacy, which can essentially be pre-determined by the practitioner at the assessment stage. A patient who is already exhibiting a high level of self-efficacy makes the job of the practitioner much easier from the outset as, according to patient profiles, these are the patients who “do the work”, but what of those patients who present with low self-efficacy?

Work in this area has been useful to inform models of practice to facilitate behavioural change within patient groups. A strategy to increase an individual's “level” of self-efficacy would be to first assess it and then establish further feedback, or exposure to behaviours that have a positive impact on it.

| LEVEL OF SELF-EFFICACY | CHARACTERISTIC                                                                                           | PATIENT PRESENTATION                                                                                                                                                                                                   |
|------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Low                    | Fear of risks and uncertainty<br>Low aspirations<br>Feelings of fear of failure<br>Impression management | Hesitant to try new exercises<br>Refusal to complete exercise/task<br>Lack of commitment to goals<br>Dwell on personal deficiencies<br>Give up quickly when presented with a difficult task                            |
| High                   | Self-confidence<br>Accurate self-evaluation<br>Willingness to take risks<br>Sense of accomplishment      | Sets personal goals and maintains commitment to those goals<br>No hesitation to complete exercise/tasks presented to them<br>Sustain efforts when presented with failure<br>Quickly recover after setbacks or failures |

**TABLE 1:** Patients presentation of varying levels of self-efficacy (Picha & Howell 2018)

## Efficacy expectations



**FIGURE 1:** Major sources of efficacy information and the principal sources through which different modes of treatment operate (Bandura 1977)

In Bandura's (1977) model, self-efficacy is based on four key sources of information; performance accomplishments, vicarious experience, verbal persuasion and emotional arousal (figure 1). In each instance it is argued that increasing a person's exposure and experience in these modes of induction may help to increase their self-efficacy.

For example, when addressing performance accomplishments, repeated exposure to success in any given area increases the experience of personal mastery. If the patient can accomplish a task with repeated success, then they can achieve a feeling of mastery, therefore lessening the potential negative impact of any occasional future failures.

Understanding self-efficacy can be helpful in guiding the creation of “positive feedback loops” for anyone

who may be undertaking something new or challenging in any area of their lives. For the practitioner, therefore, gauging the aspects of self-efficacy early on in their interactions with a patient, and using this framework as a model to address ways in which aspects of positive feedback can be supported, can help with the challenge of adherence to exercise and rehabilitation.

## How to achieve holistic change

While there are patients who are motivated and exhibit high levels of self-efficacy and self-management strategies that require little input from the practitioner to promote adherence, the fact that there is a prolific problem of lack of adherence in the wider population does require attention. It may be useful to take a multi-pronged and holistic approach to positively impact adherence in those patients who struggle to achieve it.

An individualised and biopsychological approach is acknowledged (NICE Guidelines 2014) to be the best one to take when addressing behavioural change (Engel 1977). This recognises the biological, psychological, environmental and social factors that may contribute to a person's medical condition but, more importantly, the whole patient is treated, rather than just their condition or injury in isolation. ➡

Research shows that a biopsychosocial approach by physiotherapists can have positive outcomes for their patients in terms of reduced pain, improvement in function, etc. However, there seems to be a lack of consistency in how practitioners administer biopsychosocial intervention (George 2008) which should include a good knowledge of how we measure, monitor and influence factors such as health beliefs, lifestyle choices, family relationships, social support and, in the case of patients in rehabilitation, knowledge of their condition, etc.

In a systematic review of randomised control trials (RCTs) investigating the effectiveness of a biopsychosocial model approach in the management of lower back pain, George (2008) reported that it was unclear if practitioners had the clinical skills required to administer such a holistic intervention. Indeed, further research indicates that it can be a challenge for clinicians to integrate this biopsychosocial approach into their physical therapy interventions, especially for those that have not received any formal training (Jones *et al* 2002).

What is clear is that, although there is good evidence to suggest that taking a more holistic approach can improve patient outcomes, practitioners struggle to maintain a standardised method of intervention both within and between practice.

Improving the availability to physiotherapists of training and mentoring on methods of holistic support (Sanders *et al* 2013) would not only remedy the issue of standardised practice, but would also allow for access to validated and evidence-based methods of intervention for those who wish to implement such strategies, thus initiating a more consistent level of care across patient groups.

## Goal setting

Another strategy that is often implemented to improve adherence is goal setting. The formation of goals is encouraged to foster in the patient a positive future vision of where they would like to get to in their rehabilitation.

If implemented through the specific, measured, achievable, realistic and time-based (SMART) method (Locke & Latham 2013), patients can foster a way of consciously setting specific and realistic goals in a manner that can be easily attained. In this instance, if smaller strategic goals are set by way of achieving the overall desired goal, this may then create the positive feedback loop, enhancing the patient's feelings of mastery and, arguably, helping them to create and achieve further, more inspiring goals going forward.

