STJ

Expanding Knowledge in
INAUGURAL VOLUME
Sports Rehabilitation Science

Sports Therapy Journal

JUNE 2025
VOLUME ONE

香港運動治療師總會
SPORTS THERAPISTS ASSOCIATION OF HONG KONG

Supported by
Thei 高科院
Technological and Higher Education Institute of Hong Kong
香港高等教育科技學院

www.staohk.org
editorial_stj@staohk.org

Content

Foreword

Message from Editor-in-Chief

Greetings from your Editor-in-Chief, Indy Ho. I would like to take this opportunity to extend my heartfelt appreciation to fellow editorial board members of the Sports Therapy Journal (STJ) for their unwavering support in the establishment and production of this new journal.

With a strong initiative and leadership from the Chairperson of the Sports Therapists Association of Hong Kong (STAoHK), Mr. John SIU, the decision to publish STJ in 2025 was made, and we finally made it happen. We strongly believe that our content, which has a high diversity and strong practical components, can help bridge the gap between theory and practice in the scope of sports therapy. We promote the use of evidence-based and scientific knowledge meanwhile supplemented with innovative and sensible expert opinions to underpin, sharpen, and reshape the clinical or onfield practices for sports therapists. I enthusiastically look forward to your continued supports, collaborations, and assistance in the near future to further disseminate the contemporary and evolving knowledge and ideas via this platform.

STJ JUNE 2025 VOLUME ONE

Testimonial

A Rising Star in Sports Therapy Stone Shek from Hong Kong

Stone King Yat SHEK [1,2,3*]

1. Sports Therapists Association of Hong Kong (STAoHK), Hong Kong SAR, China.
2. Department of Sport and Recreation, Technological and Higher Education Institute of Hong Kong (THEi), Hong Kong SAR, China.
3. Vegvísir Sports Therapy, Hong Kong SAR, China.
*Correspondence: stone_shek@vegvisirsportstherapy.com

> Always Give It All Out
> 99% might seem enough, but that last bit makes 100% difference for that one patient.

My name is Stone Shek, and my journey in Sports Therapy began at Technological and Higher Education Institute of Hong Kong (THEi), where I studied from 2016 to 2020. This period was foundational for me, as it did not only equip me with essential knowledge but also ignited my passion for helping people to live and achieve their best. I am deeply grateful to THEi for introducing Sports Therapy to Hong Kong, as it shaped my career and paved the way for many aspiring rehab professionals in Hong Kong, especially the local sports community.

Upon graduation, I started my career working at a physiotherapy clinic. This experience was invaluable, allowing me to learn from seasoned professionals and refine my skills in sports rehabilitation. I worked diligently to understand the unique needs of each individual, which laid the groundwork for my future endeavours.

In 2022, I took a bold step and opened my own sports therapy centre, Vegvísir Sports Therapy, becoming one of the first few clinics of its kind in Hong Kong. The journey was fraught with challenges, starting a business required resilience and determination, not mentioning the developing state of local sports therapy. However, these hardships also provided me with unique opportunities to create a practice that aligns with my own values. I have been able to implement innovative approaches to patient care, ensuring that each individual receives the attention and support they deserve.

Over the past three years, I have had the privilege of working with a diverse clientele, ranging from the inactive general population to recreational sports lovers, even elite athletes from around the world. I am also honoured to have worked with World Youth Record Holder, World Champion, Asian Games Medalist, and some other successful athletes, particularly in lifesaving sport, fencing, and track and field. Each interaction has enriched my understanding in sports therapy and deepened my commitment to the wellness of patients.

In addition to my clinical work, I have embraced opportunities to share my knowledge with others. I started teaching at the Asian Academy for Sports & Fitness Professionals (AASFP), where I engage with aspiring personal trainers and therapists, fostering their development and passion in their field of practice. In 2023, I joined THEi as Part-time Lecturer in Sports Therapy, furthering my mission to educate and inspire the next generation of practitioners, as I truly believe that sharing knowledge can reach and help more patients than I could ever reach alone.

I am also proud to be one of the founding members of the Sports Therapists Association of Hong Kong (STAoHK) and one of the editorial board members for the STJ. The STAoHK plays a vital role in promoting professional standards and developing the local (or even global) sports therapy industry. Whilst the STJ will continue the expansion of knowledge in rehabilitation, push through the limit of our understandings, and pioneer treatment modalities and standards.

One of the highlights of my career was being invited to present at the First Hong Kong Athletic Trainers' Association cum Asia Pacific Federation of Athletic Trainers Conference. This experience did not only allow me to connect with professionals from across the region, but also to share insights on the best practices in sports therapy to doctors and other sports medicine disciplines.

Becoming a Sports Therapist has truly been a great career choice for me. I find immense fulfillment in helping others and contributing to their well-being. I sincerely hope that Sports Therapy students and fellow Sports Therapists, in Hong Kong or even UK, find this subject as meaningful and rewarding as I do.

As I reflect on my journey, I am grateful for the experiences that have shaped me both personally and professionally. My commitment to patient care and education continues to drive me forward, and I look forward to what the future holds in the dynamic field of Sports Therapy.

STJ JUNE 2025 VOLUME ONE

Review Article

Innovations and Challenges in Transforming Reflective Practice within Sports Therapy Programmes: A Critical Examination

Sarah L. CATLOW [1*]

1. School of Sport, Business and Media, Plymouth Marjon University, United Kingdom.
*Correspondence: scatlow@marjon.ac.uk

Abstract

Reflective practice plays a vital role in higher education, especially within sports therapy programmes, as it enhances both student learning and professional growth. However, there is limited research on its integration into sports therapy curricula. This paper explores the challenges and opportunities in embedding reflective practice in sports therapy degrees. Key challenges include traditional assessment methods, student engagement, and staff training. Opportunities exist in developing alternative assessments that promote deeper reflection and integrating reflective practice into accreditation standards. By reviewing existing literature, this paper critiques current assessment approaches that may inhibit authentic reflective thinking and proposes new methods to encourage more meaningful reflection. It also emphasises the need for staff training to effectively support and assess reflective practices. Incorporating reflective practice into accreditation criteria can help ensure it remains a core element in the education and professional development of sports therapy students.

Keywords: Reflective Practice, Sports Therapy, Assessment Methods, Curriculum Development

1. Introduction

Reflective practice is increasingly recognised as a cornerstone of higher education, particularly within sports therapy programmes. Despite its importance, there is a notable lack of research on its integration within the sports therapy curriculum. As higher education shifts towards active, student-centred learning (Chan et al., 2017; Lo, 2010), experiential learning has become essential in enabling students to take ownership of their learning journey and foster self-direction. At the heart of experiential learning is reflection, a key component of Kolb's Learning Cycle, which emphasises that learning occurs through the transformation of experiences (Kolb, 2014). However, simply participating in experiences does not automatically lead to learning; instead, purposeful and active reflection on those experiences, emotions, and actions is crucial (Loughran, 2002).

Reflective thinking is structured and deliberate, distinguishing it from casual thought processes (Gelter, 2003). Its growing significance in higher education and professional development stems from the belief that it enhances students' ability to make effective decisions (Betts, 2004). The goal is for reflection to become a practical skill, aiding students in their transition from education to professional practice. Many higher education institutions, including sports therapy programmes, now incorporate reflective practice as a core learning outcome, based on the belief that reflective thinking can be actively developed (Saunders, 2009).

Sports Therapy degrees in the United Kingdom (UK) are becoming increasingly popular; however, there is limited research on best practices for optimising curriculum delivery. Currently, 84 Sports Therapy degree programmes are offered across 48 UK

universities (University Compare, 2025), highlighting the need for further exploration into effective teaching and learning strategies within the field. Additionally, the profession remains unregulated, with no central governing body. Given the vocational nature of sports therapy degrees, exploring improvements in reflective practice is essential for producing well-rounded practitioners.

Hora and Smolarek (2018) highlight the limited literature on reflective practice in higher education, while Raven (2014) notes the lack of empirical studies on reflective methods in professional settings. Similarly, Griggs et al. (2018) emphasise the scarcity of evidence proving that teaching reflective learning in higher education directly enhances reflective practice in professional environments. As a result, Chan and Lee (2021) argue that reflective practices have yet to be universally adopted by higher education institutions. Most research in this area remains narrow in focus, often confined to specific contexts.

This discussion explores the challenges and opportunities of integrating reflective practice into sports therapy curricula, highlighting how traditional assessment methods may hinder authentic reflective thinking. It suggests new strategies to foster deeper reflection while emphasising the importance of staff training and the role of accreditation standards in embedding reflective practice effectively. This paper seeks to address the gap in reflective practice assessment by critically analysing the limitations of traditional methods and proposing alternative approaches tailored to sports therapy students. By tackling these issues, it aims to promote the more effective integration of reflective practice into sports therapy programmes, ensuring that students develop into well-prepared practitioners with critical thinking and self-evaluation skills essential for professional growth.

2. Reflective Practice in Sports Therapy Programmes

Reflective practice is fundamental in sports therapy programmes, guiding students to contemplate their clinical experiences throughout the course. Institutions offer diverse methods to record reflections, including digital tools, videos, voice notes, portfolios, and essays. However, assessment methods often rely on pass-or-fail criteria or graded assignments, raising concerns about their effectiveness in fostering genuine reflection and critical thinking (Koole et al., 2011). When Sports Therapy programmes rely solely on traditional methods, there is a risk that students may focus more on achieving a grade rather than developing deeper clinical reasoning skills and reflective practice. This approach can lead to surface-level learning, where students memorise information for assessments rather than understanding how to apply their knowledge in real-world clinical settings (Lindblom-Ylänne et al., 2018). Furthermore, the lack of emphasis on reflective learning may hinder professional growth, limiting students' ability to critically evaluate their own practice, adapt to new challenges, and continuously improve their clinical decision-making. Over time, this could contribute to a workforce that struggles with independent problem-solving and adaptability, ultimately impacting patient care and the effectiveness of Sports Therapy as a profession.

In sports therapy, as in medical education, reflection plays a vital role in skill development, professionalism, and personal growth (Boud, 2010; Moon, 2004). There are two main types of reflection: reflection in action and reflection on action (Schön, 1983). Reflection in action occurs during a task, enabling practitioners to analyse and adjust their approach in real time, while reflection on action involves evaluating past experiences to inform future decision-making. Qualified therapists use advanced reflection to recognise patterns and refine their practice, whereas students rely on academic staff and constructive feedback to develop this skill (Wainwright et al., 2010). Although often viewed as an individual activity, reflection is also a collaborative process, benefiting from shared insights and discussion (Brookfield, 2017).

Brookfield's Four Lenses model could be more widely implemented in sports therapy programmes to enhance students' reflective practice. This model encourages reflection from four perspectives—autobiographical, student, colleague, and theoretical—fostering deeper engagement and self-awareness (Brookfield, 1995). By incorporating this approach, sports therapy education can address the

limitations of traditional assessment methods, promoting critical thinking, professional growth, and continuous learning.

Integrating reflective practice into sports therapy education plays a crucial role in enhancing clinical decision-making, improving problem-solving skills, and fostering lifelong learning. Research suggests that greater engagement in reflective activities is positively associated with higher exam performance and deeper learning retention (Sobral, 2001; Grant et al., 2006; (Kim & Lim, 2019). However, despite its recognised benefits, reflective writing remains undervalued within sports therapy curricula. Many students receive limited formal training in reflective practice, leading to low engagement and a lack of confidence in applying reflective skills effectively (Paku & Lay, 2008). Addressing these challenges could significantly improve student development and professional readiness.

3. Challenges and Constraints in Reflective Practice within Sports Therapy Programmes

Despite the powerful impact of reflective thought on enhancing learning and practice, it is evident that reflection is not a spontaneous activity. It requires dedicated time and effort because students do not engage in it automatically and need external support to do so (Wedelin & Adawi, 2014). Pedagogically, it is important to convince students of the value of reflective writing from the very beginning of their studies. This can be achieved by presenting them with quotations from more advanced students who have had positive experiences, emotions, and attitudes toward reflection (Kurunsaari et al., 2015). However, challenges arise when reflective practice is integrated into module assessments, potentially leading students to view it as a strategic move to meet requirements rather than a genuine introspective process. Reflective practice in numerous sports therapy programmes is often closely linked with clinical hours. Many programmes stipulate a mandatory number of clinical hours for students to fulfil, typically integrated into assessment criteria to ensure students meet these requirements. Reflective writing on these experiences is often tied to the evidential aspect of the coursework.

The current assessment structure often prompts students to weigh the benefits against the costs, hindering authentic reflective thinking. Within sports therapy programmes, students exhibit diverse views and experiences of reflection, particularly when tied to the assessed components of the degree programme. Negative aspects of student experiences, as observed by Hargreaves (2004) and Hobbs (2007), indicate that despite students recognising the importance of reflection, the additional pressure to excel academically hinders sincere and uninhibited reflection. Hargreaves (2004) and Hobbs (2007) further contend that the challenges associated with assessed reflection often arise due to the lack of guidance in the literature. This raises the question of whether reflection and assessments are genuinely compatible and whether students would actively engage in reflective practices without the incentive of assessment.

In this context, the completion of reflective portfolios may transform into a strategic necessity rather than an authentic exploration of personal and professional growth. This dynamic prompts a fundamental inquiry into the nature of reflective engagement, questioning whether students are fully immersed in the process or simply navigating it as a prerequisite for academic success.

