

The Regional Interdependence Model: A Clinical Examination Concept

Scott Cheatham, PT, DPT, PhD(c), OCS, ATC, CSCS • California State University Dominguez Hills, Carson, CA and Ethan Kreiswirth, PhD, ATC • Velocity Sports Performance, Hawthorne, CA

In recent years, there has been a paradigm shift in the way sports medicine professionals examine common musculoskeletal injuries. The focus has shifted from a local assessment (e.g., joint) to a broad examination of the painful area and corresponding body regions (e.g., joints above and below).¹

This investigational approach has a goal of identifying unrelated impairments in remote segmental regions that may contribute to the primary source of pain (see Figure 1).¹ Classified as the Regional Interdependence (RI) model, this approach was first introduced in 2007.¹ The utilization of the RI model has enabled clinicians to take a more comprehensive approach to injury assessment and identify other contributing factors that may be influencing the patient's source of pain or primary impairment. Since the model's inception, a growing body of literature has used the RI model with both examination and rehabilitation strategies. Through a review of the current literature, this article discusses the RI model concept and how it has been integrated in the injury assessment, rehabilitation, and return-to-play criteria.

KEY POINTS

▶ The RI model recognizes that other body regions may contribute to the patient's pain.

▶ The RI model has a growing body of supporting literature.

▶ The RI model integrates into other traditional injury assessment models.

The RI Model and Injury Assessment

Traditionally, sports medicine professionals use two common off-field examination methods: HOPS (history, observation/inspection, palpation, and special tests) and SOAP (subjective, objective, assessment, and plan). These methods have been common foundational approaches taught in athletic training curriculums. The HOPS method allows the clinician to collect data about an existing injury and make an assessment regarding the problem.² It focuses on the examination process rather than the postinjury care of the athlete and is common in traditional athletic training settings (e.g., training room). Consequently, the SOAP format offers a more detailed framework for the examination, ongoing assessment, and plan of care than is typically written for the initial examination and as a daily note. This format is common in the clinical setting (e.g., physical therapy clinic).² The integration of the RI model into the objective portion of these examination methods may offer a broader analysis of the primary impairment and any remote bodily regions that may be contributing to pathology. Although the HOPS evaluation fosters a method of injury assessment, a thorough examination using the RI model may help improve clinical accuracy and patient outcomes. Proponents of the RI model do recommend first addressing the primary area

of complaint and then examining the region above and below within the first 2 visits (Figure 1).¹

An example of integrating the RI model is shown in the following scenario. An athletic trainer (AT) initially evaluates a 23-year-old male runner with a primary complaint of right lateral knee pain using the SOAP method. After gathering the patient's *subjective* information, the AT suspects the patient to have runner's knee or iliotibial band friction syndrome. The AT then decides to do a series of *objective* clinical tests for the lower kinetic chain, which includes the hip, knee, and ankle. The AT first examines the knee (primary complaint) to confirm or deny the hypothesis. After finishing the knee exam, the AT decides to examine potential contributing factors at the hip (e.g., hip muscle weakness) and ankle (e.g., *pes planus*). On completion of the examination, the AT develops a hierarchical list of impairments in a formal *assessment* and then formulates a *plan* that includes therapeutic interventions for the hip, knee, and ankle. This brief scenario illustrates the integration of the RI model within the SOAP method but does not represent all the information that may be obtained in a comprehensive exam.

The body of research using the RI model as part of the injury assessment has grown since its recognition

in 2007. For the lower body, the more notable research has found a relationship between hip muscle weakness and the following: runners with patellofemoral pain and iliotibial band syndrome,³⁻⁸ females with patellofemoral pain,⁹⁻¹³ and individuals with chronic ankle instability.^{14,15} Additionally, research has found a relationship between poor hip joint mobility and low back pain in golfers,¹⁶⁻¹⁸ judo athletes,¹⁹ and athletes who participate in rotational sports.²⁰ Concomitantly, injury research regarding the upper body has found a relationship between neck pain and lateral elbow pain,²¹ poor shoulder kinematics,²² and inhibited scapular muscle (e.g., trapezius) activity.²³ Investigations have also shown a relationship between poor posture, restricted cervical range of motion (ROM), and carpal tunnel syndrome.^{24,25} For the shoulder girdle, shoulder impingement has been associated with poor shoulder kinematics,²⁶ inhibited scapular muscle (e.g., trapezius) activity,²⁷ and poor posture.^{28,29} The body of literature has shown successful integration of the RI model into the injury assessment and should be considered by the AT.

The RI Model and Rehabilitation

Also emerging in the literature is the use of the RI model to guide the rehabilitation of patients with various spine, upper body, and lower body pathologies. Researchers have conducted interventions to the corresponding body regions to examine the effects on the patient's primary area of pain or dysfunction. Table 1 provides a summary of the more notable studies that have used the RI model in the treatment of specific regional impairments. An example of integrating the RI model into the rehabilitation of the male runner from the prior scenario would be to select interventions for the hip (e.g., hip strengthening), knee (e.g., cross-friction massage of the distal iliotibial band), and foot (e.g., orthotics). This approach to treating the lower kinetic



Figure 1 The Regional Interdependence Model

TABLE 1. INTERVENTIONS USING THE REGIONAL INTERDEPENDENCE MODEL

| Interventions of the lumbar spine & pelvis to treat: | |
|--|--|
| Hip pain | 1993: Cibulka MT, Delitto A ³⁰ |
| Knee pain | 2000: Suter E, et al. ³¹ |
| Patellofemoral Pain Syndrome | 2008: Iverson CA, et al. ³² 2008: Cook C, et al. ³³ |
| Hamstring pain | 2013: Podschun L et al. ³⁴ |

(continued)