Health-Related Quality of Life as a Primary Clinical Outcome in Sport Rehabilitation

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Health-related quality of life (HRQOL) is a broad, multidimensional concept that refers to a synthesis of several health domains including the physical, psychological, and social domains, all of which are affected by individual experiences, expectations, beliefs, and perceptions. HRQOL also shares a well-established connection with contemporary disablement models, which enhances its utility for identifying individual experience, expectations, and values, which can also influence the way a person views his or her health status. However, the routine evaluation of HRQOL in clinical research and patient care in the field of sport rehabilitation remains limited. HRQOL has implications for both athletes who suffer sport-related injury (SRI) and those who care for them. The purpose of this article is to help clinicians and researchers understand HRQOL as a primary outcome in sport rehabilitation. First, the article provides a definition of HRQOL and explains its relationship to contemporary disablement models. Next, research demonstrating that HRQOL is sensitive to both athletic participation and to SRI in athletes at both secondary school and college levels is reviewed. Finally, several important clinical tools that can be used to measure HRQOL by both clinicians and clinical researchers are presented. Criteria to be used in selecting these tools are also presented.

Keywords: sport-related injury, disability, patient-centeredness

The evaluation of health-related quality of life (HRQOL) has become an increasingly common and important component of both clinical research and patient care. For example, only 47 articles were identified in PubMed in the 20 years between 1970 and 1990 when health-related quality of life was searched as a keyword. This number is significantly fewer than the 13,076 hits identified with PubMed between the years 1991 and 2009. But although the overall number of articles investigating HRQOL has increased, the routine evaluation of HRQOL in clinical research and patient care in the field of sport rehabilitation remains limited.

Consequently, the simple question being overlooked is, What is the impact of sport-related injury (SRI) on the overall HRQOL of athletes? The answer to that question is relevant to, and has implications for, both the athletes who suffer SRI and those who care for them. The answer is relevant to athletes for obvious reasons—they are the ones most likely to suffer an SRI and, therefore, stand to
benefit from a fuller understanding of the consequences of such an injury on their overall well-being. Clinicians should find this answer relevant because effectively incorporating HRQOL into patient care requires a complete understanding of the concept and an appreciation of the impact of SRI on HRQOL. Effective incorporation of HRQOL assessment into patient care also requires selecting appropriate instruments to measure HRQOL and establish the effectiveness of interventions by demonstrating their impact on HRQOL.

The purpose of this article is to help clinicians and researchers understand HRQOL, a multidimensional, patient-centered concept, as a primary outcome in sport rehabilitation. First, we define HRQOL. Next, we discuss the relationship between SRI and HRQOL and provide evidence that supports the claim that HRQOL is sensitive to the effects of both athletic participation and SRI. Finally, we describe several instruments that can be used to objectively measure HRQOL, as well as discuss key considerations when selecting instruments to measure HRQOL.

**HRQOL Defined**

HRQOL is a broad, multidimensional concept that refers to a synthesis of several health domains including the physical, psychological, and social domains, all of which are affected by individual experiences, expectations, beliefs, and perceptions (Figure 1). Health status, overall well-being, functional status, and quality of life are commonly used synonyms of HRQOL. Disability is sometimes used synonymously with HRQOL, as well, but this use is incorrect. Disability has a slightly different and more limited meaning, even though HRQOL and disability are compatible, and even complementary, topics. Essentially, HRQOL can be thought of as an individual’s satisfaction with life and his or her general feeling of personal well-being.

![Figure 1 — An illustration of the concept of health-related quality of life.](image-url)
At first glance, HRQOL appears to be an easy-to-understand concept representing the simple interaction of several domains of health. However, its interpretation is complicated by the fact that each domain is itself multidimensional, which increases the conceptual complexity of HRQOL. For example, the physical domain includes the attributes of mobility, endurance, performance, bodily pain/symptoms, and self-care. In other words, any or all of these attributes may be salient to a patient with a health condition affecting his or her physical status or to a clinician trying to decide on a therapeutic intervention to best address the patient’s physical condition. In addition, the attributes of the social-functioning domain can include a patient’s family, friends, social interactions, and recreational activities.