Research into goal setting in physiotherapy practice often reports positive results. It is clear when looking at the literature, however, that it may not always be straightforward or, as with holistic change, that implementation may not be consistent across practice. Schoeb *et al* (2014) investigated the prevalence of goal setting within standard physiotherapy practice and found that in 37 physiotherapy-patient sessions goal setting was explicitly addressed in only 11 of them. Furthermore, in many of these 11 sessions there seemed to be an automatic assumption that the patients already had a goal in mind. On questioning the patients, it was clear that not all had an understanding of what may be realistic or achievable, due to a lack of knowledge of relevant information such as the prognosis of their condition. This indicates that care must be taken not to impose practitioner-defined or assumed goals that appear unachievable to the patient as this could actually form a barrier to adherence.

When properly applied, however, goal setting can be a very useful tool to encouraging adherence, particularly if the therapist is able to adopt a holistic approach that addresses factors such as education and lifestyle. This can enable the physiotherapist to become aware of what a realistic goal looks like to the individual patient. For example, setting an exercise plan with repeated daily sessions for a sedentary patient is likely to appear to them to be

unmanageable, and thus result in low adherence. Through tailored dialogue the therapist can gain an appreciation of what the patient's perception of their time availability is and the exercise plan can then be designed, factoring in the patient's interpretation of the required resources, and their individual barriers and motivations, making for more successful adherence. To ensure a systematic, consistent and more structured approach to goal setting, greater availability of evidence-based, systematic, consistent and structured training needs to be made available to physiotherapists to facilitate a more structured implementation of this technique into their practice.

## Intrinsic motivation

One area in understanding a patient's adherence to health-related behavioural change that remains relatively uncovered in the scope of research literature, and that is mostly missing from patient-therapist conversations, is why engage in therapy in the first place?

This also takes us back to the earlier question about how physiotherapists might struggle to understand the patient's lack of engagement in the rehabilitation process despite the demonstrable, measurable benefits of doing so.

Here, the psychology behind an individual's lack of engagement becomes more interesting. We begin to see evidence of more complex cognitive distortions and aspects of dissonance regarding engagement. For example, the patient may know that they won't get better if they don't do their exercise but may justify not doing so as "it may get better on its own" or "it probably won't be me that gets worse".

Furthermore, other social and personal factors including feelings of depression are known to impact cognition, and present as a barrier to adherence (Jack *et al* 2010). We must be mindful of how we approach implementing strategies as a means to encourage engagement from the patient. Every individual will have their "why" and "why not" reasons,

so simply asking the patient “why” they would like to engage in the process of physiotherapy may risk answers such as “I was told to”, or “my Doctor said I should”, beyond these external reasons, encouraging the patient to access more intrinsic motivation for doing so could be a very helpful starting point for more meaningful participation in the rehabilitation process.

Ways of helping the patient to access their internal motivation can be taken from evidence-based theory on self-determination, self-regulatory and self-management practices. The importance of encouraging an autonomous, self-directed motivation to act can be far more powerful in unlocking their conscious and motivated desire to do so than might being externally motivated or pressured to behave in a particular way (Deci & Ryan 2008).

Motivational Interviewing techniques can also be useful in assisting practitioners to tap into the individual’s underlying fears, motivations and thoughts on what is being asked of them, and which may help in alleviating any perceived barriers to exercise.

## Your ‘why?’

In his work with businesses and leaders in industry, Simon Sinek (2011, 2017) developed a simple model that proves

a good starting point for anyone considering a behavioural change. Sinek argues that starting with “why?” is an important shift from a typical focus on the end result, or purely on what needs to be done (figure 2).

From a psychological point of view, one of the most important starting points when working with a client is knowing “why” they wish to change their behaviour. This insight into the client’s motivation, intrinsic or otherwise, can make the driving force behind their action clear. It offers the opportunity to build a rapport and gather more information with regard to their internal dialogue, feelings, potential hindrances, as well as to any other social factors and barriers to progress.

Knowing these factors allows for a greater impact on the things holding the client back from their goal. These factors can also open up important lines of enquiry that might assist with problem solving and taking action, thus helping to alleviate any potential barriers.

In the same way that knowing the “why?” works for psychologists, by asking this question of their patients, physiotherapists may experience similar benefits that come with fleshing out the answer as a powerful way of unlocking the patient’s initial motivations and barriers. Obtaining the answer to “why”

serves as a sound starting point for the work required towards adherence. These statements can then be used to refer the patient back to throughout the process of the exercise prescription, as a means of tracking their progress, supporting adherence, and in understanding any ongoing issues that the patient may be experiencing throughout the treatment cycle.