De la Croix and Veen (2018) introduced the concept of "reflective zombies," referring to individuals who exhibit the outward appearance of reflection without engaging in genuine reflective practice. Students often mimic reflective language without truly engaging in reflective thinking (Hays and Gay, 2011). Rather than imposing a standardised approach to reflection through prescribed assessment and marking schemes, there should be flexibility to accommodate diverse reflective styles. This requires moving away from rigid assessment checklists and allowing learning outcomes or objectives to remain unassessed.

4. Assessment of Reflective Practice within Sports Therapy Programmes

Assessment of reflective practice poses a significant challenge because of the lack of standardised methods and the subjective nature of personal reflection (Koole et al., 2011). The shortage of clear

assessment criteria leaves curriculum and programme leaders in sports therapy without practical guidelines for identifying and supporting students who struggle with reflection. Additionally, it hinders the ability to judge the effectiveness of interventions aimed at improving reflective skills. University lecturers face the challenge of assessing deeply personal reflective experiences because students often blend emotional aspects and personal feelings with specific situations. While many lecturers adhere to marking schemes or rubrics for consistency, questions arise regarding the appropriateness of a one-size-fits-all approach for grading reflective assignments. Rubrics serve as common assessment tools for evaluating students' levels of reflection (Tsingos et al., 2015), offering explicit criteria against which academic staff can assess performance (Leong, 2012). While academic staff primarily use rubrics for grading and assessment, they also serve as tools for students to enhance their learning. Research indicates that students generally view rubrics positively because they aid in understanding the standards required for improvement. However, there is evidence indicating that some students perceive rubrics as burdensome (Cockett & Jackson, 2018), feeling that they restrict creativity (Bell et al., 2013), especially in reflective writing assessments involving subjective elements such as personal feelings, emotions, and deep thoughts. Reflective assessments may prompt conflicts between lecturers and students, as judgments can be highly subjective and dependent on individual marking beliefs and attitudes towards reflection (Holmes and Jindal-Snape, 2006). Furthermore, the lack of anonymity in reflective assessments, often part of digital portfolios or clinical evidence, may discourage students from sharing their most private thoughts, compromising the authenticity of their reflections. Reflective portfolios, when used effectively, serve as a means of celebrating achievements and creating a strengths-based narrative. However, students often overlook the potential for ongoing personal development by not revisiting and rereading their written experiences in a work or clinical context.

5. Alternative Approaches to Enhance Reflective Practice within Sports Therapy Programmes

Extensive written reflective portfolios or essays are often perceived by students as time-consuming, potentially leading to superficial engagement with reflection merely to fulfil assessment requirements. To foster a more meaningful shift, the curriculum could incorporate alternatives such as formal supervision sessions and informal peer support groups linking into Brookfield's Four Lenses model (Brookfield, 2017). Encouraging one-on-one discussions between students and their professional development tutors or module leaders, though time-intensive, may create a more supportive environment for genuine reflection.

Collaborative reflection is a collective process that fosters deeper and more meaningful contemplation. It involves two or more individuals engaging in an exploration designed to advance the thoughts and practices of all participants. This type of reflection moves from descriptive accounts to analytical and critical levels, enriching the reflective experience, It is suggested that collaborative reflection could be an effective strategy to help students learn to reflect. For example, Daniel et al., (2013), Harford and MacRuairc (2008), and McCullagh (2012) have all endorsed its potential. However, research on its effectiveness has produced mixed results. Some studies indicate that collaboration facilitates deeper critical reflection and the construction of knowledge (Attard, 2012), elevates the level of reflection from mere description to theorising (Manouchehri, 2002), and helps students engage with new ideas (Sorensen, 2014). On the other hand, other research has reported that collaborative reflection can result in poor problem understanding and limited perspective shifts (Tillema and Van Der Westhuizen, 2006), overly descriptive and poorly developed reflections (Killeavy and Moloney, 2010), and inadequate use and integration of theory (Postholm, 2008).

Given these contradictory findings, it is suggested that the success of collaborative reflection in promoting reflection among students depends on two main factors: the support provided by knowledgeable others, such as University lecturers, and the social organisation of the collaboration (Gelfuso and Dennis, 2014; Moore-Russo and Wilsey, 2014). In the context of sports therapy education, incorporating structured and well-facilitated collaborative reflection could enhance

students' reflective practices, thereby enriching their learning experiences and professional development.

This extension offers a collective space for individuals to reflect collaboratively on their professional experiences, thereby extracting fresh insights for future practice. In the context of sports therapy practice, reflective processes commonly involve exchanging ideas with colleagues and participating in discussions. It is imperative to instil in students an appreciation for this collaborative approach, fostering an environment of openness and honesty instead of resorting to embellishment for academic gain. Students are encouraged to pose questions and critically evaluate the effectiveness of their approaches to various situations (Rolfe, 2014).

To support deeper learning in sports therapy, students should consider how theories learned in the classroom are applied in practice and how their experiences are interpreted. Concepts for deepening practice-based learning should be shared and discussed. Students should also reflect on theory-practice gaps, what they have learned from these gaps, and how they have used theory-practice integration to gain new knowledge. This approach links to collaboration reflection and theory-practice reflection, encouraging students to critically evaluate and enhance their professional practice.

De la Croix and Veen (2018) proposed the concept of ipsative assessment within the realm of reflection, which involves assessing how an individual has progressed relative to their earlier work, focusing on the learner's development rather than merely measuring outcomes and achievement levels (Hughes, 2011). Since reflection is inherently personal and may not align with academic or assessment objectives, this perspective questions the efficacy of anonymous individuals grading reflective portfolios, but also to introduces the concept of small-weighted attendance for meaningful meetings or tutorials.

6. Staff Training and Integration of Reflective Practice

This highlights the necessity for academic staff to possess the requisite skills for evaluating reflective assessments. Within university settings, particularly in fields like sports therapy, many educators may lack formal training in pedagogy, often being researchers or clinical experts tasked with teaching responsibilities (Chan & Lee, 2021). Reflective practice emerges as a significant strategy in professional education, playing a significant role in fostering both learning and professional development. However, the current pedagogical approach to teaching and evaluating reflection often lacks a clear structure, offering inadequate guidance for educators and learners alike (Fisher, 2003; McGuire et al., 2009). Despite abundant literature extolling the value of reflective practice across various professions, there remains a notable dearth of well-described and validated methods for assessing competence in reflective practice (Levett-Jones, 2005).

Furthermore, there is a need to focus on integrating reflective practice into the training of academic staff, encompassing both their performance and assessment of students' reflective learning. As reflective engagement is actively endorsed within the sports therapy profession, there is a demand to explore effective means of supporting academic staff in honing this skill. While numerous studies have delved into the benefits of reflective practice for students and its integration into academic programmes, there is a distinct scarcity in examining the reflective practices of teaching and academic staff.

7. Role of Professional Bodies in Supporting Reflection Practice in Sports Therapy

In the UK, the profession of sports therapy operates without statutory regulation, allowing individuals to practice as sports therapists without compulsory registration with a regulatory body. Nevertheless, numerous professional bodies and organisations play a crucial role in upholding standards within the profession.

These professional bodies are instrumental in accrediting degree-level sports therapy programmes, significantly contributing to the establishment and maintenance of rigorous educational and practice standards. In the UK, three primary voluntary

accrediting bodies oversee several degree-level programmes in sports therapy. Their accreditation processes ensure that educational programmes meet specific criteria, guaranteeing that students receive high-quality training and are well-prepared for their careers as sports therapists. By collaborating closely with educational institutions, these bodies assess and uphold the quality of sports therapy education, ultimately benefiting both students and the profession.

Despite these efforts, there is a noticeable lack of emphasis on reflective practice within the accreditation criteria and in promoting it to graduates. In contrast, the Health and Care Professions Council (HCPC) underscores the importance of reflective thinking as a crucial component of professional practice across all regulated professions (Health and Care Professions Council, 2024b). The HCPC mandates that registrants engage in reflective practice to continuously improve their professional skills and ensure high-quality care. Reflective practice is a core element of the HCPC's continuous professional development (CPD) standards, requiring registrants to maintain up-to-date records of their reflective activities and demonstrate their impact on practice (Health and Care Professions Council, 2024a). The HCPC supports this through guidance, resources, and regular audits of CPD portfolios. Additionally, the HCPC collaborates with educational institutions to ensure reflective practice is embedded in curricula, preparing students to engage in meaningful reflection throughout their careers.

This contrast highlights a gap in the sports therapy profession, where the focus on reflective practice may not be as rigorously enforced or integrated into accreditation processes. To advance the profession, sports therapy must align more closely with these guidelines, ensuring that reflective practice becomes a fundamental part of professional development and education. By doing so, sports therapists can enhance their practice, contribute to the profession's growth, and ultimately provide better care for their clients.

To promote reflective thinking and ongoing professional development among sports therapy practitioners, it is imperative that these voluntary bodies actively advocate for the integration of reflective practice into university settings. These voluntary bodies must prioritise the inclusion of reflective practice within their guidelines to underscore its importance to undergraduate students, enabling them to develop a deeper understanding and appreciation for this aspect of their profession.

Although accrediting bodies mandate CPD requirements for sports therapy practitioners, such as case reviews and professional development courses, there is a lack of specific guidance on reflective practice. Therefore, accrediting bodies should provide more comprehensive information and resources to facilitate the incorporation of reflective activities into practitioners' ongoing learning and development.

Graduate sports therapists require structured guidance to enhance their reflective capacity and to systematise their reflection process to improve the consistency and quality of their CPD activities. Moreover, accrediting bodies should advocate more assertively for reflective practice within the sports therapy profession, elevating its recognition and integration into professional standards and guidelines. By highlighting its value in enhancing clinical decision-making, improving patient outcomes, and fostering professional growth, accrediting bodies can significantly contribute to the advancement and refinement of the sports therapy profession by taking a leadership role in promoting reflective practice.

8. Navigating the Future of Reflective Practice within Sports Therapy Higher Education Programmes

Reflective practice is pivotal in Sports Therapy Higher Education programmes, facilitating students' ability to critically evaluate their experiences, integrate theoretical knowledge with practical skills, and ultimately enhance their professional development. Navigating the future of reflective practice within these programmes presents various challenges and opportunities. Key considerations and recommendations for advancing reflective practice in Sports Therapy Higher Education programmes are explored below.

i. Transition to Independent Student-Led Reflection: Shifting from tutor-led to independent student-led reflection is essential in developing deeper learning and self-awareness. However, it is important to consider when and how reflective practice is introduced to students. A gradual progression may be more effective, ensuring that students build confidence and competence in reflective skills. Introducing structured scaffolding in earlier years (e.g., Year 1) and gradually promoting independent reflection in Year 2 or 3 may enhance engagement and effectiveness. This approach allows students to develop the necessary critical thinking and self-evaluation skills before transitioning to fully independent reflective practice.

ii. Enhancing Reflective Practice Cultivation: Higher Education Institutions must assess and enhance how reflective practice is cultivated. This necessitates additional training and CPD for staff involved in sports therapy programme delivery.

iii. Impact of Reflective Practice Assessment: Reflecting on the impact of reflective practice assessment on student learning and motivation is crucial. Evaluating the effectiveness of assessment methods prompts refinement to ensure authenticity and meaningful reflection.

iv. Student Involvement in Optimal Practices: Actively involving students in discussions about optimal practices for developing reflective thinking is vital. Collaborative dialogue empowers students to contribute to the enhancement of reflective practice approaches.

v. Promotion of Reflective Outcomes: Promoting dialogue with students on effective ways to demonstrate reflective outcomes is necessary. Providing clarity on assessment criteria encourages students to articulate their reflections effectively.

vi. Exploration of Alternative Reflection Methods: Exploring alternative reflection methods beyond writing is imperative. Solo, peer, or group approaches foster diversity in reflective experiences and enhance engagement.

vii. Role of Professional/Voluntary Bodies: The role of professional and accrediting bodies in encouraging changes to reflective practice should be explored. Collaboration between academic institutions and professional bodies ensures alignment with industry standards.

viii. Longitudinal Research for Programme Refinement: Continuous longitudinal research is essential to refine Sports Therapy Higher Education programme design, delivery, and reflective practice assessment. This ongoing evaluation informs iterative improvements to meet evolving educational needs.

Navigating the future of reflective practice within Sports Therapy Higher Education programmes requires a multifaceted approach encompassing pedagogical innovation, student engagement, assessment refinement, and collaboration with professional bodies. By addressing these considerations, Higher Education Institutes can ensure that reflective practice remains a cornerstone of professional development in sports therapy education.

9. Conclusion and Future Research Directions

Reflective practice is a crucial element of higher education, particularly in sports therapy programmes, where it enhances student learning and professional development. It deepens understanding of clinical experiences, improves critical thinking, and fosters continuous learning among practitioners. However, challenges remain in effectively assessing and integrating reflective practice into curricula. Traditional assessment methods often prioritise compliance over genuine engagement, making it difficult to cultivate meaningful self-reflection among students.

To overcome these challenges, a shift towards student-centred reflection is needed, focusing on authenticity and personal growth rather than assessment-driven reflection. This requires re-evaluating traditional assessment methods and incorporating more interactive and collaborative reflective processes. Additionally, academic staff training is essential for facilitating and evaluating reflective practice effectively. By embedding reflective training into staff development, institutions can create a more supportive learning environment, allowing students to develop into self-aware, critical, and adaptable practitioners. This, in turn, equips them to meet the dynamic demands of healthcare, ultimately improving patient care and clinical outcomes.