Conceptual boundaries for HRQOL are usually determined by the specific concerns of the patient, clinician, and researcher⁶ and, as we will discuss, are important considerations when selecting evaluation instruments. For example, a clinician or researcher interested in evaluating the impact of an injury on a specific component of the physical domain of health, such as physical function, might be better served by selecting an instrument that assesses function and not one that assesses physical symptoms. Therefore, it is important to note that the multidimensionality of HRQOL, based on the variety of its domains and their attributes, produces infinite states of health, all of which contain different qualities and are capable of distinguishing an individual’s overall well-being.³

In addition to domains and attributes, HRQOL is also characterized by its individual and variable nature.⁷ HRQOL is not static; it is influenced by injury, illness, and disease, as well as previous personal experiences and changing values and priorities.⁸⁻¹³ In fact the Greek philosopher Aristotle, among the first to introduce concepts similar to our current understanding of HRQOL,⁷ appreciated that happiness and well-being mean different things to different people. He also recognized that HRQOL may vary within a person based on his or her current situation.⁷ Individual experience, expectations, and values affect HRQOL and can also influence the way a person views his or her health status.³,⁶,¹³ As we will discuss in more detail, patient perspective is salient to evidence-based practice, which encourages the consideration of evidence about patients’ beliefs and values for the purpose of establishing a patient-centered approach to care. Measuring HRQOL is one clinical approach by which to account for these things.¹⁴ For example, 2 patients with the same diagnosis (eg, anterior cruciate ligament tear) and the same set of physical challenges (eg, decreased range of motion, inability to walk without crutches, limitation in bathing) may, and frequently do, exhibit completely different reactions to the injury. One patient may maintain an active social life and positive outlook while coping with the tear, whereas the other patient may become isolated and struggle with depression as a result of the injury.

The individual and variable nature of HRQOL highlights the patient-centered characteristic of this construct. A clinician who provides patient-centered health care should, as defined by the Institute of Medicine, “identify, respect, and care about patients’ differences, values, preferences, and expressed needs.”¹⁵,p4 Clearly, there is commonality between the concept of HRQOL and the definition of patient-centered health care because both include the patient and his or her perspective as an integral component of health and the provision of care. The total impact of injury and illness on an individual is greater than just its physical manifestation. Every injury or illness has the potential to affect the psychological, social, and
even spiritual aspects of life. HRQOL is valuable to both patients and clinicians because it accounts for a multidimensional impact on health.

Therefore, thorough evaluation of HRQOL requires patient-centeredness. A patient-centered approach to care requires collecting and accounting for patient input at every step of the patient care process. Without patient input, it is difficult to determine overall well-being because the patient’s own perspectives and experiences are missing. Consequently, it is recommended that patients evaluate their own HRQOL, as opposed to having proxy (eg, clinician, caregiver, parent, coach) reports of this information. It is also important to note that HRQOL is a form of patient-oriented evidence that matters (POEM), which is considered the highest-quality research evidence in standard evidence-based practice protocols. POEM consists of variables that matter to patients, such as symptom improvement, morbidity, financial considerations, and quality of life. Consequently, the assessment of POEM should enable more comprehensive changes in clinical practice by providing the clinician with a broader and more comprehensive package of data than is available without POEM.

Unfortunately, the evaluation of HRQOL in sport-rehabilitation-related clinical practice and research is not yet routine. The failure may be partly because HRQOL is still a foreign concept to those working in sport rehabilitation, which results in a persistent lack of awareness and understanding. Therefore, in this article we seek to explain how clinicians can include HRQOL as a standard component of patient evaluation and even clinical research studies by demonstrating how SRI affects HRQOL, where on the patient-care spectrum HRQOL belongs, and how knowledge of HRQOL is helpful to patient care.

**SRI and HRQOL**

Injury and illness are phenomena whose effects go beyond the physical dimension and manifestations of these conditions. In sport rehabilitation practice, SRI and illness are of primary concern. Therefore, it is reasonable to ask whether HRQOL is the appropriate conceptual framework from which to identify and measure the effects of SRI on an athlete’s overall well-being. Because it encompasses a variety of dimensions of health, we believe it is a relevant conceptual framework for this task. The established evidence demonstrates that HRQOL is higher in athletes than in nonathletes. In addition, SRI significantly affects an athlete’s HRQOL, and this impact can last beyond the point of physical recovery.

Determining the full impact SRI has on an individual’s well-being is essential for comprehensive patient evaluation and the development of a proper injury-management plan. Comprehensive patient evaluation is especially important in patient populations such as adolescent athletes, in which athletic participation provides a number of important secondary physical and psychosocial benefits. These physical and psychosocial benefits include enhanced leadership abilities, enhanced self-esteem, and an increased likelihood of participation in sport and physical fitness activities later in life. If SRI is improperly managed, or if its effects are incompletely evaluated, patients may withdraw from sport, thereby missing out on these benefits. Therefore, we suggest that clinician interest in the HRQOL concept should be partly driven by an appreciation that it is capable of capturing the full range of health effects of SRI and, consequently, informing the
development of a more comprehensive, and hopefully more effective, injury- or illness-management plan.