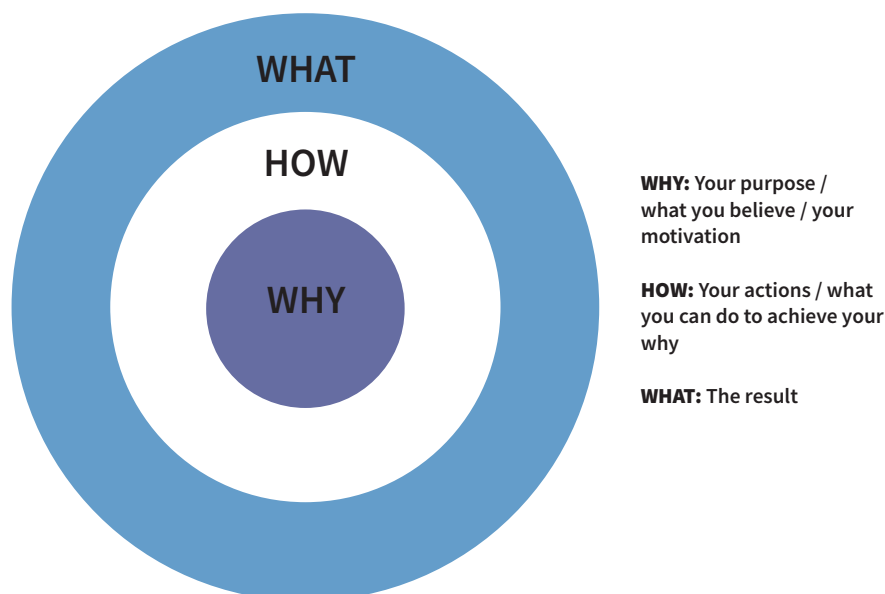
## Forming clear boundaries

It is acknowledged that physiotherapists are not counsellors and they should not be pressured into a role that would be outside of the Chartered Society of Physiotherapy (CSP) scope of practice. There is, however, a clear direction to treat more holistically, i.e. treat the patient as a whole. This would involve tackling the patient’s psychological barriers to adherence. So, how to achieve that within the remit of the physiotherapy scope of practice?

It seems clear from the research that currently, during a physiotherapist’s initial education, there is little in the way of formal training available in the psychological aspects of treating patients to support them in addressing this part of the holistic approach to healthcare which, given the nature of the work, seems somewhat remiss.

Further, for physiotherapists already in practice, access to more CPD in this area as well as ongoing support and mentoring is vital to help alleviate issues around how to implement such strategies as well as, importantly, giving therapists the support and confidence to administer the necessary interventions.

By increasing availability of such training, it is hoped that the therapist will not only feel that they have a better understanding of the topic and awareness of the potential impact a psychology-focused intervention can have, but that they also feel supported and more confident to deliver an evidence-based and individualised package of care. ➡



**FIGURE 2:** Simon Sinek (2011, 2017) model of ‘why?’

## About the author

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# Can we reduce the burden of patellofemoral pain across the lifespan? A patient-centred approach

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Patellofemoral pain is a prevalent, chronic knee pain condition that frequently presents to physiotherapy. Physiotherapists should understand the prevalence of patellofemoral pain and its burden across the lifespan. We should aim to reduce the patient's pain severity early, to improve prognosis. Identifying individual contributors to patellofemoral pain will help guide targeted, evidence-informed treatments, and most likely will need to be adjusted over the patient's recovery journey. Lifestyle approaches may be needed, and the patient is an important member of the patient journey. This article has been adapted for Physio First from Crossley *et al* (2019).

## LEARNING OUTCOMES

### TO SUPPORT PHYSIO FIRST QAP

- 1 Patellofemoral pain occurs frequently across the lifespan (adolescents, adults, older people) and is associated with considerable burden for all (i.e. persistent pain, poor quality of life and reduced participation in physical activity and social activities).
- 2 There are many individual presentations, requiring a patient-centred approach to management, targeting individual physical or psychosocial presentations.
- 3 Assess often and adjust treatment approaches if needed.
- 4 Lifestyle approaches are likely to be needed.

## Introduction

Patellofemoral pain is a common knee complaint often observed in physically active young individuals (DeHaven & Lintner 1986). Patellofemoral pain

is characterised by retropatellar pain (behind the knee cap) or peripatellar pain (around the knee cap), specifically during activities that load the patellofemoral joint, such as running, cycling, squatting, stair climbing, and / or during prolonged sitting (Collins *et al* 2016), with or without symptoms of crepitus and feelings of giving way (Dixit *et al* 2007; Thomee *et al* 1999; Post 1999).

We often think about patellofemoral pain as being a condition of adults, with recent clinical guidelines indicating that approximately 25% of adults will have patellofemoral pain (Willy *et al* 2019). However, recent work indicates that patellofemoral pain occurs frequently in adolescents who, at 29%, have similar annual prevalence rates as the adult population at 25% (Dey *et al* 2016; Fairbank *et al* 1984). Women seem to be at higher risk of patellofemoral pain than men (Smith *et al* 2018), particularly in adolescence (Molgaard *et al* 2011).

Patellofemoral pain is theorised

as a precursor to patellofemoral osteoarthritis (Crossley 2014; Utting *et al* 2005; Mills & Hunter 2014; Thomas *et al* 2010). The patellofemoral joint is involved in 67% of all radiographic knee osteoarthritis (Hinman *et al* 2014). Our recent systematic review highlights that patellofemoral disease is more prevalent than previously thought, with patellofemoral osteoarthritis evident in one-half of people with knee pain or radiographic osteoarthritis (Hart *et al* 2017).

Patellofemoral pain is more than just a problem for young adults, being the most common cause of knee pain in adolescents (Rathleff 2016), and the patellofemoral joint most affected in knee osteoarthritis.