Future research should focus on several key areas, including developing sophisticated assessment tools that encourage honest reflection without hindering engagement. These tools should balance evaluation with the subjectivity and personal nature of reflection, ensuring that students engage meaningfully. Additionally, research should investigate how reflective activities correlate with improvements in patient care and therapeutic effectiveness, demonstrating their value in clinical practice. Understanding the barriers students face in engaging with reflection and identifying strategies to enhance their reflective skills is another critical area. Creating supportive environments that foster meaningful engagement will help strengthen reflective practice. Longitudinal studies examining the long-term effects of reflective practice on graduates could provide insights into its impact on professional development and clinical decision-making. Furthermore, evaluating the effectiveness of digital tools in facilitating reflection is essential, as research should explore how these technologies can enhance reflective thinking and integrate seamlessly into sports therapy curricula. Addressing these areas through practical, evidence-based research will refine and enhance reflective practice, ensuring it remains a cornerstone of student learning and professional growth, ultimately benefiting both the profession and patient care.

Acknowledgment

The author would like to acknowledge the help from Dr. Lance Doggart and Jim Doggart.

Reference List

1. Attard, K., 2012. Public reflection within learning communities: An incessant type of professional development. *European Journal of Teacher Education*, 35(2), pp.199-211.
2. Bell, A., Mladenovic, R., and Price, M., 2013. Students' perceptions of the usefulness of marking guides, grade descriptors and annotated exemplars. *Assessment & Evaluation in Higher Education*, 38(7), pp.769–788.
3. Betts, J., 2004. Theology, therapy, or picket line? What's the 'good' of reflective practice in management education? *Reflective Practice*, 5(2), pp.239–251.
4. Boud, D., 2010. Relocating reflection in the context of practice. In H. Bradbury, N. Frost, and S. Kilminster, (Eds.), *Beyond Reflective Practice.* pp. 25–36. New York, NY: Routledge.
5. Brookfield, S. D., 1995. *Becoming a critically reflective teacher*. Jossey-Bass.
6. Brookfield, S. D., 2017. *Becoming a critically reflective teacher (2nd ed.)*. Jossey-Bass.
7. Chan, C. K. Y., and Lee, K. K. W., 2021. Reflection literacy: A multilevel perspective on the challenges of using reflections in higher education through a comprehensive literature review. *Educational Research Review*, 32.
8. Chan, C. K. Y., Wong, G. C. K., Law, A. K. H., Zhang, T., and Au, F. T. K., 2017. Evidence-based conclusions concerning practice, curriculum design and curriculum reform in a civil engineering capstone design course in Hong Kong. *Innovations in Education and Teaching International*, 54(3), pp.260–274.
9. Cockett, A., and Jackson, C., 2018. The use of assessment rubrics to enhance feedback in higher education: An integrative literature review. *Nurse Education Today*, 69, pp.8–13.

10. Daniel, G. R., Auhl, G., and Hastings, W., 2013. Collaborative feedback and reflection for professional growth: Preparing first-year pre-service teachers for participation in the community of practice. *Asia-Pacific Journal of Teacher Education*, 41(2), pp.159-172.

11. De la Croix, A., and Veen, M., 2018. The reflective zombie: Problematizing the conceptual framework of reflection in medical education. *Perspectives on Medical Education*, 7(6), pp.394-400.

12. Fisher, K., 2003. Demystifying critical reflection: Defining criteria for assessment. Higher Education *Research and Development*, 22(3), pp.313–325.

13. Gelfuso, A., and Dennis, D. V., 2014. Getting reflection off the page: The challenges of developing support structures for pre-service teacher reflection. *Teaching and Teacher Education*, 38, pp.1-11.

14. Gelter, H., 2003. Why is reflective thinking uncommon? *Reflective Practice*, 4(3), pp.337–344.

15. Grant, A., Kinnersley, P., Metcalf, E., Pill, R., and Houston, H., 2006. Students' views of reflective learning techniques: An efficacy study at a UK medical school. *Medical Education*, 40(4), pp.379–388.

16. Griggs, V., Holden, R., Lawless, A., and Rae, J., 2018. From reflective learning to reflective practice: Assessing transfer. *Studies in Higher Education*, 43(7), pp.1172–1183.

17. Hargreaves, J., 2004. So how do you feel about that? Assessing reflective practice. *Nurse Education Today*, 24(3), pp.196-201.

18. Harford, J., and MacRuairc, G., 2008. Engaging student teachers in meaningful reflective practice. *Teaching and Teacher Education*, 24(7), pp.1884-1892.

19. Hays, R., and Gay, S., 2011. Reflection or 'pre-reflection': What are we actually measuring in reflective practice? *Medical Education*, 45, pp.116–118.

20. Health and Care Professions Council, 2024(a). *Continuing professional development (CPD)*. [online] Available at: <https://www.hcpc-uk.org/cpd/> [Accessed 12 March 2025].

21. Health and Care Professions Council, 2024(b). Reflection and meeting your standards. [online] Available at: <https://www.hcpc-uk.org/standards/meeting-our-standards/reflective-practice/reflection-and-meeting-your-standards/> [Accessed 12 March 2025].

22. Hobbs, V., 2007. "Faking It or Hating It: Can Reflective Practice be Forced?" *Reflective Practice* 8 (3): pp.405–417.

23. Holmes, E. A., and Jindal-Snape, D., 2006. Investigating methods for enhancing reflective practice used by Educational Psychology students and practitioners. *International Research Network e-journal*, 1, pp.1-10.

24. Hora, M. T., and Smolarek, B. B., 2018. Examining faculty reflective practice: A call for critical awareness and institutional support. *Journal of Higher Education*, 89(4), pp.553–581. https://doi.org/10.1080/00221546.2018.143766

25. Hughes, G., 2011. Towards a personal best: A case for introducing ipsative assessment in Higher Education. *Studies in Higher Education*, 36, pp.353–367.

26. Killeavy, M., and Moloney, A., 2010. Reflection in a social space: Can blogging support reflective practice for beginning teachers? *Teaching and Teacher Education*, 26(5), pp.1070-1076.

27. Kim, J. Y., and Lim, K. Y., 2019. Promoting learning in online, ill-structured problem solving: The effects of scaffolding type and metacognition level. *Computers & Education*, 138, pp.116–129.

28. Kolb, D. A. (2014). *Experiential learning: Experience as the source of learning and development*. FT Press.

29. Koole, S., Dornan, T., Aper, L., Scherpbier, A., Valcke, M., Cohen-Schotanus, J., and Derese, A., 2011. Factors confounding the assessment of reflection: A critical review. *BMC Medical Education*, 11, pp.104.

30. Kurunsaari, M., Piirainen, A., and Tynjälä, P., 2015. Students' experiences of reflective writing in physiotherapy education. *Physiotherapy*, 101.

31. Leong, R., 2012(November). An assessment rubric on reflection in a career development learning component of a business course. In 2012 *Australian Collaborative Education Network National Conference* p.153.

32. Levett-Jones, T., 2005. Self-directed learning: Implications and limitations for undergraduate nursing education. *Nurse Education Today*, 25, pp.363–368.

33. Lindblom-Ylänne, S., Parpala, A., and Postareff, L., 2018. What constitutes the surface approach to learning in the light of new empirical evidence? *Studies in Higher Education*, 44(12), pp.2183–2195.

34. Lo, Y.-F., 2010. Implementing reflective portfolios for promoting autonomous learning among EFL college students in Taiwan. *Language Teaching Research*, 14(1), pp.77–95.

35. Loughran, J. J., 2002. Effective reflective practice: In search of meaning in learning about teaching. *Journal of Teacher Education*, 53(1), pp.33–43.

36. Manouchehri, A., 2002. Developing teaching knowledge through peer discourse. *Teaching and Teacher Education*, 18(6), pp.715-737.

37. McCullagh, J. F., 2012. How can video supported reflection enhance teachers' professional development? *Cultural Studies of Science Education*, 7(1), pp.137-152.

38. McGuire, L., Lay, K., and Peters, J., 2009. Pedagogy of reflective writing in professional education. *Journal of Scholarship of Teaching & Learning*, 9(1), pp.93–107.

39. Moon, J. A., 2004. A Handbook of Reflective and Experiential Learning: *Theory and Practice (1st ed.)*. Routledge. https://doi.org/10.4324/9780203416150

40. Moore-Russo, D. A., and Wilsey, J. N., 2014. Delving into the meaning of productive reflection: A study of future teachers' reflections on representations of teaching. *Teaching and Teacher Education*, 37, pp.76-90.

41. Paku, L., and Lay, M., 2008(September). Reflective learning of cooperative education students. In *WACE Asia Pacific Conference.* p.468.

42. Postholm, M. B., 2008. Teachers developing practice: Reflection as key activity. *Teaching and Teacher Education*, 24, pp.1717-1728.

43. Raven, N., 2014. Learning from experience: Reflective practices amongst higher education professionals. *Reflective Practice*, 15(6), pp.766–779. https://doi.org/10.1080/14623943.2014.944134

44. Rolfe, G., 2014) Rethinking reflective education: What would Dewey have done? *Nurse Education Today*, 34, pp.1179–1183.

45. Saunders, R., 2009. *Education in parenting young children*. Unpublished dissertation (UMI submission number 10164). [APA]

46. Schön, D. A., 1983. *The reflective practitioner: How professionals think in action*. Basic Books, Inc.

47. Sobral, D., 2001. Medical students' reflection-inlearning in relation to approaches to study and academic achievement. *Medical Teacher*, 23(5), pp.508-513.

48. Sorensen, P., 2014. Collaboration, dialogue and expansive learning: The use of paired and multiple placements in the school practicum. *Teaching and Teacher Education*, 44, pp.128-137.

49. Tillema, H., and Van der Westhuizen, G. J., 2006. Knowledge construction in collaborative enquiry among teachers. *Teachers and Teaching: Theory and Practice*, 12(1), pp.51-67.

50. Tsingos, C., Bosnic-Anticevich, S., Lonie, J. M., and Smith, L., 2015. A model for assessing reflective practices in pharmacy education. *American Journal of Pharmaceutical Education*, 79(8), pp.124.

51. University Compare. (n.d.). *Sports therapy degrees in the UK*. University Compare. [online] Available at: <https://universitycompare.com/courses/degrees/sports-therapy> [Accessed 12 March 2025].

52. Wainwright, S. F., Shepard, K. F., Harman, L. B., and Stephens, J., 2010. Novice and experienced physical therapist clinicians: A comparison of how reflection is used to inform the clinical decision-making process. *Physical Therapy*, 90, pp.75–88.

53. Wedelin, D., and Adawi, T., 2014. Teaching mathematical modelling and problem solving: A cognitive apprenticeship approach to mathematics and engineering education. *International Journal of Engineering Pedagogy (IJEP)*, 4(5), pp.49–55.

STJ JUNE 2025 VOLUME ONE

Case Report

Ultrasound-Guided Dry Needling in the Treatment of a Patient with Chronic Plantar Fasciopathy: A Case Report

Alex Chun Ming CHAN [1,2*]

1. Dr Cure Musculoskeletal Pain & Sports Injury Physiotherapy Centre, Hong Kong SAR, China.
2. Sports Therapists Association of Hong Kong, Hong Kong SAR, China.
*Correspondence: alexchan.physio@hotmail.com

Abstract

Background and purpose

Plantar fasciopathy (PF) results from chronic strain and degeneration of the plantar fascia, leading to significant heel pain and undermining individuals' health-related quality of life. Dry needling (DN) is one of the most common and cost-effective non-pharmaceutical treatments practiced by physiotherapists to manage PF. It provides a favorable outcome by initiating a controlled micro-trauma to the symptomatic and impaired tissue to induce a healing response. Diagnostic ultrasound allows accurate needle placement to the intended and impaired tissue and prevents harming healthy tissue. Ultrasound-guided dry needling (UDN) may improve effectiveness of dry needling in managing PF compared to non-guided DN.

Case Description

The patient is a 65-year-old retired female with 52 weeks of insidious onset of heel and plantar foot pain who received five weeks of unsuccessful physiotherapy with standard care and progressed to five weekly visits of UDN.

Outcome

The patient's pain perception on the Numeric Pain Rating Scale (NPRS) and foot function Index-revised (FFI) were measured before (week 58) and after the five weekly visits of UDN (week 63). At week 63 (after five sessions of UDN), pain at her plantar heel reduced from 5/10 to 1/10 on the NPRS when initiating walking. Aching pain after 5 minutes of walking was reduced from 2 /10 to 0/10 NPRS Scale, and FFI improved by 20 points from 22.4 to 2.4, suggesting a significant reduction in pain, disability, and activity limitation in the patient.

Discussion

UDN could be a viable treatment option for managing PF. Further research of higher levels of evidence, for example, a randomized control trial comparing UDN with ultrasound-guided placebo DN, is recommended to establish a causal association relationship.

Keywords: Ultrasonography, Heel pain, Foot and ankle, Dry needling, Rehabilitation

1. Background and Purpose

Plantar fasciopathy (PF) is the most common cause of heel pain that affects the plantar fascia, a thick band of tissue located along the bottom of the foot (Devika et al., 2020). This condition results from chronic strain and degeneration of the plantar fascia (Devika et al., 2020), leading to significant heel pain and undermining individuals' health-related quality of life (Irving et al., 2008). While most cases of PF are self-limiting and respond to standard physiotherapy, a significant portion of patients (>10%) continued to have their function limited beyond 12 months (Monteagudo et al., 2018).