One obvious way of determining the impact of SRI on a patient population is to examine epidemiological data such as the data available for child and adolescent athletes, an extremely relevant population to sport rehabilitation clinicians. As we will demonstrate, although these data are helpful they are inherently limited in their ability to paint a complete picture of the effects of SRI on these patients. The exact number of adolescents who participate in organized sport on a yearly basis is difficult to establish, but several estimates include both children and adolescents. For example, 20 to 35 million children and adolescents are estimated to participate in organized sports programs. The National Federation of State High School Associations estimates that more than 7 million students participate in organized high school sports, which is approximately 35% of the over 20 million adolescents age 15 to 19 in the United States as of the 2000 census.

It is clear that SRI is the most common cause of injury in adolescents. Powell and Barber-Foss estimated that adolescent high school athletes account for 2 million injuries per year. Furthermore, sports have been found to be the most frequent reason for the 2.8 million injury-related visits to primary-care physician offices each year. From 1997 to 1998, 3.7 million emergency room visits resulted from injuries caused by participation in sports and recreation activities. Of these, 2.6 million involved patients age 5 to 24 years. Using data from the Injury Cost Model of the U.S. Consumers Product Safety Commission, McGuine found direct expenses totaling $588 million and indirect expenses totaling $6.6 billion for injuries in the 5 most common boys’ and girls’ high school sports.

These statistics represent a way of accounting for the impact of SRI on adolescent athletes by demonstrating the amount or frequency of injury occurrence. Evaluating epidemiological data is a perfectly reasonable approach to identifying the impact of SRI on athletes and is critical to our ability to monitor the prevalence of SRI in adolescent athletes. Epidemiologic framing also carries an important secondary benefit of facilitating a financial accounting of the impact of SRIs on the health care system. Consequently, these epidemiologic numbers are understandable and intuitively persuasive to a variety of stakeholder groups including regulators, parents, and the patients themselves. These data also resonate with an injury-model approach to medicine and its corresponding focus on morbidity and mortality. In our opinion, an epidemiological approach is most appropriate for quantitatively representing the physical and economic impact of SRI.

However, there is reason to believe that the health effects of SRI extend beyond those represented in traditional epidemiological approaches and can occur in multiple patient populations other than just youth and adolescents. For example, the emotional reaction of athletes of all ages to SRI is thought to be both significant and complex and frequently involves anger, depression, and anxiety. In some cases this response is transient, lasting only a few days or a few weeks until the athlete begins to recover or make psychological adjustments that allow him or her to cope with the situation. However, research has documented, and personal experience confirms, that athletes who are otherwise physically healthy sometimes do not return to competition solely because of unresolved psychological or social factors. Unfortunately, and too often, the psychological, social, and spiritual consequences of SRI are either missed or ignored in traditional approaches to patient care, when
only the physical consequence is of primary clinical interest. This is one reason why concepts like patient-centeredness have become valuable to contemporary health care practice. The potential for unresolved psychological or social issues and, as a result, decreased overall well-being is also why we believe that HRQOL is valuable to clinical practice—it provides a construct to measure and track multiple aspects of the injury phenomenon.

In the last decade, a clear relationship between athletic participation, SRI, and HRQOL has been established in college athletes. For example, McAllister et al. studied 562 “elite” athletes at a major university. Compared with a nonathletic control group, college athletes scored higher on a number of domains of HRQOL as measured with the Short Form 36 Health Survey (SF-36), a common generic outcomes instrument on which higher subscale and composite scores indicate better health. However, athletes with a history of serious SRI reported lower scores in all SF-36 domains (role physical, mental health, bodily pain, social functioning, and general health) than their noninjured athlete counterparts, and athletes with mild injuries reported lower scores on a number of subscales (role physical, bodily pain, social functioning, and general health) than noninjured athletes, as well. Huffman et al. found similar results in a much larger and more representative sample of college athletes. Using the SF-36, they demonstrated that college athletes had higher scores in every dimension of HRQOL than age-matched, nonathlete subjects except for the bodily pain dimension. Furthermore, athletes with no history of injury scored significantly higher in every dimension of HRQOL measured by the SF-36 than those with a history of previous injury, except for role limitations resulting from emotional problems.