## Burden of patellofemoral pain over the lifespan

Considering the numerous activities, such as squatting, climbing stairs, running, cycling, prolonged sitting and rising from sitting that are associated with patellofemoral pain, it is not

## "THE PATELLOFEMORAL JOINT IS INVOLVED IN 67% OF ALL RADIOGRAPHIC KNEE OSTEOARTHRITIS"

surprising that chronic patellofemoral pain creates a burden for the sufferers.

Consistently, we see that adolescents with patellofemoral pain (van Middelkoop *et al* 2017; Rathleff *et al* 2016; Sandow & Goodfellow 1985; Nimon *et al* 1998), and adults with patellofemoral pain (Nimon *et al* 1998; Lankhorst *et al* 2016; Witvrouw *et al* 2004) report persistent symptoms >8 years, confirming that patellofemoral pain is not a self-limiting condition. Furthermore, patellofemoral osteoarthritis is strongly associated with pain and disability. People with radiographic patellofemoral osteoarthritis are two to three times more likely to have difficulties performing daily activities such as light domestic duties, and to have higher levels of pain while performing tasks compared to those without patellofemoral osteoarthritis (Duncan *et al* 2009).

Across the lifespan we observe poor quality of life, compared with healthy controls and population norms in adolescents (van Middelkoop *et al* 2017) and adults (Coburn *et al* 2018) with patellofemoral pain. People with patellofemoral osteoarthritis

have significantly poorer quality of life compared to those without this condition (Hart *et al* 2018, 2017).

Once present, patellofemoral pain can be persistent for many years, often resulting in poor quality of life and reduced participation in physical activity (figure 1). Physiotherapists frequently encounter people with patellofemoral pain in private practice or outpatient clinics and are tasked with trying to improve the patellofemoral pain burden. Importantly, longer duration and greater severity of patellofemoral pain are consistently associated with poor prognosis (Lankhorst *et al* 2016; Collins *et al* 2013).

### Is patellofemoral pain more common in women?

Women are twice as likely to develop patellofemoral pain than men (Boling *et al* 2009; Smith *et al* 2018), but the reasons are unclear. The patellofemoral pain risk factors (figure 2) may be more common in women of over 14 years old as they typically have lower quadriceps strength (Frontera *et al* 1991; Anderson *et al* 2001). While women display

greater dynamic knee abduction angles during weight-bearing tasks than men (Cronström *et al* 2016), greater knee abduction has limited evidence as a risk factor for patellofemoral pain (Lankhorst *et al* 2012). Further research should investigate other potential mechanisms behind the greater incidence of patellofemoral pain in women.

### A patient-centred approach to reducing the burden of patellofemoral pain

There is clear evidence that physiotherapy-led approaches, i.e. exercise-therapy, education, and modalities such as patellar taping, joint mobilisations and foot orthoses can be effective treatments for adults with patellofemoral pain (Collins *et al* 2018). The challenge for physiotherapists is how to tailor the treatment to the individual needs and presentations of the patient in front of us.

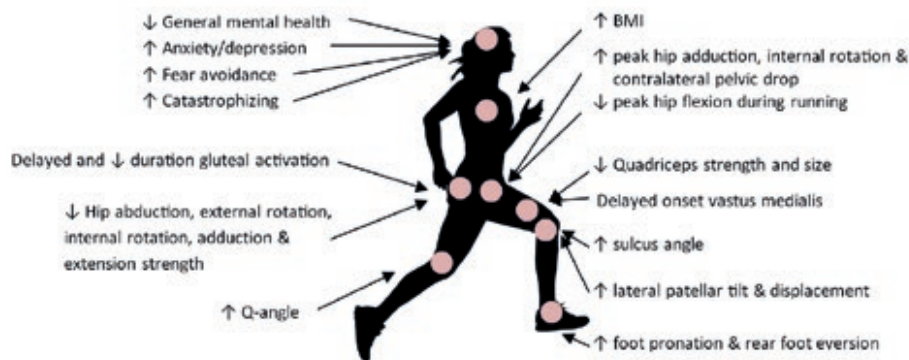
### TARGET INDIVIDUAL PHYSICAL OR PSYCHOSOCIAL PRESENTATIONS

One approach is to target the physical impairments of the person with patellofemoral pain. There are many physical, structural, biomechanical and psychological factors identified as impairments in people with prevalent patellofemoral pain (Figure 2). Emerging evidence also points to psychological factors being associated with patellofemoral pain, with levels of anxiety, depression, fear of movement and catastrophizing being reported to be features of patellofemoral pain ➔



FIGURE 1: The burden of patellofemoral pain over the lifespan

"THERE IS CLEAR EVIDENCE THAT PHYSIOTHERAPY-LED APPROACHES CAN BE EFFECTIVE FOR ADULTS WITH PATELLOFEMORAL PAIN"



**FIGURE 2:** Physical, structural, biomechanical and psychological factors associated with patellofemoral pain (based on systematic review evidence). Adapted from Crossley *et al* (2019)

(MacLachlan *et al* 2017). Future prospective studies may uncover important psychological risk factors for patellofemoral pain, providing new targets for preventative trials.

Any patient may present, with some, all or none of the impairments that have been identified in prior studies and illustrated in figure 2. Selecting treatments with known ability to address the impairments that you discover in your assessment may enhance the effectiveness of your treatment.