Dry needling (DN) is one of the most common and cost-effective non-pharmaceutical treatments practiced by physiotherapists to manage PF (Cagnie et al., 2013; Dommerholt et al., 2015). DN is the puncture of impaired tissue without injection. It provides a favorable outcome by initiating a controlled micro-trauma to the symptomatic and impaired tissue to elicit an inflammatory response (Yin et al., 2018). It facilitates mast cell proliferation and promotes the anti-inflammatory cytokine IL-10, inducing a healing response (Yin et al., 2018). Additionally, repeated needling of the impaired tissue could physically break down degenerated and scar tissue and promote bleeding into the tissue, promoting fibroblast growth factor and growth factor-beta (James et al., 2007). DN also facilitates both peripheral and central desensitization (Sandberg et al., 2005). The effectiveness of DN depends on the accuracy of the needle placement and the intensity of stimulation by the needle (Legge, 2014).

Although DN improves painful conditions in a few studies, including knee osteoarthritis, hip osteoarthritis, and shoulder pain (Ceballos-Laita et al., 2019; Ceballos-Laita et al., 2021; Itoh et al., 2008), other studies failed to induce favorable outcomes (Ceballos-Laita et al., 2019; Espí-López et al., 2017; Korbe et al., 2015). The inconsistency between studies can be related to the poor accuracy of needle placement of DN, which is why imaging-guided DN is proposed to improve the accuracy of needle placement and enhance its clinical effectiveness in managing PF (Pang et al., 2022).

Diagnostic ultrasound is an accessible and relatively cost-effective technology that can guide percutaneous intervention without exposing the patient to ionizing radiation (Korbe et al., 2015). When DN is guided by ultrasound, it ensures accurate needling placement to the intended and impaired tissue and prevents harming healthy tissue (Korbe et al., 2015). Ultrasound-guided dry needling (UDN) may improve its effectiveness in managing PF compared to non-guided DN (Pang et al., 2022). However, to our knowledge, there is little research on UDN managing PF. This case report aims to describe and illustrate the use of UDN intervention in the successful treatment of chronic PF.

2. Case Description: Patient History and Systems Review

The patient is a 65-year-old retired female who experienced the insidious onset of heel and plantar foot pain for 52 weeks. Despite receiving five weeks of physiotherapy with standard care, which included stretching exercises, manual therapy, ultrasound therapy and shockwave therapy, the care was unsuccessful and did not resolve her pain. The patient presented to this physiotherapy clinic at 58 weeks, seeking an alternate treatment.

At that time, her primary complaint was stabbing pain at her left plantar heel of 5/10 on NPRS when initiating walking after prolonged rest and aching pain of 2/10 on NPRS after 5 minutes of walking.

The patient had no comorbidities and no history of other orthopedic conditions. Her height was 170.5cm, and she weighed 55kg. Her primary goals for physiotherapy were to suffer minimal pain during the initiation of walking and pain-free walking for 1 hour.

Clinical Impression 1

The patient was a 65-year-old retired female who had been experiencing heel and plantar foot pain for 52 weeks, despite receiving standard physiotherapy care. Her pain continued to affect her ability to walk for more than 5 minutes, and the pain was moderate during the initiation of walking (Table 1). Given her motivation and high expectations for recovery, she was considered a potential candidate for UDN.

The physiotherapist performed a subjective examination, a diagnostic ultrasound exam, and orthopedic special tests to confirm the diagnosis and evaluate prognostic factors and contributing factors, including the joint range of motion, foot posture, leg discrepancy, and weight. This evaluation process is required to determine the appropriateness and success of the ultrasound-guided dry-needling intervention.

Examination

Range of motion (ROM)
ROM of the talocrural joint (TCJ) and first metatarsophalangeal joint (1st MTPJ) were measured by Goniometer to assess their contribution to the patient's PF. The results showed that the patient had a normal amount of dorsiflexion (23 degrees), a normal amount of plantar flexion (50 degrees), and a normal amount of dorsiflexion of the 1st MTPJ (70 degrees).

Posture
The patient's posture examination did not display foot posture deformity, including pes cavus or pes planus, and there was no excessive foot pronation during walking. Additionally, there was no leg length discrepancy, which can result in altered gait. These results suggested that altered foot posture was not a primary contributor to the patient's PF.

Pain-provoking test and Orthopedic special test
Palpation at the medial calcaneal tubercle at the plantar fascia's origin reproduced the patient's plantar heel pain. The positive result of the Windlass test, a test for diagnosis of PF, further confirms the diagnosis of PF.

Weight
Body Mass Index (BMI) was evaluated and measured to be 18.9, within the normal limit. A high BMI was a contributing factor to PF. However, the patient's BMI was normal, suggesting the BMI was not a primary contributor to the patient's PF.

Diagnostics Ultrasound findings
A hypoechoic and thickened fascia (4.7mm) was evident at the plantar fascia proximal origin at the medial tubercle of calcaneus, confirming the diagnosis of PF (Fig 1).

Outcome Measures
Foot function Index-revised (FFI) was a reliable and valid outcome measure used to measure pain, disability, and activity limitation in patients suffering from foot conditions, including PF (Budiman-Mak et al., 1991). The minimally clinically important difference was (MCID) 6.5 points for the total score (Martin et al., 2005).In this case, the patient scored 22.4 at week 58. This score suggests that the patient was experiencing mild to moderate pain, disability, and activity limitation.

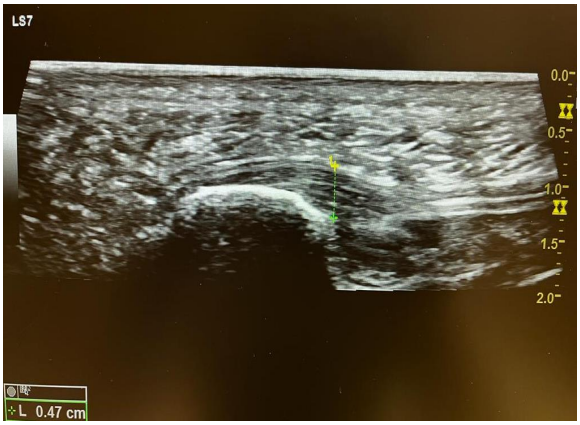


Figure 1 — Diagnostic Ultrasound: Image demonstrating the longitudinal view of the plantar fascia. Hypoechoic and thickened fascia (4.7mm) was evident at the plantar fascia proximal origin to medial tubercle of calcaneus.

Clinical Impression 2

Pain-provoking tests, special orthopedic tests, and diagnostic ultrasound findings confirmed the PF diagnosis. Biomechanical factors were normal, including the ROM of TCJ ROM and 1st MTPJ ROM, foot alignment, and BMI. The examination did not suggest poor foot biomechanics or body weight be a leading contributor to this patient's PF.

Based on the above findings, the patient was not prescribed any education on footwear nor orthosis. The main focus of physiotherapy should not be improving foot biomechanics, but instead directed towards initiating a controlled micro-trauma to the impaired plantar fascia to elicit an inflammatory response and promote healing. UDN could serve the above purpose in this patient's case.

The patient's goal of improving pain during initiating walking, improving pain with walking, and reducing the total score of FFI can be used as outcome measures to determine the effectiveness of the ultrasound-guided DN intervention.

These were measured before (week 58) and after (week 63) the five weekly visits to UDN. Reaching the patient's goal would suggest that UDN is a viable intervention for PF, and a reduction in the total score of FFI would indicate an improvement in pain, disability, and activity limitations.

3. Intervention

The development of UDN intervention for PF was influenced by the increase in the use and accessibility of diagnostics ultrasound and the acknowledgment of the positive effect of DN for various musculoskeletal pain conditions, including PF. The following steps were the procedure for administering UDN intervention for PF.

Patient Preparation and Positioning
The patient was supine. The entire heel of the affected side was disinfected with a 70% Isopropyl Alcohol Pad and covered with a poly-lined sterile drape.

Probe disinfection and scanning
The ultrasound scanning was performed utilizing an ultrasound system (GE Logiq S7 Expert Ultrasound System; General Electric, INC, New York, the United States) with a high-frequency linear-array probe (GE 8-12MHz probe; General Electric, INC, New York, the United States). The probe was disinfected by a disinfection wipe (Clinell Universal Wipes, GAMA Healthcare Ltd, Hemel Hempstead, Hertfordshire) and wrapped with an ultrasound probe cover (3M; St. Paul, MN, USA). Transmission gel (Aquasonic sterile transmission gel, Parker Laboratories, INC) was applied to the probe with the probe placed over the medial tubercle of the calcaneus longitudinal to the plantar fascia to visualize the impaired plantar fascia. The most thickened and hypoechoic portion of the plantar fascia at the medial tubercle of the calcaneus was located (Fig.1).

Needle Insertion
A 0.3 x 40 mm sterile stainless needle (Pipe handle; Healthcare, INC, Hong Kong, China) was inserted with an in-plane technique. The needle advanced to the most thickened and hypoechoic portion of the plantar fascia under the visualization of the ultrasound to ensure the desired location was reached (Figure 2). The needle was retracted and advanced repeatedly 15 times.

Needle Removal
The needle was then removed, with pressure applied to prevent excessive swelling and bleeding.

Treatment Regime
The patient was given weekly UDN for five weeks. The patient did not receive other co-interventions.

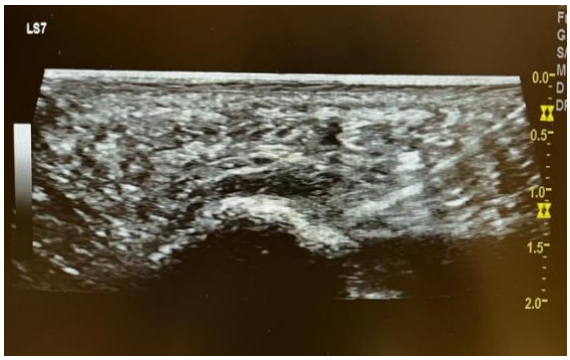


Figure 2 — Ultrasound-guided dry needling: A 0.3 x 40 mm sterile stainless needle was inserted with an in-plane technique. The needle advanced to the most thickened and hypoechoic portion of the plantar fascia under the visualization of the ultrasound to ensure the desired location was reached. The needle was retracted and advanced repeatedly 15 times.

4. Outcome

The patient underwent five sessions of UDN starting at week 58 and completing at week 63. Table 1 outlines the clinical outcome measures before (week 58) and after (week 63) UDN intervention. At the beginning of the UDN at week 58 prior, the patient reported stabbing pain at her plantar heel of 5/10 on NPRS on initiating walking, and aching pain after 5 minutes of walking was 2/10 on NPRS, and FFI was 22.4. After completing five UDN sessions, pain at her plantar heel reduced from 5/10 to 1/10 on the NPRS on initiating walking. Aching pain after 5 minutes of walking was reduced from 2 /10 to 0/10 NPRS Scale, and there was no aching pain even with one hour of walking. FFI improved by 20 points from 22.4 to 2.4, suggesting a clinically significant reduction in pain, disability, and activity limitation in the patient.

	Week 58 Before UDN	Week 63 After 5 Sessions of UDN
Main Complaint		
Pain on initiating walking (NPRS)	5/10	0/10
Pain after 5 minutes of walking (NPRS)	2/10	0/10
Outcome Measure		
Foot function Index-revised	22.4	2.4

Table 1 — Clinical Outcome Measures before (week 58) and after (week 63) ultrasound-guided dry needling intervention.

5. Discussion

The patient, in this case, received five weeks of unresponsive physiotherapy with standard care. After progressing to five sessions of weekly UDN, she experienced a clinically significant improvement in her major complaint and a clinically significant reduction in pain, disability, and activity limitation, as indicated in FFI. This indicates that UDN may serve as a more appropriate therapeutic approach compared to standard physiotherapy in the management of chronic PF cases where no observable biomechanical dysfunctions are present. The results could be because PF is chronic and degenerative in nature, standard care might fail to provide adequate stimulus to initiate healing, while needling could initiate a controlled micro-trauma to the symptomatic and impaired tissue to induce a healing response. In addition, the success of UDN can be attributed to the accurate needling placement to the intended and impaired tissue, further improving its effectiveness compared to blinded DN.

This case report indicated that UDN could be a viable treatment option for managing chronic PF. Our author acknowledged that it was only a single case study. Further research of higher levels of evidence is required to establish a causal association relationship between UDN and improved outcomes in PF. This can be achieved by a randomized control trial comparing UDN with ultrasound-guided placebo DN.