Evidence from adolescent patients also suggests that HRQOL is affected both by athletic participation and by SRI or other conditions that affect a patient’s ability to participate in sport. For example, adolescent athletes demonstrated higher levels of the global-health, social-functioning, and mental-functioning components of HRQOL as measured on the SF-36 than their nonathlete peers. These findings resonate with those from McAllister et al. and Huffman et al. Several other studies provide evidence that demonstrates declines in adolescent HRQOL in response to illness or injury. For example, adolescent athletes with a previous diagnosis of asthma have demonstrated significantly lower total Pediatric Quality of Life Inventory (PedsQL) scale scores, as well as lower physical-, emotional-, and school-functioning scores, than nonasthmatic adolescent athletes. More recently, Valovich McLeod et al. found that injured adolescent athletes scored lower on components of both the SF-36 and the Pediatric Outcomes Data Collection Instrument than their uninjured peers, demonstrating deficits in global, physical, and social components of HRQOL.

Adolescents’ perceptions of their quality of life are also susceptible to variations in both their physical and mental health, a trait that differs from adults, who tend to be more responsive to changes in physical health only. Using the Centers for Disease Control HRQOL scale in 2 geographically diverse samples of adolescents, Zullig et al. demonstrated that adolescent quality-of-life ratings are more strongly correlated to mental health status than to physical health status, which suggests that mental health is a more important predictor of adolescents’ perceptions of their quality of life. This finding suggests that to neglect the mental component of HRQOL in the wake of an SRI in an adolescent patient is to risk missing a significant
change in mental health status brought on by the physical effects of the injury. In a separate study, Zullig et al. found that in nonathlete adolescents there is a link between decreased perception of physical health and reduced life satisfaction. In other words, as adolescents perceive that their physical health has declined, they grow more dissatisfied with their lives.

Clinicians should also recognize that these measurement tools could be repeatedly administered as a way of identifying HRQOL fluctuations, in real time, that may otherwise go unnoticed. In fact, repeat administration of patient-rated measures is important because SRIs can produce physical limitations that hinder an athlete for decades. Repeated administration is also useful for directing treatment decisions and evaluating the effectiveness of clinical interventions.

In addition to repeat administration, it is also important that patients report their own HRQOL, because clinicians have proven poor at estimating their patients’ HRQOL. For example, one study found that nephrologists underestimated the number of their patients who experienced HRQOL deficits by 24%. Another study using qualitative methods found that, especially in cases of chronic injury or chronic pain, injury severity was often underestimated by athletic trainers. This underestimation was often made because these athletes were presumed to be “head cases”; they tended to overreport injury, often out of a need for attention. Although HRQOL was not accounted for, it is reasonable to assume that if clinicians are capable of underestimating the physical impact of the injury, for whatever reason, they are also vulnerable to misjudgment about the broader impact of the injury on HRQOL.

There is also reason to believe that HRQOL might be useful for clinicians trying to objectively determine when an athlete has recovered from an SRI. A growing body of psychosocial research suggests that recovery is a more complicated concept than is often assumed. It is a deeply nuanced and contextualized concept, and its meaning may vary greatly between patients. The meaning of recovery to a patient can extend well beyond structural repair and healing. In one study, patients with work-related musculoskeletal disorders of the upper extremity were asked for their perceptions of “being better.” These patients framed being better in terms of resolution, readjustment, and redefinition. Of the 3 categories, only resolution includes experiences that would traditionally be associated with recovery—a condition from which the patient has completely recovered. The other 2 categories represent situations in which the condition is not fully resolved, but the patient adjusts aspects of his or her life, including activities or expectations, to accommodate the condition. Beaton et al. observed that, unfortunately, athletes do not often have that degree of flexibility in their recovery, and resolution is the only form of recovery that is acceptable to them or to the system of organized sport of which they are a part. Other forms of recovery that might demand some level of accommodation are typically unavailable to athletes because most accommodations would be accompanied by limitations or declines in athletic performance, which would be unacceptable, especially to highly competitive athletes.

Through this review of SRI and HRQOL, it is clear that SRI is a phenomenon whose significance can be accounted for in several ways. Although epidemiological data demonstrate the sheer volume of SRI, research on the relationship between SRI and HRQOL provides important insight into the broader impact of SRI on the individual beyond just the physical domains of health. HRQOL is sensitive
to both athletic participation and the effects of SRI on the full spectrum of health and well-being. However, understanding where on the spectrum of patient care the evaluation of HRQOL fits is important for establishing its clinical usefulness.

**Role of HRQOL Evaluation in Patient Care**

Disablement models provide a comprehensive, theoretical framework for approaching patient health status and HRQOL. Common models include the Nagi model of disablement, the National Center for Medical Rehabilitation Research disablement model, and the World Health Organization’s International Classification of Functioning, Disability, and Health (ICF; Table 1). For example, the ICF model allows for an injury or illness to be described from a variety of perspectives, including the active pathology or health condition (eg, diagnosis), impairments of body structures and functions caused by the injury or illness (eg, strength and range-of-motion limitations), activity limitations resulting from the impairments (eg, difficulty lifting heavy objects and limitations in completing activities of daily living), and participation restrictions or disability (eg, limitation in fulfilling personal and social roles). The ICF model also accounts for factors that may affect overall well-being (eg, environmental and personal factors).