### ADDRESS MUSCLE WEAKNESS WITH SPECIFIC EXERCISE-THERAPY

One of the most commonly reported impairments in people with patellofemoral pain is muscle weakness. Strength deficits typically affect the hip (gluteal) and knee (quadriceps) musculature. Therefore, a core element of a patellofemoral pain management plan should include exercises addressing these strength deficits (Collins *et al* 2018). Specific exercise-therapy should address endurance, strength and / or power to address the patient-specific needs.

This can include both non-weight-bearing exercises, e.g. leg press, and weight-bearing exercises, e.g. squats, because they result in differential patterns of patellofemoral joint loading which may influence a patient's response (Powers *et al* 2014). Importantly, at five-year follow-up, the study showed that there was no one type of strength exercise that was superior to any other, whether weight-bearing or non-weight-bearing. In addition, the overall body of evidence points to a combination of hip

and knee targeted exercises, over solely knee targeted exercises, to optimise outcomes in patellofemoral pain (Witvrouw *et al* 2004).

Further guidance on exercise prescription principles can be found in the American College of Sports Medicine guidelines (2009) or the iPFrn website (<https://ipfrn.org/exercise-guide/>).

### ASSESS OFTEN AND ADJUST TREATMENT APPROACHES IF NEEDED

Pain is the symptom that most likely drives a patient to seek treatment, and a long duration or worsening severity of pain / symptoms will adversely affect the prognosis (Lankhorst *et al* 2016; Collins *et al* 2013). Early pain reduction may therefore enhance the patient journey and potentially help to gain the patient's confidence in the practitioner and treatment. This could help with adherence to treatments such as exercise therapy. A number of adjunctive treatments such as taping, bracing and in shoe-foot orthoses have shown to work for people with patellofemoral pain and may be used as appropriate.

Considering that people will often present with a variety of impairments, it may be that one single approach may not work and so the physiotherapist should assess the response of the patient and adjust how they treat different impairments as necessary along the journey to the patient recovery.

### LIFESTYLE CHANGES ARE LIKELY TO BE NEEDED

Patellofemoral pain is a chronic

condition, often associated with reduced physical activity and greater BMI. Therefore, any approach should consider all lifestyle considerations that are relevant for people with chronic musculoskeletal pain / other chronic conditions. Effective education and possibly coaching may be needed to facilitate self-management, and optimise adherence to other interventions such as exercise-therapy. Quality patient education for patellofemoral pain should include load management, weight management where appropriate, understanding the potential value of treatments such as exercise-therapy, and addressing any psychosocial factors (Barton *et al* 2015). Patient education and / or coaching should also be tailored to the individual patient and may require multiple consultations to facilitate adequate knowledge gains or behaviour change. Patient education might also play a critical role in ensuring that the patient has the skills and knowledge to progress their rehabilitation beyond the course of supervised physiotherapy treatment.

There are a few published educational resources for people with patellofemoral pain, one of which is a patient-education leaflet based on literature syntheses, and with input from international experts, patients and clinicians (Barton & Rathleff 2016) which supports clinical practice, but is not designed to replace individual consultation with a physiotherapist. Therefore, strong communication skills are still needed by the treating clinician, including how to facilitate and support shared decision making (Barton & Crossley 2016).

### Can treatments for adults with patellofemoral pain be adapted to adolescents and those with patellofemoral osteoarthritis?

While there are fewer studies and, therefore, much less investigative evidence into the treatments for patellofemoral pain in the younger and older generations, emerging evidence does suggest that similar approaches to those of the mid age-range population may be effective (Rathleff *et al* 2015;

Crossley *et al* 2015; van Middelkoop *et al* 2018), but that more research is required (Collins *et al* 2018). It is also likely that a patient-centred approach will be critical to the success of physiotherapy-led treatment in these populations. More work is needed in this space.

Physiotherapists should understand the prevalence of patellofemoral pain and its burden across the lifespan. We should aim to reduce the patient's pain severity early, to improve prognosis. Identifying individual contributors to patellofemoral pain will help guide targeted treatments, and most likely will need to be adjusted over the patient's recovery journey. Lifestyle approaches may be necessary, as is remembering that the patient is an important member of their own journey.

## About the authors

Kay Crossley, Marienke van Middelkoop, Christian Barton and Adam Culvenor are researchers. Kay, Adam and Christian are also physiotherapists, with a special interest in patellofemoral pain and osteoarthritis. They have completed PhDs in the field of patellofemoral pain, knee injury and osteoarthritis, and have published many peer-review articles in international journals and written several book chapters on these topics. They currently lead research projects in patellofemoral pain and osteoarthritis within the La Trobe University Sport and Exercise Medicine Research Centre and Erasmus MC Medical University Centre Rotterdam. Additionally, they lead numerous workshops and symposiums around the world to teach physiotherapists how to manage knee and patellofemoral pain.

Blog: <http://semrc.blogs.latrobe.edu.au/blog/>

See also [www.patellofemoral.trekeeducation.org](http://www.patellofemoral.trekeeducation.org)

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## 2020 CONFERENCE LECTURES AND WORKSHOP

Kay Crossley and Adam Culvenor will be delivering lectures at our Physio First annual conference "Brave New World" on 24-25 April 2020.