Appendix

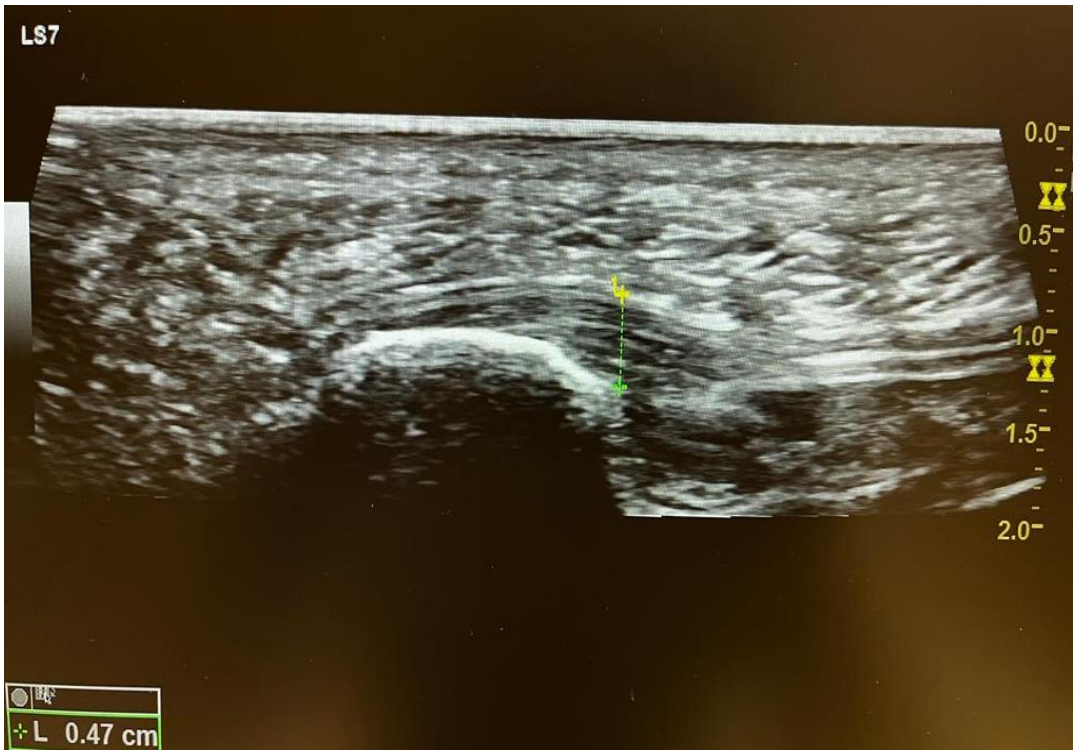


Figure 1 — Diagnostic Ultrasound: Image demonstrating the longitudinal view of the plantar fascia. Hypoechoic and thickened fascia (4.7mm) was evident at the plantar fascia proximal origin to medial tubercle of calcaneus.

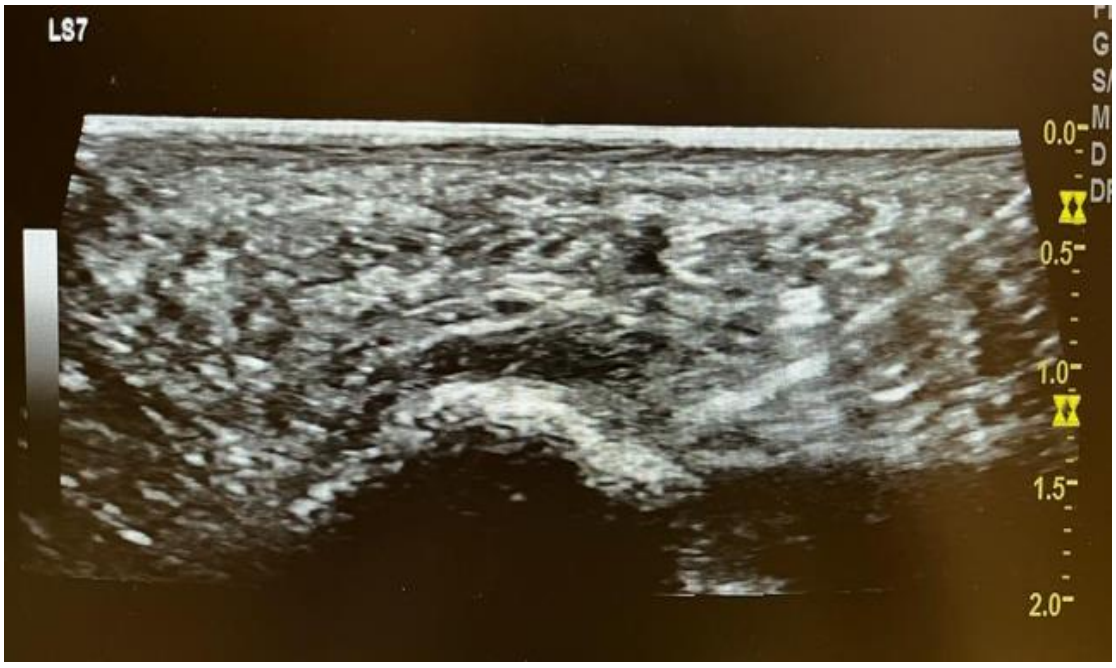


Figure 2 — Ultrasound-guided dry needling: A 0.3 x 40 mm sterile stainless needle was inserted with an in-plane technique. The needle advanced to the most thickened and hypoechoic portion of the plantar fascia under the visualization of the ultrasound to ensure the desired location was reached. The needle was retracted and advanced repeatedly 15 times.

Reference List

1. Budiman-Mak, E., Conrad, K.J. and Roach, K.E., 1991. The Foot Function Index: a measure of foot pain and disability. *Journal of Clinical Epidemiology*, 44(6), pp.561–570. doi:10.1016/0895-4356(91)90220-4.
2. Cagnie, B., Dewitte, V., Barbe, T., Timmermans, F., Delrue, N. and Meeus, M., 2013. Physiologic effects of dry needling. *Current Pain and Headache Reports*, 17(8), pp.348. doi:10.1007/s11916-013-0348-5.
3. Ceballos-Laita, L., Jiménez-Del-Barrio, S., Marín-Zurdo, J., Moreno-Calvo, A., Marín-Boné, J., Albarova-Corral, M.I. et al., 2019. Effects of dry needling in HIP muscles in patients with HIP osteoarthritis: A randomized controlled trial. *Musculoskeletal Science and Practice*, 43, pp.76–82. doi:10.1016/j.msksp.2019.07.006.
4. Ceballos-Laita, L., Medrano-de-la-Fuente, R., Estébanez-De-Miguel, E., Moreno-Calvo, A., Marín-Boné, J., Albarova-Corral, M.I. et al., 2021. Effects of Dry Needling in Teres Major Muscle in Elite Handball Athletes. A Randomised Controlled Trial. *Journal of Clinical Medicine*, 10(18), pp.4260. doi:10.3390/jcm10184260.
5. Devika, B., Mohanraj, K.G. and Priya, V.V., 2020. Prevalence and Risk Factors of Plantar Fasciitis Among Middle Aged Male and Female Population - A survey Based Study. *International Journal of Research in Pharmaceutical Sciences*, 11(SPL3), pp.1251–1258. doi:10.26452/ijrps.v11iSPL3.3373.
6. Dommerholt, J., Grieve, R., Layton, M. and Hooks, T., 2015. An evidence-informed review of the current myofascial pain literature--January 2015. *Journal of Bodywork and Movement Therapies*, 19(1), pp.126–137. doi:10.1016/j.jbmt.2014.11.006.
7. Espí-López, G.V., Serra-Añó, P., Vicent-Ferrando, J., Sánchez-Zuriaga, D., Cleland, J.A. and Fernández-de-las-Peñas, C., 2017. Effectiveness of Inclusion of Dry Needling in a Multimodal Therapy Program for Patellofemoral Pain: A Randomized Parallel-Group Trial. *Journal of Orthopaedic & Sports Physical Therapy*, 47(6), pp.392–401. doi:10.2519/jospt.2017.7389.
8. Irving, D.B., Cook, J.L., Young, M.A. and Menz, H.B., 2008. Impact of chronic plantar heel pain on health-related quality of life. *Journal of the American Podiatric Medical Association*, 98(4), pp.283–289. doi:10.7547/0980283.
9. Itoh, K., Hirota, S., Katsumi, Y., Ochi, H. and Kitakoji, H., 2008. Trigger point acupuncture for treatment of knee osteoarthritis--a preliminary RCT for a pragmatic trial. *Acupuncture in Medicine*, 26(1), pp.17–26. doi:10.1136/aim.26.1.17.
10. James, S.L., Ali, K., Pocock, C., Robertson, C. and Walter, J., 2007. Ultrasound guided dry needling and autologous blood injection for patellar tendinosis. *British Journal of Sports Medicine*, 41(8), pp.518–522. doi:10.1136/bjsm.2006.034686.
11. Korbe, S., Udoji, E.N., Ness, T.J. and Udoji, M.A., 2015. Ultrasound-guided interventional procedures for chronic pain management. *Pain Management*, 5(6), pp.465–482. doi:10.2217/pmt.15.46.
12. Legge, D., 2014. A history of dry needling. *Journal of Musculoskeletal Pain*, 22(3), pp.301–307.
13. Martin, R.L., Irrgang, J.J., Burdett, R.G., Conti, S.F. and Van Swearingen, J.M., 2005. Evidence of validity for the Foot and Ankle Ability Measure (FAAM). *Foot & Ankle International*, 26(11), pp.968–983. doi:10.1177/107110070502601113.
14. Monteagudo, M., de Albornoz, P.M., Gutierrez, B., Tabuenca, J. and Álvarez, I. 2018. Plantar fasciopathy: A current concepts review. *EFORT Open Reviews*, 3(8), pp.485–493. doi:10.1302/2058-5241.3.170080.
15. Pang, J.C.Y., Fu, A.S.N., Lam, S.K.H., Peng, B. and Fu, A.C.L., 2022. Ultrasound-guided dry needling versus traditional dry needling for patients with knee osteoarthritis: A double-blind randomized controlled trial. *PLOS ONE*, 17(9), e0274990. doi:10.1371/journal.pone.0274990.
16. Sandberg, M., Larsson, B., Lindberg, L.G. and Gerdle, B., 2005. Different patterns of blood flow response in the trapezius muscle following needle stimulation (acupuncture) between healthy subjects and patients with fibromyalgia and work-related trapezius myalgia. *European Journal of Pain*, 9(5), pp.497–510. doi:10.1016/j.ejpain.2004.11.002.
17. Yin, N., Yang, H., Yao, W., Xia, Y. and Ding, G., 2018. Mast Cells and Nerve Signal Conduction in Acupuncture. *Evidence-Based Complementary and Alternative Medicine*, 2018, Article ID 3524279. doi:10.1155/2018/3524279.

STJ JUNE 2025 VOLUME ONE

Exercise Highlight

Single-Arm Reverse Kettlebell Overhead Press with Band Pulled

Indy Man Kit HO [1,2*], Tate Ka Hin IP [1], Nicole Ka Ching LEE [1,3], Mavis Nga Ting LAI [1], and Jim Tze Chung LUK [1]

1. Department of Sport and Recreation, Technological and Higher Education Institute of Hong Kong (THEi), Hong Kong SAR, China.
2. Faculty of Kinesiology, University of Zagreb, Croatia.
3. Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong SAR, China.
*Correspondence: indymankit@hotmail.com

Overhead athletes, particularly those who required to perform high volume of repetitive throwing actions, are prone to shoulder injuries such as rotator cuff tendinitis (Wilk et al., 2009), external or internal impingement (Lin, Wong, & Kazam, 2018), and labral tear (Steinmetz et al., 2022). A wide range of studies showed the important roles of the rotator cuff muscles, such as infraspinatus, in providing the necessary stability and optimum force coupling of the glenohumeral joint (Akhtar, Richards, & Monga, 2021). For instance, the rotator cuff muscles can be activated in a timely manner to provide both downward (for depression) and inward (for compression) vector forces. This helps to reduce the compensatory upshift or anterior translation of the humeral head subsequently leading to decreased subacromial space, a higher risk of impingement, and tensile stress on the anterior joint capsule and corresponding ligamentous structures (Elder & Power, 2025; Garving et al., 2017; Halder et al., 2001).

Besides the rotator cuff muscles, the scapular stabilisers such as the lower trapezius and serratus anterior, are also critical for maintaining proper motor control and scapulohumeral rhythm during multi-planar movements of the shoulder complex (Tsuruike & Ellenbecker, 2015). Since all the rotator cuff muscles originate at the scapula, the scapular stabilisation and kinetic control will therefore further safeguard the efficiency of the rotator cuff muscle activities and functions (Bury et al., 2016). Therefore, the proper incorporation and pre-activation of these scapular stabilisers during powerful overhead throwing actions should not be omitted (Elder & Power, 2025).

Traditionally, shoulder strength training heavily relies on human movements across different planes, such as shoulder press, bench press, lateral raise, scapular shrug, push-up plus, or bent over fly, etc. In this regard, both resisted shoulder internal and external rotation are commonly adopted to effectively activate and strengthen the rotator cuff muscles based on the functional anatomy. Given the dual role of our rotator cuff muscles (i.e., producing shoulder rotation as a prime mover or holding the humeral head as a stabiliser), the use of shoulder rotational movement to strengthen the rotator cuff muscles tends to emphasise their role as prime movers (Saeki et al., 2025). On the other hand, reactive neuromuscular strength training that focus on the use of proprioceptive inputs and feedback control may be a better option than typical strength exercises that stress on the prime mover role (Wang, Liu, & Chen, 2024; Guido, & Stemm, 2007). In other words, both the scapular and glenohumeral stabilisation muscles should be treated as the stabilisers rather than agonists when designing the functional strength training or rehabilitation exercises.