In disablement-model terms, HRQOL is best captured through a combination of the activity-limitations component and disability component, which together include physical, social, and emotional well-being as illustrated by the components on the right side of the disablement-model framework (Table 1). Note that HRQOL cannot be evaluated through assessment of active pathology or physical impairment, both of which are familiar to clinicians and components of health status they frequently evaluate. Furthermore, the assessment of functional status may identify limitations in function that have the potential to affect HRQOL, but functional status alone does not account for the entire HRQOL construct. A similar mistake is made when impairment is used to infer the patient’s functional status, as is often done in clinical practice that emphasizes clinician-based measures. For example, an athlete may have permanent range-of-motion restrictions (impairment) after surgical reconstruction for shoulder instability yet exhibit no functional limitations in throwing a baseball or pitching in a baseball game. Errors are commonly made when clinicians incorrectly assume that impairments predict functional ability and disability status; this assumption may not be true. Disablement models are useful because they highlight components of HRQOL that may be important to patient recovery and future health.

There are 3 basic reasons that clinicians provide treatment to patients: increasing longevity, preventing future morbidity or ill health, and making patients feel better (ie, improving quality of life). Traditionally, increasing longevity refers to extending years of life. However, in sports rehabilitation, increasing longevity refers to sustaining or lengthening time in sport and ultimately increasing the number of active life years. Improperly managed sport injuries may result in future disabling conditions or related medical treatments, such as osteoarthritis or knee replacements, that affect the quality of the remaining active years of life. In fact, most conditions treated in a sport rehabilitation setting are of a type that will affect quality of life.

For example, injuries like anterior cruciate ligament tears, ankle sprains, and concussions are all common SRIs that affect an athlete in several ways. Not only do they have physical consequences (eg, torn ACL) and related impairments, but
### Table 1  Comparison of Common Disablement Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Origin</th>
<th>Organ level</th>
<th>Person level</th>
<th>Societal level</th>
<th>Other domains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nagi model of disablement&lt;sup&gt;47&lt;/sup&gt;</td>
<td>Active pathology</td>
<td>Impairment</td>
<td>Functional limitations</td>
<td>Disability</td>
<td></td>
</tr>
<tr>
<td>National Center for Medical Rehabilitation Research disablement model</td>
<td>Pathophysiology</td>
<td>Impairment</td>
<td>Functional limitations</td>
<td>Disability</td>
<td>Societal limitations</td>
</tr>
<tr>
<td>International Classification of Functioning, Disability, and Health&lt;sup&gt;50&lt;/sup&gt;</td>
<td>Health condition</td>
<td>Body structure and function</td>
<td>Activity</td>
<td>Participation</td>
<td>Environmental and personal factors</td>
</tr>
</tbody>
</table>

Italicized cells represent areas of health-related quality of life. Adapted with permission from Snyder et al.<sup>19</sup>
they also interfere with the athlete’s participation in established team roles. Athletes participate in several roles on a team, from starting lineman to soccer fullback to team captain. Disablement theories teach us that an inability to participate in these roles is central to disability. Note that HRQOL tools measure the domains of health that are likely to reflect the effect of changes in role participation.

Therefore, it seems appropriate to incorporate the evaluation of HRQOL into regular patient care. HRQOL evaluation addresses all 3 of the reasons clinicians provide treatment while simultaneously accounting for what is important to the patient, thereby facilitating a patient-centered approach to care. For example, patients may be more aware of, and therefore more focused on, improving function and relieving disability (ie, components of HRQOL) than they are with changes in impairments because function and disability affect their lives in ways that are important to them and that they intuitively understand (the lone exception being pain). In other words, a loss of shoulder external rotation may or may not make sense to a patient, but he or she intuitively understands and is annoyed by the obstacles to activities of daily living that arise from that loss of external rotation (eg, removing a T-shirt, washing hair). When the primary goal of a particular treatment or course of care is to make patients feel better or to improve their ability to perform necessary or desired roles, such as being a baseball pitcher or playing on the tennis team, evaluation of HRQOL is required.1

Clearly, the role clinicians play in increasing patient longevity, preventing future morbidity or ill health, and making patients feel better highlights the need to assess patient HRQOL, but there are other reasons for its importance in health care. Evaluation of HRQOL is useful for identifying and prioritizing health problems, facilitating communication and shared decision making between clinician and patient, screening for hidden conditions (eg, psychological issues), monitoring response to treatment, and driving treatment decisions.55 Measures of HRQOL are also important for determining clinical effectiveness52,56 and are often required components of clinical trials.7 In addition, improvements in patient HRQOL as a result of rehabilitative services can be considered by payers for reimbursement decisions, a relevant consideration in our changing health care system. For these reasons, HRQOL not only has become an important and necessary component of patient care but also is of interest to a variety of health care stakeholders including patients, clinicians, health care administrators, and payers.