Adam is also holding a workshop on Assessing and Rehabilitating Function Across the Spectrum from Joint Injury to Osteoarthritis on 24 April 2020.

To find out more about our 2020 conference and to book your place go to [www.physiofirst.org.uk](http://www.physiofirst.org.uk) > **events > annual conference 2020**, and to book on Adam's course go to **events > education courses** and scroll down to the course title.

The Annual General Meeting (AGM), open to all members of Physio First, will take place in Nottingham on **Friday 24 April 2020** at 16:05hrs.

Physio First members are invited to submit motions for inclusion on the agenda of the AGM.

These must be proposed and seconded and reach the Physio First office **by Friday 10 January 2020**. Please address your submissions for the attention of our Secretarial Support Team, and send to: Physio First, Minerva House, Tithe Barn Way, Swan Valley, Northampton, Northamptonshire NN4 9BA or email [minerva@physiofirst.org.uk](mailto:minerva@physiofirst.org.uk).

### PPEF AGM 2020

The AGM of the PPEF will take place on **24 April 2020** at 13:00hrs, at the East Midlands Conference Centre, Nottingham.



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### Paediatric Physiotherapists in the Independent and Private Sectors

Aren't children just small adults?  
Paediatric Physiotherapy, the joys and the pitfalls

- March 6th 2020
- CSP 14 Bedford Row, London WC1R 4ED
- 9.30am-4.30pm

**Speaker Di Coggings MCSP, MBE**  
NHS and private practitioner in paediatrics

To book go to [www.eventbrite.co.uk/e/arent-children-just-small-adults-paediatric-physio-the-joys-and-pitfalls-tickets-76945976487](http://www.eventbrite.co.uk/e/arent-children-just-small-adults-paediatric-physio-the-joys-and-pitfalls-tickets-76945976487)

# Members achieve Quality Assured Clinic status

Congratulations to all of our members who were confirmed as Quality Assured Clinics (QACs) in the September wave of results from the University of Brighton.

This is a huge achievement for our individual members and for the people who are an integral part of their practices. This not only includes the people who work in their clinics, but also their patients who enthusiastically engage with the process.

Here, two of our recent QAC awardees, Lucinda Brock and Belinda Holloway, discuss their achievement. Lucinda, from the point of view of why she made the decision to work towards QAC status, how her clinic team approached it, and what difference it has made to all aspects of her businesses, and Belinda on how she and her team feel about such an achievement.

## WHY DID WE DECIDE TO AIM FOR QAC STATUS?

For a while after Physio First launched the Quality Assured Practitioner (QAP) scheme, I debated trying for it, but as Practice Principal and the longest serving physio in my clinic, I felt that there was no need for me to prove the quality of my treatment with so many of my clients being 'repeat customers'. However, I realise that quality is what matters to all of us, not only our patients, but also GPs, consultants and insurance companies. If I was going to stay ahead of the competition and future-proof my business, proving quality needed greater consideration.

As soon as Physio First offered the option of Quality Assured Clinic (QAC) status, there was little left to think about. As the criteria for gaining QAC is that all musculoskeletal physiotherapists in the practice must be Physio First members in order to input data to the Data for

Impact tool, I took the decision to pay the subscription for my team. I recognise that this option is not open to all but for me, it certainly feels worth it.

Although it took a while for everyone to get used to inputting data, as a team it gave us the chance to work towards something together that will mutually benefit all of us, and we are all extremely proud of playing our part in achieving QAC status. As a result of the process we find that we reflect more on our treatments and discuss what options we use and why. In addition, our patients are fascinated by what we are doing and have encouraged us throughout. I like to think that they might go home and tell others about how we are focusing on quality and involving them in the process - you never know!

"I LIKE TO THINK THAT PATIENTS GO HOME AND TELL OTHERS ABOUT HOW WE ARE INVOLVING THEM IN ACHIEVING QUALITY"

As Practice Principal, I find the task of advertising how great we are as a clinic quite hard, but now I have a tool with which I can define our quality status, it makes marketing our practice so much easier, particularly as it involves the buy-in from our whole team. The next step in making the most of our QAC is to continue to ensure that everyone knows that it is a reflection of the great quality treatment we provide to our patients.

**Lucinda Brock MCSP**  
Chipping Norton Physiotherapy Clinic  
and Pilates Studio



## PLEASED AND PROUD OF OUR ACHIEVEMENT

I am pleased and proud that I and my team of expert physiotherapy clinicians at Ashby Physiotherapy & Sports Injury Clinic have been awarded QAC status.

The Physio First Quality Assured scheme is the only third party assessed and validated one in the UK for private musculoskeletal physiotherapists, and having our treatment quality benchmarked against the national



“TO HAVE WHAT WE KNOW INTUITIVELY INDEPENDENTLY VALIDATED IS AN ESSENTIAL PART OF BEING A SUCCESS IN TODAY’S HEALTHCARE MARKETPLACE ”



Members of our Physio First Executive who have achieved QAP and QAC status. From back left: Kenny Cross, Byron Clitheroe, Elizabeth Palmer, Susannah Solt, Sandy Williams, Tracy Bolger and Lucinda Brock. Seated from left: Karen Lay, Paul Johnson, Sue England, Karen Winrow and Belinda Holloway

average gives us, as a practice, immense satisfaction and confidence in our quality standards, and this is something that translates to how we interact with our existing and potential customers.