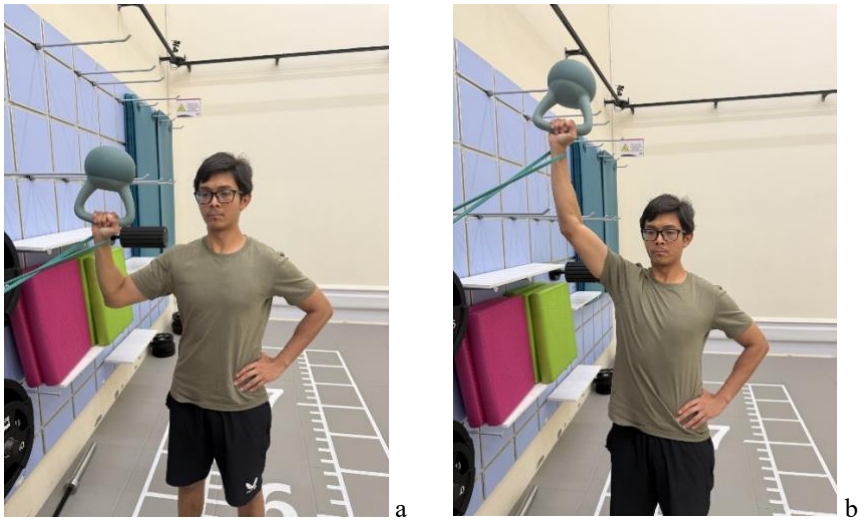


Figure 1 – Single-Arm (SA) Overhead Press with Reverse Kettlebell (KB) with Band Pulled: a) starting position; b) finishing position

The SA overhead press using the reverse KB provides a long lever for the moment of inertia, and a frequent while relatively unpredictable swaying motion during the overhead lifting motion. It induces timely yet sufficient activation of the glenohumeral stabilisation muscles to dynamically control the movements from sensorimotor perspectives (Fig. 1a and 1b). By incorporating the body movements (e.g. walking, backward walking), changing base of support (e.g. performing on BOSU) and altering the lifting tempo, the proprioceptive and stabilisation challenges in maintaining the shoulder stability and kinetic control are greatly increased. Moreover, this single-arm overhead exercise can potentially mimic the overhead throwing actions and functional positions in sports. To further enhance the pre-activation of the posterior muscles including the lower trapezius and serratus anterior, as well as the shoulder external rotators for optimum scapular upward rotation and scapulohumeral rhythm, a band pulled anteriorly can be incorporated as a training progression and movement optimization (Dai et al., 2014). Apart from the reverse kettlebell, similarly, the aqua bag with water flowing and flushing action inside can induce multi-planar and multi-directional perturbation (Fig. 2). With proper control of the trunk and shoulder alignment, these exercises can supplement the traditional strength training to overload the stabilisation muscles in a "smarter" way.

Figure 2 – Overhead press with aqua bag inducing multi-directional perturbation

Acknowledgement

We specially thank Mr. Andrei Ledesma for the exercise demonstration.

Reference List

1. Akhtar, A., Richards, J., and Monga, P., 2021. The biomechanics of the rotator cuff in health and disease - A narrative review. *Journal of Clinical Orthopaedics and Trauma*, 18, pp.150–156. https://doi.org/10.1016/j.jcot.2021.04.019
2. Bury, J., West, M., Chamorro-Moriana, G., and Littlewood, C., 2016. Effectiveness of scapula-focused approaches in patients with rotator cuff related shoulder pain: A systematic review and meta-analysis. *Manual Therapy*, 25, pp.35–42. https://doi.org/10.1016/j.math.2016.05.337
3. Dai, B., Heinbaugh, E. M., Ning, X., and Zhu, Q., 2014. A resistance band increased internal hip abduction moments and gluteus medius activation during pre-landing and early-landing. *Journal of Biomechanics*, 47(15), pp.3674–3680. https://doi.org/10.1016/j.jbiomech.2014.09.032
4. Elder, A., and Powers, C. M., 2025. Scapular Stabilization for Shoulder Pain: Putting the Cart Before the Horse?. *International Journal of Sports Physical Therapy*, 20(2), pp.275–282. https://doi.org/10.26603/001c.128049
5. Garving, C., Jakob, S., Bauer, I., Nadjar, R., and Brunner, U. H., 2017. Impingement Syndrome of the Shoulder. *Deutsches Arzteblatt International*, 114(45), pp. 765–776. https://doi.org/10.3238/arztebl.2017.0765
6. Guido, J. A., Jr, and Stemm, J., 2007. Reactive Neuromuscular Training: A Multi-level Approach to Rehabilitation of the Unstable Shoulder. *North American Journal of Sports Physical Therapy* : NAJSPT, 2(2), pp.97–103.
7. Halder, A. M., Zhao, K. D., Odriscoll, S. W., Morrey, B. F., and An, K. N., 2001. Dynamic contributions to superior shoulder stability. *Journal of orthopaedic research : official publication of the Orthopaedic Research Society*, 19(2), pp.206–212. https://doi.org/10.1016/S0736-0266(00)00028-0
8. Lin, D. J., Wong, T. T., and Kazam, J. K., 2018. Shoulder Injuries in the Overhead-Throwing Athlete: Epidemiology, Mechanisms of Injury, and Imaging Findings. *Radiology*, 286(2), pp.370–387. https://doi.org/10.1148/radiol.2017170481
9. Saeki, Y., Kubota, A., Kishimoto, K., Inoue, M., Inoue, T., and Takazawa, Y., 2025. Effect of different load of shoulder external rotation exercises on changes in muscle activity and exerted torque. *Frontiers in Sports and Active Living*, 7, 1527296. https://doi.org/10.3389/fspor.2025.1527296
10. Steinmetz, R. G., Guth, J. J., Matava, M. J., Brophy, R. H., and Smith, M. V., 2022. Return to play following nonsurgical management of superior labrum anterior-posterior tears: a systematic review. *Journal of Shoulder and Elbow Surgery*, 31(6), pp.1323–1333. https://doi.org/10.1016/j.jse.2021.12.022
11. Tsuruike, M., and Ellenbecker, T. S., 2015. Serratus anterior and lower trapezius muscle activities during multi-joint isotonic scapular exercises and isometric contractions. *Journal of Athletic Training*, 50(2), pp.199–210. https://doi.org/10.4085/1062-6050-49.3.80
12. Wang, P., Liu, Y., and Chen, C., 2024. Effects of neuromuscular training on dynamic balance ability in athletes: A systematic review and meta-analysis. *Heliyon*, 10(16), e35823. https://doi.org/10.1016/j.heliyon.2024.e35823
13. Wilk, K. E., Obma, P., Simpson, C. D., Cain, E. L., Dugas, J. R., and Andrews, J. R., 2009. Shoulder injuries in the overhead athlete. *Journal of Orthopaedic and Sports Physical Therapy*, 39(2), pp.38–54. https://doi.org/10.2519/jospt.2009.2929

STJ JUNE 2025 VOLUME ONE

Exercise Highlight

Can the Single-Leg Romanian Deadlift replace the Nordic Hamstring Curl?

Indy Man Kit HO [1,2*], Tate Ka Hin IP [1], Nicole Ka Ching LEE [1,3], Mavis Nga Ting LAI [1], and Jim Tze Chung LUK [1]

1. Department of Sport and Recreation, Technological and Higher Education Institute of Hong Kong (THEi), Hong Kong SAR, China.
2. Faculty of Kinesiology, University of Zagreb, Croatia.
3. Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong SAR, China.
*Correspondence: indymankit@hotmail.com

The single-leg Romanian deadlift (SLRDL) is a popular exercise in both rehabilitation by sports therapists, physiotherapists, or athletic trainers, and performance enhancement by strength and conditioning coaches. This exercise effectively activates and strengthens the posterior chain, including the gluteus maximus (both superior and inferior portions) and hamstring muscles (Mo et al., 2023). The SLRDL can also effectively activate the core and other hip muscles, such as erector spinae and gluteus medius, especially when the weight is held on the contralateral side to further lengthen the lever arm in the frontal and transverse planes, despite the use of free weights or flywheel as the source of resistance.

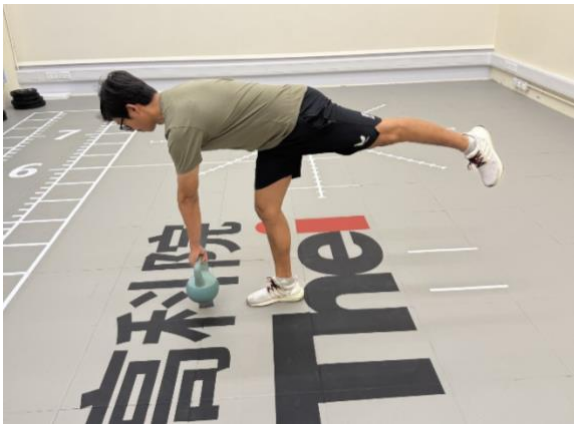


Figure 1 – The demonstration of the end of the eccentric phase in single-leg Romanian deadlift.

In terms of muscle length and the variable resistance across the range of motion in the SLRDL, this exercise allows a maximum lever arm (i.e. resistance) and also muscle length of the hamstring (i.e. hip and knee extended positions) during the end of the eccentric phase (Fig. 1). Therefore, from a biomechanics and force angle perspective, the SLRDL shares high similarity with another well-known hamstring injury prevention exercise, Nordic Hamstring Curl. From epidemiological statistics, type 1 hamstring strain is more commonly found, in which the injury occurs during the terminal swing of the sprint in the gait cycle (e.g. knee extension when hip flexed) (Chu & Rho, 2016; Danielsson et al., 2020), it is believed that the eccentric strength of the hamstring in this "risky" position should play an important role to prevent the overstretching of the fibres. In this regard, extensive studies and evidence support the value of the Nordic Hamstring Curl (NHC) in preventing hamstring strains (van Dyk, Behan, & Whiteley, 2019). Interestingly, there is a lack of literature comparing the SLRDL and Nordic hamstring curl.

Can the SLRDL replace the role of NHC? While empirical data from experimental studies would provide more definite answers, preliminary kinesiological and qualitative analyses can still offer some insights to rehab practitioners.

One of the critical factors in determining the success of hamstring tear prevention is the high force output during the eccentric phase, when the hamstring muscles are mostly or fully lengthened (Hibbert et al., 2008). In the NHC,

it is not uncommon for athletes to struggle to control the lowering motion due to the dramatic increase in resistance torque, as the body lowers to a nearly horizontal orientation. Consequently, soccer players also often exhibit a high break-point angle (BPA) upon which they would lose control and fall forward (Koç et al., 2025; Soga et al., 2023). When athletes are required to control slow eccentric movement in lowering motion until reaching the BPA, it indicates that the hamstring force output has likely surpassed the maximum voluntary contraction of the muscle (Johansson et al., 2015). When looking into slow movements, it is believed that unintentional slow is caused by fatigue in extremely high-intensity lifting action (Lu, Du, & Zhou, 2023). In this regard, the unintentional slow motion before reaching the BPA and generally high BPA are good hints of potentially high force output during the eccentric phase of the NHC. Moreover, the stable and wide kneeling position in the NHC further allows and facilitates maximum force output of the targeted muscles.

In contrast, the SLRDL has a relatively smaller base of support, which challenges postural control, proprioceptive sense, and stability. In that, it is overly challenging and risky for most athletes to perform the SLRDL at high intensity (e.g., six repetition maximum or higher intensity) while maintaining good postural stability. Therefore, submaximal eccentric force output may limit the exercise effectiveness in maximizing hamstring eccentric strength in a lengthened position.

Moreover, the NHC is performed by knee extension with the hip fixed, whereas the SLRDL primarily involves hip flexion with the fixed knee joint angle. As a result, the NHC better targets the distal hamstrings while the SLRDL focuses more on the proximal portion close to the origin at the ischial tuberosity. Given that the SLRDL is performed in a single-leg stand position while the NHC is performed in a kneeling position, the former puts more challenges and integration to the core and postural stability in a more functional (closed-chain) position.

In conclusion, both the NHC and SLRDL are highly specific hamstring exercises that enhance eccentric strength, particularly in a nearly fully lengthened position. Due to the different biomechanical characteristics, physiological, and physical demands of these two exercises, it is believed that neither exercise can completely replace the role and value of the other. Instead, practitioners or therapists should consider using NHC for maximum strength and force output, and the SLRDL for integrating the postural control, core stability, and eccentric strengthening at a functional body position.