Finally, it is important to reinforce the connection between HRQOL, clinical research, and evidence-based practice. As we previously argued, to the degree that HRQOL represents a patient-oriented outcome measure, clinical research that measures HRQOL in response to an intervention is collecting, and subsequently producing, POEM. The advantage to including measures such as HRQOL in clinical research is that contemporary level-of-evidence heuristics assign studies that produce POEM a higher level of evidence. Consequently, such studies are more likely to be acted on by clinicians who are practicing in an evidence-based way and who are more likely to employ findings from articles with higher level-of-evidence ratings. For example, the Strength of Recommendation Taxonomy18 downgrades studies or bodies of literature that are not grounded on patient-oriented outcomes, limiting individual studies to level 3 evidence (the lowest level of evidence) and bodies of literature to a grade of C (the lowest level). Low grades imply that these studies have the least ability to affect clinical practice.
Evaluating HRQOL Through Patient-Based Outcomes Instruments

HRQOL is evaluated through the use of patient-based outcomes instruments, which are questionnaires or surveys that ask patients about their health status. Patient-based outcomes instruments are differentiated as either generic or specific. Generic outcomes instruments are necessarily multidimensional, covering a variety of HRQOL domains, and provide a broad glimpse into an individual’s health status. These measures are appropriate for all health conditions and can be used to evaluate and compare the same or different injuries, demographic regions, or cultural subgroups. They can also be used within or across patients. Because of the broad nature and relevance to a variety of patient conditions, generic instruments are not particularly responsive to change resulting from specific treatments or therapeutic interventions. However, they may identify an unexpected change in HRQOL as a result of treatment or intervention.

Three common generic HRQOL instruments are the SF-36, its associated shorter version, the SF-12, and the PedsQL. The SF-36 is a widely used 36-item questionnaire that aims to evaluate an individual’s perception of his or her overall health status and physical functioning. There are 8 subscales of the SF-36 that address physical functioning, role limitations resulting from physical health issues, bodily pain, general health perceptions, vitality, social functioning, role limitations resulting from emotional problems, and mental health. In addition, 2 summary composite scores are calculated for the questions related to physical and mental health. Responses to Likert-style questions are recorded, with scores ranging from 0 to 100. For all subscales and composite scores, lower scores indicate lower ratings of HRQOL for the respective domain of HRQOL.

The SF-12 is a shortened version of the SF-36 that includes the same subscales and composite scores as the SF-36 and reportedly reproduces the physical and mental composite summary scores with 90% accuracy. Therefore, if time is an issue for either the clinician or the patient, using the shorter SF-12 is a reasonable substitute when a measure of overall well-being is desired. Both the SF-36 and the SF-12 are valid and reliable in a variety of patient populations. In addition, the SF-36 has been used in several investigations with adolescent athletes.

Although the SF-36 and SF-12 are reportedly appropriate measures of health status for people age 14 and up, it is possible that these instruments do not reflect the activities and issues important to younger populations. Therefore, clinicians working with pediatric populations should consider using a generic instrument created specifically for a younger age group, such as the PedsQL. The PedsQL is a 23-item questionnaire that evaluates 4 aspects of HRQOL: physical, emotional, social, and school functioning. The PedsQL also incorporates summary scores for physical, psychosocial, and total health for both healthy patients and those who suffer either acute or chronic health conditions. Scores for the subscales and summary scores range from 0 to 100, with higher scores indicating better HRQOL in the respective domain of HRQOL. Like the SF-36 and SF-12, the PedsQL is reliable, valid, and responsive in a variety of healthy and patient groups. Generic instruments provide a broad glimpse into an individual’s HRQOL and should be used in conjunction with specific outcomes instruments. A series of 4 clinical-application articles is included in this thematic issue that provide a brief
patient scenario and then demonstrate the value of using both generic and specific patient-rated outcomes instruments in the evaluation of upper extremity, lower extremity, low-back, and concussive injuries.