The three reports we receive per year from the University of Brighton validated tool are a valuable assessment of personal and clinic standards on our performance and outcomes. These reports are used as a CPD tool and discussion points with regard to our

evaluation, clinical reasoning and treatment programmes, and inform us towards solid, functional outcomes that are meaningful to our patients.

Achieving QAC status gives our whole team an assurance that we are offering our patients the best in evidence-based quality physiotherapy treatment. We have always known that our interventions improve our patients’ lives and wellbeing, but to have what we know intuitively independently validated

and documented is an essential part of being a success in today’s healthcare marketplace; it reassures our existing patients and gives those searching for physiotherapy services a standard to look for when choosing which clinic to trust.

**Belinda Holloway MCSP**  
**Ashby Physiotherapy & Sports Injury Clinic**



## WELCOME TO THE PRIVATE PHYSIOTHERAPY EDUCATIONAL FOUNDATION

### LOUIS GIFFORD AWARD WINNERS 2019

# We help physiotherapy make a difference

The Private Physiotherapy Educational Foundation (PPEF) are pleased to announce the winners of this year's Louis Gifford Award.

One complimentary place on the Physio First 2020 annual conference goes to Physio First member Daniel Turley, while the non-member awarded place is presented to Cliona McRobert, Lecturer in Physiotherapy at the University of Liverpool.

In addition to places at the conference, held at the East Midlands Conference Centre on Friday 24 and Saturday 25 April 2020, both winners will receive their

travel expenses and accommodation at the Orchard Hotel included as part of the award package.

As many will know, Louis Gifford was an inspiring clinician who enjoyed attending the Physio First conference as a delegate and was always a firm favourite whenever he participated as a speaker. His death in 2014 was a huge loss to the physiotherapy profession, and so this award is in honour of his memory.

For more information on work of the PPEF, contact [admin@ppef.org.uk](mailto:admin@ppef.org.uk) or see our website [www.ppef.org.uk](http://www.ppef.org.uk) for details.



**DANIEL TURLEY**



**CLIONA MCROBERT**

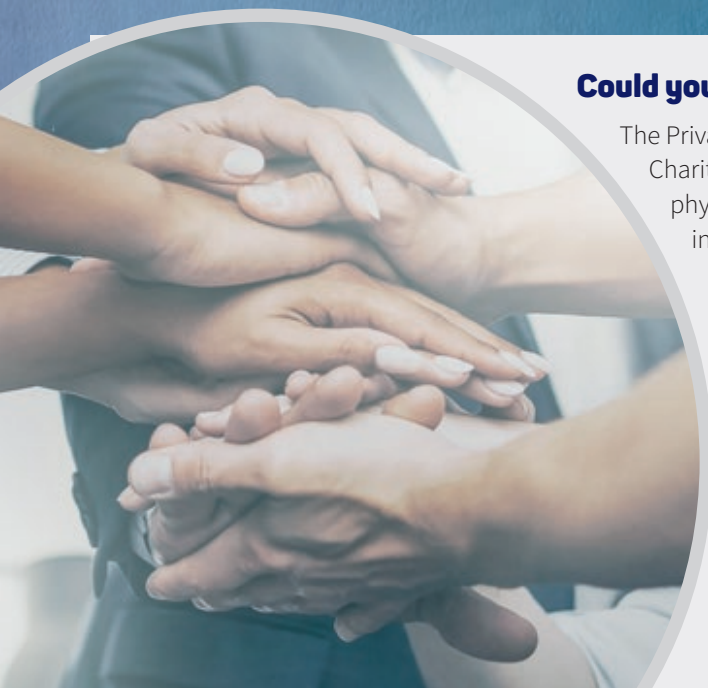
### Could you be a PPEF trustee?

The Private Physiotherapy Educational Foundation (PPEF) is an independent Charitable Foundation (Charity No: 1005738) that provides funding for physiotherapy educational activities and research opportunities for individuals and large organisations.

The PPEF Board consists of eight trustees and currently has two vacancies. As a practicing physiotherapist is required for only one of the vacancies, all applications will be considered.

Applications need to be submitted to the PPEF Chair by the end of January 2020, after which shortlisted candidates will be invited to attend for interview in London in early 2020.

For an information pack and application form, please contact [admin@ppef.org.uk](mailto:admin@ppef.org.uk)





## Tips from our team



# PAY-AS-YOU-GO MEMBERSHIP

**NEW MONTHLY PAYMENT OPTION LAUNCHED**

Hopefully, by now you will have received your e-alert about our exciting new payment option for membership of Physio First. We have listened to what our members and potential members have told us about their payment preferences and, as of 01 October 2019, we have launched the monthly payment method in response to that feedback.

The main reasons for offering this new choice for payment include:

- Flexibility. Membership is on a month by month payment basis; no locked-in contract, no strings, no hidden clauses
- Cost efficiency. We believe that the option to pay monthly supports the budgeting plans of physiotherapy practices of any size.