Reference List

1. Chu, S. K., and Rho, M. E., 2016. Hamstring Injuries in the Athlete: Diagnosis, Treatment, and Return to Play. *Current Sports Medicine Reports*, 15(3), pp.184–190. https://doi.org/10.1249/JSR.0000000000000264
2. Danielson, A., Horvath, A., Senorski, C., Alentorn-Geli, E., Garrett, W. E., Cugat, R., Samuelsson, K., and Hamrin Senorski, E., 2020. The mechanism of hamstring injuries - a systematic review. *BMC Musculoskeletal Disorders*, 21(1), pp.641. https://doi.org/10.1186/s12891-020-03658-8
3. Hibbert, O., Cheong, K., Grant, A., Beers, A., and Moizumi, T., 2008. A systematic review of the effectiveness of eccentric strength training in the prevention of hamstring muscle strains in otherwise healthy individuals. *North American journal of sports physical therapy* : NAJSPT, 3(2), pp.67–81.
4. Johansson, F. R., Skillgate, E., Lapauw, M. L., Clijmans, D., Deneulin, V. P., Palmans, T., Engineer, H. K., and Cools, A. M., 2015. Measuring Eccentric Strength of the Shoulder External Rotators Using a Handheld Dynamometer: Reliability and Validity. *Journal of Athletic Training*, 50(7), pp.719–725. https://doi.org/10.4085/1062-6050-49.3.72
5. Koç, M., Sıdkı Adıgüzel, N., Öztürk, B., Engin, H., Karaçam, A., Canli, U., Erhan Orhan, B., Prieto-González, P., Sagat, P., Perez, J., Isip, M., and Bartik, P. (2025). Impact of Nordic hamstring breaking point angle on football player performance. *PeerJ*, 13, e19275. https://doi.org/10.7717/peerj.19275
6. Lu, W., Du, Z., and Zhou, A., 2023. Fast and Medium Tempo Resistance Training with a Low Number of Repetitions in Trained Men: Effects on Maximal Strength and Power Output. *Journal of human kinetics*, 87, pp.157–165. https://doi.org/10.5114/jhk/161472

7. Mo, R. C. Y., Ngai, D. C. W., Ng, C. C. M., Sin, K. H. S., Luk, J. T. C., and Ho, I. M. K., 2023. Effects of loading positions on the activation of trunk and hip muscles during flywheel and dumbbell single-leg Romanian deadlift exercises. *Frontiers in physiology*, *14*, 1264604. https://doi.org/10.3389/fphys.2023.1264604

8. Soga, T., Yamaguchi, S., Inami, T., Saito, H., Hakariya, N., Nakaichi, N., Shinohara, S., Sasabe, K., Nakamura, H., Laddawong, T., Akiyama, K., and Hirose, N., 2023. Hamstring Activity Before and After Break-Point Angle Calculated By Smartphone Application During the Nordic Hamstring Exercise. International *Journal of Sports Physical Therapy*, 18(6), pp.1290–1298. https://doi.org/10.26603/001c.89271

9. van Dyk, N., Behan, F. P., and Whiteley, R., 2019. Including the Nordic hamstring exercise in injury prevention programmes halves the rate of hamstring injuries: a systematic review and meta-analysis of 8459 athletes. *British Journal of Sports Medicine*, *53*(21), pp.1362–1370. https://doi.org/10.1136/bjsports-2018-100045

STJ JUNE 2025 VOLUME ONE

Exercise Highlight

Thoracic Rotation with Lumbo-Pelvic-Hip Stabilisation for Rotational Athletes

Indy Man Kit HO [1,2*], Tate Ka Hin IP [1], Nicole Ka Ching LEE [1,3], Mavis Nga Ting LAI [1], and Jim Tze Chung LUK [1]

1. Department of Sport and Recreation, Technological and Higher Education Institute of Hong Kong (THEi), Hong Kong SAR, China.
2. Faculty of Kinesiology, University of Zagreb, Croatia.
3. Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong SAR, China.
*Correspondence: indymankit@hotmail.com

Rotational movements are vital in various sports actions such as handball throwing, baseball or softball pitching, soccer kicks, volleyball spikes, tennis serves, forehand and backhand strokes, and the golf swing (Carvalho et al., 2021; Chasse et al., 2018; Wang, Qin & Wei, 2024; Zemková, Poór & Jeleň, 2019). Anatomically, numerous trunk muscles with diagonal or horizontal fibre orientation, such as the external oblique, internal oblique, erector spinae, and latissimus dorsi, are highly active in producing rotational torque (Price et al., 2023; Torén, 2001; Urquhart & Hodges, 2005). From the fascia line or muscle sling (or sub-system) perspectives, the functional back line, or the anterior oblique sub-system work synergistically to transfer the power from the lower body via the lumbo-pelvic-hip complex and thoracolumbar fascia to thoracic spine and hence the upper body to produce powerful rotations (Krause et al., 2016; Santana, Brown & Ferrigno, 2016). On the other hand, the thoracic mobility in the transverse plane for maximum segmental spinal movements is crucial for the efficient energy storage and release in the production of powerful rotation. This relies on the concept of "X-factor" considering the shoulder-hip distance, or upper torso and pelvic separation (Cole & Grimshaw, 2009; Gould et al., 2021). Previous studies showed that the high upper torso pelvic separation is favourable to club head speed by allowing a longer golf driving distance (Hume, Keog & Reid, 2005; Marshall & Llewellyn, 2017).

To promote thoracic mobility, particularly rotation in the transverse plane, it is not uncommon for strength coaches or therapists to adopt exercises, such as quadruped thoracic rotation or open book T-spine rotation in side lying or lunge position (Murofushi et al., 2024). When performing the thoracic rotation in these positions, the pelvis and hip are primarily fixated to prevent compensatory hip or pelvic rotation. However, in the sports-specific conditions, athletes requires the incorporation of the neuromuscular system to stabilise and control the lumbo-pelvic-hip complex instead of achieving the rotation passively by relying on any external fixation. Previous studies found that golfers with stiff thoracic rotation may tend to increase the overall backswing and downswing range of motion with compensatory movements such as excessive lumbar rotation, sacroiliac joint torsion, hip internal/external rotation, as well as lateral shift of the pelvis and bodyweight (Yasuda, Jaotawipart & Kuruma, 2023). This disruption of the fluidity of the kinetic chain in the rotational golf swing movements can lead to excessive joint loading on particular body regions. For example, the lumbar ligament and intervertebral disc of the lumbar spine can be particularly at risk if most compensatory movements occur at the lower back, while the unnecessary hip shift and rotation may put additional stress on the articular surface and labrum of the hip. Similarly, the excessive lateral hip or body weight shift during the backswing may lead to a suboptimal swing path, timing, and hitting accuracy subsequently.

To further challenge lumbo-pelvic-hip control during thoracic rotation for golfers, the golf-specific standing position can be performed with one leg isometrically abducting against an object (e.g., soccer) onto the wall (Fig.1a). For increased feedback and external cue, a half-length foam roller can be placed laterally to the outer leg. When performing the thoracic rotation, it is required to swing the medicine ball by 1) keeping both shoulders and the medicine ball as an isosceles triangle (imagine both arms and the sternum form an isosceles triangle) throughout the range of motion; 2) Maintaining inner leg position to keep the object (i.e., soccer) firmly against the wall; and 3) maintaining the outer leg position without pushing or touching the foam roller (Fig. 1b). As external focus or cue can be an effective feedback for motor learning and control as well as performance enhancement (Moran et al., 2023; Wulf & Su, 2007), the optimum neuromuscular control of lumbo-pelvic-hip complex can therefore be achieved using this set up. The common faulty movement during this exercise is that excessive compensatory lower body movements subsequently lead to the fall of the object or pushing away the foam roller (Fig. 2). This exercise can be progressed by simply increasing the tempo of rotational movement, hence the demand for postural control. As this exercise mainly requires mobility and postural control, it can be performed and practiced in high volume without substantial fatigue.


a


b

Figure 1 (a) and (b)– The setup, starting, and finishing position of the thoracic rotation exercise using external cues

In conclusion, this thoracic rotation with lumbo-pelvic-hip stabilisation can supplement the traditional passive (or active assisted) thoracic mobility exercise for better postural and motor control for rotational athletes, particularly but not limited to golfers.

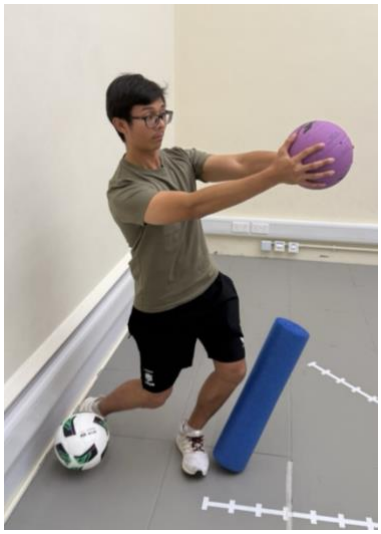


Figure 2 – The fall of soccer and contact of foam roller showing the excessive hip and pelvic compensatory movements during rotation

Acknowledgement

We specially thank Mr. Andrei Ledesma for the model demonstration.

Reference List

1. Carvalho, D. D. S., Ocarino, J. M., Cruz, A. C., Barsante, L. D., Teixeira, B. G., Resende, R. A., Fonseca, S. T., and Souza, T. R., 2021. The trunk is exploited for energy transfers of maximal instep soccer kick: A power flow study. *Journal of Biomechanics*, 121, 110425. https://doi.org/10.1016/j.jbiomech.2021.110425
2. Chasse, P., Bullock, G. S., Schmitt, A. C., Little, B. A., Diehl, L. H., and Butler, R. J., 2018. The relationship between trunk rotation, upper quarter dynamic stability, and the Kerlan-Jobe orthopaedic clinic overhead athlete shoulder and elbow score in division I collegiate pitchers. *International Journal of Sports Physical Therapy*, 13(5), pp.819–827.
3. Cole, M. and Grimshaw, P., 2009. The X-Factor and Its Relationship to Golfing Performance. Journal of *Quantitative Analysis in Sports*, 5(1). https://doi.org/10.2202/1559-0410.1134
4. Gould, Z. I., Oliver, J. L., Lloyd, R. S., Neil, R., and Bull, M., 2021. The Golf Movement Screen Is Related to Spine Control and X-Factor of the Golf Swing in Low Handicap Golfers. *Journal of Strength and Conditioning Research*, 35(1), pp.240–246. https://doi.org/10.1519/JSC.0000000000002664
5. Hume, P. A., Keogh, J., and Reid, D., 2005. The role of biomechanics in maximising distance and accuracy of golf shots. *Sports medicine (Auckland, N.Z.)*, 35(5), pp.429–449. https://doi.org/10.2165/00007256-200535050-00005
6. Krause, F., Wilke, J., Vogt, L., and Banzer, W., 2016. Intermuscular force transmission along myofascial chains: a systematic review. *Journal of Anatomy*, 228(6), pp.910–918. https://doi.org/10.1111/joa.12464
7. Marshall, K. J., and Llewellyn, T. L., 2017. Effects of Flexibility and Balance on Driving Distance and Club Head Speed in Collegiate Golfers. *International Journal of Exercise Science*, 10(7), pp.954–963. https://doi.org/10.70252/YNDR8824
8. Moran, J., Allen, M., Butson, J., Granacher, U., Hammami, R., Clemente, F. M., Klabunde, M., and Sandercock, G., 2023. How effective are external cues and analogies in enhancing sprint and jump performance in academy soccer players?. *Journal of Sports Sciences*, 41(22), pp.2054–2061. https://doi.org/10.1080/02640414.2024.2309814
9. Murofushi, K., Mitomo, S., Hirohata, K., Furuya, H., Katagiri, H., Kaneoka, K., and Yagishita, K., 2024. Comparative Analysis of Thoracic Rotation Exercises: Range of Motion Improvement in Standing and Quadruped Variants. *Acta Medica Okayama*, 78(3), pp.251–258. https://doi.org/10.18926/AMO/67200
10. Price, D., Ginn, K. A., Halaki, M., and Reed, D., 2024. What is the contribution of latissimus dorsi to trunk movement and control? A systematic review and meta-analysis. *Physical Therapy Reviews*, 29(1–3), pp.47–63. https://doi.org/10.1080/10833196.2024.2359815
11. Santana, J. C., Brown, L.E., and Ferrigno, V.A., 2016. The Training Octagon: Training the Anterior and Posterior Serape. *Strength and Conditioning Journal*, 38(5).
12. Torén, A., 2001. Muscle activity and range of motion during active trunk rotation in a sitting posture. *Applied Ergonomics*, 32(6), pp.583–591. https://doi.org/10.1016/s0003-6870(01)00040-0
13. Urquhart, D. M., and Hodges, P. W., 2005. Differential activity of regions of transversus abdominis during trunk rotation. *European spine journal : official publication of the European Spine Society, the European Spinal Deformity Society, and the European Section of the Cervical Spine Research Society*, 14(4), pp.393–400. https://doi.org/10.1007/s00586-004-0799-9
14. Wang, J., Qin, Z. and Wei, Z., 2024. Power and velocity performance of swing movement in the adolescent male volleyball players – age and positional difference. *BMC Sports Science, Medicine Rehabilitation*, 16(111). https://doi.org/10.1186/s13102-024-00898-2

15. Wulf, G., and Su, J., 2007. An external focus of attention enhances golf shot accuracy in beginners and experts. *Research Quarterly for Exercise and Sport*, 78(4), pp.384–389. https://doi.org/10.1080/02701367.2007.10599436

16. Yasuda, T., Jaotawipart, S., and Kuruma, H., 2023. Effects of Thoracic Spine Self-mobilization on Patients with Low Back Pain and Lumbar Hypermobility: A Randomized Controlled Trial. *Progress in rehabilitation medicine*, 8, 20230022. https://doi.org/10.2490/prm.20230022

17. Zemková, E., Poór, O., and Jeleň, M., 2019. Between-side differences in trunk rotational power in athletes trained in asymmetric sports. *Journal of back and musculoskeletal rehabilitation*, 32(4), pp.529–537. https://doi.org/10.3233/BMR-181131

STJ JUNE 2025 VOLUME ONE

Exercise Highlight

Enhancing Recovery: The Role of Proprioception and Neuromuscular Training in Rehabilitation

Nicole Ka Ching LEE [1,2], Jim Tze Chung LUK [1], Gary Ka Ki LI [3]

1. Department of Sport and Recreation, Technological and Higher Education Institute of Hong Kong (THEi), Hong Kong SAR, China.
2. Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong SAR, China.
3. Dynamic Care Limited, Hong Kong SAR, China.
*Correspondence: nicolelee@thei.edu.hk

Musculoskeletal injuries, particularly those involving knee and ankle ligament sprain injuries, are prevalent in both athletic and general populations. These injuries can compromise joint stability and proprioception, leading to long-term functional deficits and increased risk of reinjury (Gimigliano et al., 2021; West et al., 2024). Effective rehabilitation not only targets strength and mobility enhancement but also aims to restore neuromuscular control and proprioceptive acuity, both of which are critical for optimal recovery and performance.