In contrast to generic outcomes tools, specific instruments are appropriate and useful for evaluating components of HRQOL that may be affected by specific injuries, diseases, body regions, or injury sites. Specific instruments target a particular condition or injury and typically include a number of questions that are highly relevant to that condition or injury. High specificity makes specific instruments both more responsive to change and better able to detect small changes resulting from particular treatments and therapeutic interventions. For example, the Foot and Ankle Ability Measures (FAAM) is a valid and reliable region-specific instrument for evaluating physical function associated with a wide variety of musculoskeletal conditions of the leg, foot, and ankle. The FAAM includes multiple questions related to the concerns of patients who have ankle and foot injuries, such as whether the patient has difficulty walking on even ground, walking up or down hills, and going up or down stairs. In addition, the FAAM has a sports module that contains questions relevant to sporting activities, such as difficulty with running, jumping, and cutting or lateral movements, and to athletic populations.

Like the FAAM, the Disabilities of the Arm, Shoulder and Hand (DASH) is a reliable and valid instrument in many populations for evaluating the symptoms and disability associated with various upper extremity conditions and includes optional work or sports modules. The DASH includes questions related to body structure and function, activity, and participation, resulting in a well-rounded upper extremity outcomes instrument for the assessment of several domains of HRQOL. However, a recent investigation of college athletes reported ceiling effects associated with the DASH, potentially limiting its validity in this high-functioning population.

The Modified Oswestry is a 10-item region-specific self-report instrument aimed at evaluating function in people with low back pain, and its questions more specifically relate to activity than participation. Finally, the Headache Impact Test is a simple instrument developed to measure the burden of headache on HRQOL, with questions targeting the physical aspects of headache (ie, body structures and function and activity). Examples of where the FAAM, DASH, Modified Oswestry, and Headache Impact Test are used in the treatment of ankle, shoulder, low-back, and concussive injuries are provided in the clinical-application articles in this thematic issue. In addition, Michener provides a general overview of using patient-rated instruments to assist in clinical decision making. Understanding the differences between general and specific tools is important when evaluating HRQOL because the instrument selected determines the aspect of health status that will be measured.

As discussed previously, HRQOL is a synthesis of domains emphasizing psychological, physical, social, and spiritual aspects of health. Patient-based outcomes instruments are often loosely referred to as measures of HRQOL. Although theoretically a patient-based outcomes instrument could comprehensively evaluate HRQOL, in practice, a single instrument that measures the entirety of HRQOL, such as the SF-36, is rare. More common are instruments that measure only 1 or 2 HRQOL constructs such as physical function and clearly do not capture the entire HRQOL construct. In addition, some patient-based outcomes instruments focus on function as a single construct or in combination with symptoms, and other instruments emphasize disability.
Instruments have also been developed based on the structure of contemporary disablement models, although using this framework does not mean that the instrument measures all aspects of disablement or HRQOL, such as the social and psychological components. Because the HRQOL and disablement constructs captured by various patient-based outcomes instruments vary, it is important to know what constructs are evaluated by which particular instrument so that the instrument meets the needs of the intended purpose of its use. This knowledge is critical for proper instrument selection. Simply using a patient-based outcomes instrument on the premise that it measures HRQOL is inadequate and may be inaccurate because there are very few instruments that measure all HRQOL dimensions.

**Selecting Patient-Based Outcomes Instruments**

Although understanding the difference between generic and specific outcomes instruments is important, it is also necessary to critically review available instruments before implementing them in research or clinical practice. Selecting a patient-based outcomes instrument that is appropriate for the intended use requires a review of key criteria including the purpose of the instrument, its measurement properties, and burden of the tool. Snyder and Valovich McLeod, Streiner and Norman, and Suk et al address many of the practical and psychometric issues important when selecting patient-based outcomes instruments. All criteria are important, but one that requires special attention, especially given the time constraints involved with sport rehabilitation, is the burden of administering and completing outcomes instruments on both patients (ie, patient-friendliness) and clinicians (ie, clinician-friendliness). In addition, consideration of the type (generic or specific) of outcomes instrument administered is also important because the selection may dictate the kind of information gathered.

When using patient-based outcomes instruments, distress to the patient should be minimized so that high response or completion rates are encouraged and achieved. For example, longer surveys with a large number of questions increase completion time, which can burden patients and potentially decrease their compliance. Patients tolerate shorter surveys better. For example, the Pediatric Outcomes Data Collection Instrument is a patient-rated outcomes measure created to address concerns of pediatric and adolescent youth who suffer orthopedic injuries. On first glance, the instrument appears promising for use in athletes because their injuries are often orthopedic in nature. However, the instrument consists of 83 questions and, as a result, may be difficult for adolescents to complete without losing interest or focus. An instrument with fewer questions, like the 23-item PedsQL, may be more acceptable to adolescent populations.