Members who choose to pay monthly have full access to the same benefits available to members who pay annually, such as:

- Data collection and analysis through the University of Brighton
- The opportunity to gain Quality Assured Practitioner and / or Clinic status
- Support and networking with fellow private physiotherapists
- Education provision designed to help your clinic and

your business succeed

- Important, relevant and concise marketplace news delivered directly to your inbox
- Trusted partnerships sourced to enhance and assist in the needs of your practice.

Monthly membership is open to new members now, and to existing members from April 2020, at the end of this membership year.

Monthly membership charges are open to all practising categories as follows:

**Full members: £22 a month**

**Affiliate members: £20 a month**

**Part-time subscribers: £11 a month**

**For more information contact Claire or Maddie on 01604 684960**

### **Do we have your correct details?**

Our membership team have discovered that we have a number of member records that contain incorrect information such as an out-of-date contact address, telephone number or email. If you have changed any of your personal details recently, please let us know as this will help us to ensure that you are receiving all the benefits of membership that you are entitled to.

# Book reviews

If you have recently read a physiotherapy-themed book that you think would benefit fellow members, and that you would like to share, or if you would like to join our *In Touch* review team, please contact our **Book Editor SUSANNAH SOLT** [susannah@activenowphysio.com](mailto:susannah@activenowphysio.com)

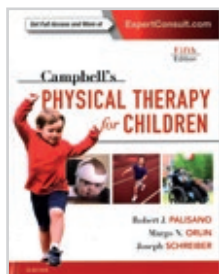


## Campbell's Physical Therapy for Children

(5th edition)

Robert J Palisano,  
Margo Orlin,  
Joseph Schreiber

**Publisher:** Elsevier  
**ISBN:** 9780323390187  
**RRP** £87.14



This is an incredibly comprehensive book, complete with additional videos and tutorials which can be accessed via the publisher's website.

Starting with an explanation of the system of evidence-based decision making, which is an interesting read in itself, this book goes on to discuss, in depth, motor development and the practical applications of motor learning in paediatric rehabilitation. It then describes the musculoskeletal development and notions around physical fitness for children and adolescents.

All the chapters are very well laid out with plenty of imagery, graphs and summaries to highlight important points.

The second section of the book focuses on the management of musculoskeletal conditions and, again, the same high standard is maintained in the quality of the content. Neurological and orthopaedic conditions from birth through to adolescence are discussed and, in this latter stage, also covers sports injuries. The final sections then focus on neurological conditions, cardiopulmonary and paediatric care in special settings.

Having read this book, I now wish that it had been a key text during my paediatric training; with it I would have been miles ahead in my understanding of this area of physiotherapy.

It is well worth a read!

**Tobias Bremer**

## Temporomandibular Disorders. Manual therapy, exercise and needling

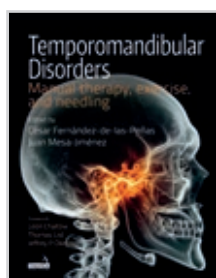
Cesar Fernandez-de-las-Penas  
and Juan Mesa-Jimenez

**Publisher:** Handspring Publishing  
**ISBN:** 9781909141803  
**RRP** £42

If you are interested in developing your understanding of temporomandibular dysfunctions and their connection to the upper cervical and cranial region, you could do worse than reading a text as comprehensive as this one in which the anatomical drivers, pain generators and treatment options for various regions are beautifully married up.

This book is rich in clinically relevant information as it draws on experts from the fields of acupuncture, fascia, medicine and physiotherapy, and Toby Hall's co-authored chapter on clinical classifications of cranial neuropathies neatly slots into the jigsaw of content, demonstrating how multidisciplinary healthcare professionals can all learn from each other.

The explanation of anatomy and pathomechanism of the temporomandibular joint (TMJ) is done well, with diagrams used to highlight points. Personally, I really liked the chapter on therapeutic exercise as it linked the TMJ back to the whole body through simple home exercises, which really brought a holistic feel to the overall text.



If this is an area that you regularly treat, or is of particular fascination for you, then this is definitely the book to read.

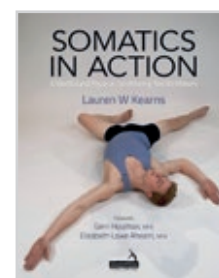
**Tobias Bremer**

## Somatics in Action

Lauren W Kearns

**Publisher:** Handspring Publishing  
**ISBN:** 9781909141643  
**RRP** £32

This book draws from yoga, Pilates and dance inspired stretches, mobilisations and exercises and invites the reader to explore their mind and body with three dimensional movements.



At the opposite end of the spectrum to the strength and conditioning literature, this is a guide to moving in a new way through mindfulness, imagery, and anatomy knowledge as a way of deepening understanding of the body, as well as the body-mind connection.

The chapters describe a series of "movement workouts" that can be performed alone, or in a class setting. Insight into the reason for an activity is given equal emphasis as how to do it. This publication could therefore be used as a workbook to enhance the understanding of movement, or as a source of inspiration for clinicians who offer movement classes as part of their business.

I really enjoyed this book and I am certain that anyone who places importance on movement as part of treatment and rehabilitation will feel the same.

**Tobias Bremer**

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