Proprioception refers to the ability to perceive its own position and movement in space. It relies on sensory input from fascia, ligament, and joint capsule to inform motor responses for postural control, joint stability, and movement coordination. Injury-related disruptions in proprioceptive feedback often result in impaired balance and joint control (Bornstein et al., 2021). Neuromuscular training focuses on retraining these responses, enhancing motor control, and improving joint function under dynamic conditions. Research supports the benefits of proprioceptive and neuromuscular interventions in rehabilitation. In that, Lazarou et al. (2018) reported that proprioceptive exercises significantly improved ankle range of motion, balance, and function in patients with ankle sprain. Additionally, neuromuscular training after anterior cruciate ligament (ACL) reconstruction improved pain, strength, and quality of life outcomes (Khalid et al., 2022). Proprioception is often altered following injury due to joint effusion and pain, which can delay recovery. Early intervention that addresses these deficits can enhance movement quality and support a quicker return to function (Bornstein et al., 2021).

Traditionally, strength coaches or therapists employ balance exercises on an unstable surface to promote the reactive neuromuscular training using the feedback control mechanism. In addition to using small props such as balance pad, BOSU, wobble board, and trampoline to provide an unstable training surface, sports practitioners may consider modifying typical strength training exercises to significantly increase the demand on proprioceptive input and postural control for enhancing joint stability. For example, additional rotational movements can be incorporated into Single-leg Romanian Deadlifts, while explosive hop and land can also be added into Bulgarian Split Squats, to provide extra challenge to stability.

Key Proprioceptive and Neuromuscular Exercises

Two exercises are fundamental to neuromuscular rehabilitation protocols to enhance the sensorimotor functions and kinetic chain of the lower extremities. These include:

- **Single-leg Romanian Deadlifts (RDLs) with Rotation (Fig. 1):** This variation challenges balance, posterior chain strength, and trunk control. The addition of trunk rotation increases the demand on the postural control in anti-rotation, whilst also enhances coordination between the upper and lower body, simulating the complex movement patterns in sports. Furthermore, the rotational movement increases the mobility demand for the hip internal and external rotations. By varying tempo of the added otation, lower limb muscles of the hip, knee, and ankle joints are required to synergistically coordinate to decelerate and control the movement.

Figure 1 – Single-leg Romanian Deadlifts (RDLs) with Rotation

- **Bulgarian Split Squat Hop:** This dynamic exercise enhances lower-limb power, stability, and proprioceptive feedback. Consecutive hops can be incorporated during advanced stages, while briefly holding the landing helps reinforce balance and neuromuscular control. The rapid landing and force absorption in this high-impact exercise induce a reactive response of the stabiliser muscles.

Figure 2 – Bulgarian Split Squat Hop

Practical Exercise Considerations when Prescribing Hopping Variations

Stable vs. Unstable Surface
When hopping on stable or unstable surfaces, both consecutive hopping and static holds can be beneficial. Beginners should start by holding each landing for 2–3 seconds to build control before progressing to continuous hopping. Exercises on unstable surfaces have been shown to significantly improve balance and proprioceptive feedback (Lazarou et al., 2018).

Soft vs. Stiff Landing
Soft landings help in shock absorption and reduce joint loading, ideal in early rehab. Stiff landings simulate reactive sport-specific movements and are suitable for advanced stages. Winter et al. (2022) highlighted that different landing techniques elicit different neuromuscular strategies, supporting the need for phase-specific implementation.

Visual Focus During Landing
Watching the foot or knee may provide feedback in early learning stages, but promoting forward gaze encourages more natural, functional movement and challenges balance more effectively. Studies suggest that visual input modulates postural control and shifting gaze can enhance proprioceptive demand (Efstathiou et al., 2022)

Shoes vs. Barefoot Training
Barefoot training increases proprioceptive input and strengthens intrinsic foot muscles. However, safety and the athlete's condition must be considered—early stages or those with instability may benefit from shoes initially. Bornstein et al. (2021) support the sensory benefits of barefoot activities in stimulating joint mechanoreceptors.

Without Proper Equipment for Unstable Surface
Proprioceptive challenge can be increased using household items like folded towels or foam pads. Additionally, performing exercises with eyes closed or adding cognitive tasks (e.g., counting backwards) enhances sensory reliance and motor control (Winter et al., 2022).

The principles of proprioceptive and neuromuscular training apply broadly, from elite athletes to general orthopedic patients. Whether recovering from ligament injuries, joint instability, or chronic musculoskeletal pain, these interventions are adaptable and effective. For instance, neuromuscular training following anterior cruciate ligament reconstruction has been shown to reduce pain and improve strength and quality of life (Khalid et al., 2022).

Proprioceptive and neuromuscular training play a foundational role in musculoskeletal rehabilitation. These interventions not only accelerate recovery but also enhance long-term function and reduce reinjury risk. Given their broad applicability and strong evidence base, clinicians should prioritize integrating targeted proprioceptive and neuromuscular exercises—such as single-leg RDLs with rotation and Bulgarian split squat hops—into rehabilitation protocols. Practical considerations regarding execution and equipment adaptations can further tailor training for optimal outcomes.

Reference List

1. Bornstein, B, Konstantin N, Alessandro C, Tresch M.C., and Zelzer E., 2021. More than movement: the proprioceptive system as a new regulator of musculoskeletal biology. *Current Opinion in Physiology*, 20, pp.77–89.
2. Khalid, K., Anwar, N., Saqulain, G., and Afzal, M. F., 2022. Neuromuscular Training following Anterior Cruciate Ligament reconstruction - Pain, Function, Strength, Power & Quality of Life Perspective: A Randomized Control Trial. *Pakistan Journal of Medical Sciences*, *38*(8), pp.2175–2181. https://doi.org/10.12669/pjms.38.8.5730
3. Lazarou, L., Kofotolis, N., Pafis, G., and Kellis, E., 2018. Effects of two proprioceptive training programs on ankle range of motion, pain, functional and balance performance in individuals with ankle sprain. *Journal of Back and Musculoskeletal Rehabilitation*, *31*(3), pp.437–446. https://doi.org/10.3233/BMR-170836
4. West, S. W., Hudson, S. J., Starling, L., Cross, M., Williams, S., McKay, C. D., Cazzola, D., Brooks, J. H. M., Murray, R., Williams, A., Kemp, S. P. T., and Stokes, K. A., 2024. Twenty year analysis of professional men's rugby union knee injuries from the English premiership shows high rates and burden. *British Journal of Sports Medicine*, *58*(24), pp.1496–1504. https://doi.org/10.1136/bjsports-2024-108639
5. Winter, L., Huang, Q., Sertic, J. V. L., and Konczak, J., 2022. The Effectiveness of Proprioceptive Training for Improving Motor Performance and Motor Dysfunction: A Systematic Review. *Frontiers in Rehabilitation Sciences*, *3*, 830166. https://doi.org/10.3389/fresc.2022.830166
6. Efstathiou, M., Giannaki, C., Roupa, Z., Hadjisavvas, S., and Stefanakis, M., 2022. Evidence of distorted proprioception and postural control in studies of experimentally induced pain: a critical review of the literature. *Scandinavian Journal of Pain*, *22*(3), pp.445–456. https://doi.org/10.1515/sjpain-2021-0205

STJ Editorial Board

香港運動治療師總會
SPORTS THERAPISTS ASSOCIATION OF HONG KONG

Supported by
Thei 高科院
Technological and Higher Education Institute of Hong Kong
香港高等教育科技學院

Mr Indy HO

Editor-in-Chief

- **Assistant Professor**
  Department of Sport and Recreation (DSR), THEi
- **Co-Programme Leader**
  Sports Therapy Specialisation
  BSocSc (Hons) in Sports and Recreation Management, DSR, THEi
- **PhD Candidate**
  The University of Zagreb, Croatia
- **MSc Data Science**
  The University of Sunderland, UK
- **MSc Exercise Science in Strength & Conditioning**
  Edith Cowan University, Australia
- **BSc (Hons) Physiotherapy**
  The Hong Kong Polytechnic University, HK
- **Associate Strength & Conditioning Coach Level 2, ASCA**
- **Author/ Co-author / Guest reviewer** of papers in SCI / SCIE peer-reviewed journals

Prof. Del P WONG

Editorial Board Member

- **Adjunct Professor**
  Flinders University, Australia
- **Founding Head**
  The Sports & Recreation Research Centre, THEi
- **PhD at the Faculty of Medicine**
  Norwegian University of Science and Technology

Achievements:

- **Outstanding Young Investigator Award**
  by National Strength and Conditioning Association (NSCA) in 2012
- **Chartered Scientist status in Science Council, UK**
  from 2013
- **Fellowship at European College of Sport Science**
  from 2017

Services in science and research:

- **Over 100 research papers published in top tier journals**
- **Advisory board, Journal of Sports Sciences (IF: 3.94)**
- **Associate editor, European Journal of Sport Science (IF: 3.98)**
- **Associate editor, Science and Medicine in Football (IF: 3.33)**
- **Associate editor, Frontiers in Physiology (for 'Exercise Physiology' section) (IF: 4.75)**
- **Associate editor, Frontiers in Psychology (for 'Movement Science and Sport Psychology' section) (IF: 4.23)**
- **Editorial board, Biology of Sport (IF: 4.61)**
- **Editorial board, Research in Sports Medicine (IF: 3.66)**

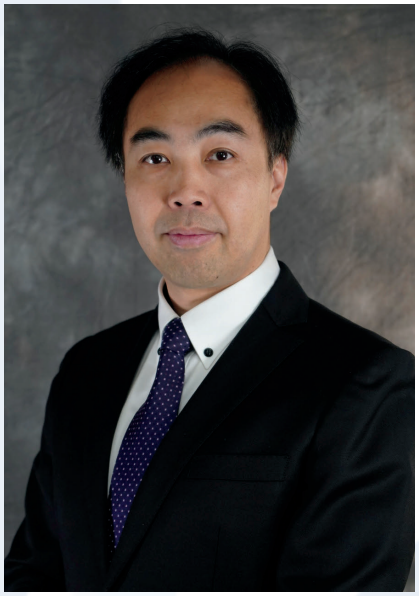
STJ Editorial Board

香港運動治療師總會
SPORTS THERAPISTS ASSOCIATION OF HONG KONG

Supported by
Thei 高科院
Technological and Higher Education Institute of Hong Kong
香港高等教育科技學院

Ms Sarah Catlow
Editorial Board Member

- **Programme Leader**
  - **MSc Injury Prevention and Musculoskeletal Rehabilitation**
  - **BSc (Hons) Sports Therapy**
  - **Plymouth Marjon University, UK**
- **Chairperson, Sports Therapy Organisation (STO), UK**
- **PhD (in progress) - Investigating Curriculum Development in Sports Therapy Education**
- **MSc Sport Injury Management and Therapy**
- **FA Diploma in the Treatment and Management of Injuries**
- **PGCE in Higher and Further Education**
- **BSc (Hons) Applied Physiology**



Dr Jim LUK
Editorial Board Member

- **Associate Professor**
  Department of Sport and Recreation (DSR), THEi
- **Head of Department** of Sport and Recreation (DSR), THEi
- **PhD in Education**
  The Chinese University of Hong Kong
- **M.Phil. in Sports Science**
  The Chinese University of Hong Kong
- **BSc (Hons) in Engineering Physics**
  The Hong Kong Polytechnic University
- **Certified Strength & Conditioning Specialist (CSCS)**,
  National Strength & Conditioning Association (2007-2017)

STJ
Editorial Board

香港運動治療師總會
SPORTS THERAPISTS ASSOCIATION OF HONG KONG

Supported by
Thei 高科院
Technological and Higher Education Institute of Hong Kong
香港高等教育科技學院

Mr Stone SHEK

Editorial Board Member

- **Lecturer**
  Sports Therapy Specialisation
  Department of Sport and Recreation (DSR), THEi
- **Executive Committee Member**
  Sports Therapists Association of Hong Kong (STAoHK)
- **Sports Therapy Specialisation**
  BSocSc (Hons) in Sports and Recreation Management, DSR, THEi
- **Registered Sports Therapist (HK & UK)**
  STAoHK, MSST

Mr John Siu

Ex-officio Member

- **Chairperson of the Sports Therapists Association of Hong Kong**
- **Registered Sports Therapist (HK &UK)**
  STAoHK, MSTO
- **M. Dip in Advanced Clinical Sports Therapy and Rehabilitation**
- **BSc(Hons) in Work Based Learning Studies (Fitness and Exercise)**

STJ
Editorial Board

Contact Us
www.staohk.org
editorial_stj@staohk.org