In addition, question difficulty and acceptability for the target population are important. For example, some questions may confuse patients, making them less likely to answer the question correctly or at all, and other questions might make patients uncomfortable. For example, the DASH contains a question related to difficulty with sexual function as a result of arm, shoulder, or hand problems. Although there is no set age range for the appropriate use of the DASH, reference to sexual activities may be perceived as inappropriate for younger populations. Removal of this question in younger populations is suggested, and the omission of this question would be considered a “missed” question when the instrument is scored.
Both of the previous situations can create burden and hinder compliance. The burden associated with clinician administration of an instrument should also be considered. Training-time requirements, as well as the costs associated with using these instruments, including financial (eg, license fees) and time (eg, administering, scoring, and analyzing questionnaires) components, should be evaluated before implementing a scale. An instrument that is less burdensome and friendlier to patients and clinicians may produce higher response rates and more clinician buy-in.

Finally, it is important to note that because generic and specific outcomes instruments produce different types of information, they are complementary measures and should be used together in routine patient evaluation. As previously discussed, generic instruments are more likely to identify areas of concern that are unexpected as a result of specific interventions or treatments, whereas specific instruments are helpful in gauging health status in areas that might change in response to specific interventions or treatments. In addition, although specific instruments are more responsive to particular treatments and interventions and, as a result, are helpful in measuring progress of individual patients throughout the rehabilitation process, generic instruments can be compared across injury types and health conditions, allowing for the evaluation of the impact of different injuries on HRQOL. For example, it may be helpful to consider the differing impact of concussive, shoulder, or ankle injuries on mental or physical status or on the ability to participate in social roles (eg, athlete, student, or friend). Each of the clinical-application articles in this thematic issue includes both a generic and a specific instrument in its patient scenario, which helps demonstrate the value of routinely including both types of measure in patient care.

Conclusion

It is painfully clear that there is a need for additional research in the area of HRQOL. We identify 3 specific and related needs. First, and most important, is that additional research is needed to establish the validity, reliability, and responsiveness of all relevant HRQOL instruments across all the varied sport rehabilitation patient populations. Preliminary work on adolescents has begun but must be expanded and duplicated across other populations. Additional work is critical to systematically answering the question, What is the effect of sport-related injury on HRQOL? Second, the effect of different kinds of SRI on HRQOL must be explored. For example, it is reasonable to wonder if the effects of lower and upper extremity injuries on HRQOL may vary and whether musculoskeletal injuries differ from other types of injuries, such as concussion. These effects need to be identified and explored across common SRIs. Third, new instruments, perhaps population- or condition-specific instruments, must be developed and psychometrically tested when research in the first 2 categories indicates a deficiency in available tools. Ideally, these 3 research goals are the responsibility of sport rehabilitation personnel from both the research and clinical communities, working together to answer relevant clinical questions for the benefit of our patients.

One concern we have is that clinicians will dismiss HRQOL as nothing more than repackaged sport-psychology principles. Although there is resonance with sport-psychology research on emotional reactions to injury, our arguments are broader than those traditionally made in sport psychology. It is our observation that
the “psychosocial” aspects of the injury experience identified in the sport-psychology literature of the last 2 decades is more heavily weighted on the psychological than it is on the social, where the focus is on the psychological antecedents of injury (ie, injury prediction), psychological consequence of injury (eg, coping), and psychological considerations for injury rehabilitation, wherein behavioral responses to injury are almost always evaluated in terms of rehabilitation adherence. The overarching goal of these studies is the elucidation of the cognitive appraisal processes engaged in by the athlete. Although this information is both relevant and clinically useful, the complex social effects of SRI are left largely unexplored. This oversight is especially troubling given that social factors are known to be an important factor in the injury experience.

Consequently, the full impact of SRI on all facets of an athlete’s health and well-being has yet to be determined. Part of our satisfaction with the HRQOL concept is that it gives psychological issues the attention and proper weighting they deserve as fundamental components of health and wellness. HRQOL simultaneously helps us move beyond just the psychological in considering the effects, not just the predictors, covariates, or contributors, of SRI. The concept of HRQOL also provides a methodological and theoretical opening for greater exploration of the social effects of injury, while retaining the focus on the individual that has been common to sport-psychology research and simultaneously accounting for effects that may also be unique to the condition that the patient is experiencing.

We hope that this and the other articles in this Clinical Outcomes Assessment thematic issue will motivate sports rehabilitation clinicians and researchers to reflect on their approaches to the evaluation of SRI and to consider the role that HRQOL plays in the care and management of their patients. Although it is not a “silver bullet,” we believe that HRQOL is a primary clinical outcome in sport rehabilitation that provides clinicians an opportunity to effectively evaluate and document the true impact of SRI on the overall well-being of their injured athletes.

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