Patient-Reported Measures of Physical Function in Knee Osteoarthritis

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KEYWORDS

• Knee osteoarthritis • Patient-reported measures • WOMAC • KOOS • PROMIS

KEY POINTS

- The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) physical function subscale is a well-validated and reliable patient-reported measure, although it is questionable if the constructs of physical function and pain are separately evaluated.
- The Knee Injury and Osteoarthritis Outcome Score (KOOS) Function in Sport and Recreation subscale is a well-validated measure of physical function, although floor effects are present for people with moderate to severe functional limitation.
- The Patient Reported Outcomes Measurement Information System (PROMIS) Physical Function measure is a newer measurement instrument, and preliminary studies show high test-retest reliability and no floor or ceiling effects among people with osteoarthritis (OA).

INTRODUCTION

Knee OA is a leading cause of functional limitation worldwide.[1,2] People with knee OA have pain, which limits commonly performed daily activities. Functional limitation is defined by Nagi as restriction in the performance of an individual, such as difficulty getting up out of bed, getting up from a chair, walking, and climbing stairs.[3] Functional limitation is a construct that is unique and separate from impairments (eg, knee pain) and disease (eg, knee OA).

Accurately assessing the type and severity of functional limitation is important for people with knee OA. From a societal perspective, proper measurement helps determine the burden of disease on function. From a research perspective, evaluating the efficacy and effectiveness of new treatment interventions requires measurement of physical function using appropriate measures. Lastly, from a clinical perspective,

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assessing functional limitation is important to demonstrate the efficacy of one-on-one intervention and describe worsening or improvement over time.[4] Measurement in knee OA is challenging because there is a wide spectrum of functional limitation types and severity.

Examples of commonly used fixed-length questionnaires of physical function in knee OA include the WOMAC, the KOOS, and the PROMIS Physical Function subscale. WOMAC is a disease-specific instrument that measures the domains of pain, stiffness, and physical function.[5] This article focuses on the physical function subscale. The KOOS is another disease-specific instrument that has similar items as the WOMAC physical function subscale with the addition of questions about sport and recreation and knee-related quality of life (QOL).[6,7] The PROMIS Physical Function instrument is a recently developed general measure of health.[8]

The purpose of this article is to review psychometric properties of commonly used patient-reported measures of physical function in knee OA and discuss the strengths and limitations of each measurement instrument.

THE IMPORTANCE OF MEASURING THE CONSTRUCT OF PHYSICAL FUNCTION

The disablement model is a useful tool to communicate the consequences of injury and disease. Jette[9] adopted Nagi's definition of disablement as "various impacts of chronic and acute conditions on the functioning of specific body systems, on basic human performance, and on people's functioning in necessary, usual, expected, and personally desired roles in society."[9] Physical function has a unique place in contemporary disablement frameworks. Functional limitation is a distinct phenomenon in the Nagi model that describes the construct of physical function, defined as restriction in the performance of an individual, such as difficulty getting up out of bed, getting up from a chair, walking, and climbing stairs.[3] In the more recent International Classification of Functioning, Disability and Health model from the World Health Organization, "activity" and "activity limitations" best describe physical function. Activity is "… the execution of a task or action by an individual. Activity limitations are defined as difficulties an individual may have in executing activities."[10,11]

From a measurement perspective, outcome instruments should measure specific underlying constructs and not mix 2 or more constructs together. For instance, although physical function is closely related to disease and pain, it is a unique construct of disablement. To best understand the prevalence and associated risk factors of functional limitation, an ideal measurement instrument should attempt to solely measure the construct of physical function.

PSYCHOMETRIC PROPERTIES

The authors reviewed the following psychometric properties of patient-reported measures: reliability, validity, and sensitivity to change and responsiveness (**Table 1**). The authors also investigated known group validity, which is the extent to which a measurement instrument can differentiate scores from groups that are known to be different. Lastly, sensitivity to change and responsiveness were evaluated. Sensitivity to change is the ability of measure to detect change that exceeds statistical error without regard to clinical relevance, whereas responsiveness refers to clinically relevant or meaningful change.[15] Responsiveness is determined using scores anchored to patient-reported or provider-reported thresholds, such as the minimum clinical important difference (MCID).[15,16]

The greater number of psychometric properties studied and properly fulfilled, the better a measurement instrument assesses physical function. It is important for

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