



Clinimetric quality of the new 2011 Knee Society Score: High validity, low completion rate



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ABSTRACT

Background: The demands of the younger and more active current total knee arthroplasty (TKA) patients are not in line with the current outcome assessments. Therefore, new questionnaires are developed or adjusted, as with the popular 1989 Knee Society Score (KSS). This study is the first to investigate the clinimetric parameters of the patient-reported outcome measurement (PROM) part of the 2011 KSS.

Methods: Four-hundred-fifteen primary Dutch TKA patients were scored using the PROM part of the 2011 KSS. The scale is subdivided into an Objective (not evaluated), Satisfaction, Expectation and Function subscales. Clinimetric quality was evaluated by response and completion rate, test–retest reliability ($n = 29$, intraclass correlation coefficient), internal consistency ($n = 172$, Cronbach's alpha), construct validity (Pearson's correlations with 1989 KSS ($n = 75$) and KOOS-PS ($n = 139$)) and responsiveness ($n = 20$, paired-samples t -test, effect sizes and floor and ceiling effects).

Results: A response rate of 96% and completion rate of 43% were found. Reliability and internal consistency proved excellent with ICCs ≥ 0.79 and Cronbach's alpha ≥ 0.76 for all subscales. Strong correlations were found between the Function subscales of the 2011 KSS and KOOS-PS ($r = -0.60$ to -0.83). All subscales improved significantly after intervention, with exception of Walking & Standing and Discretionary Activities. 23% reached the maximum score postoperatively in Walking & Standing, indicating a ceiling effect.

Conclusions: The 2011 KSS is a reliable, internal consistent, construct valid and responsive questionnaire to assess the outcome of the Dutch TKA patients. Optimizations (e.g. shortening the scale, simplified design) are recommended to increase the disappointing completion rate.

Clinical relevance: The 2011 KSS is a reliable, internal consistent, construct valid and responsive questionnaire to assess the outcome of the Dutch TKA patients.

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Contents

1.	Introduction	648
2.	Methods	649
2.1.	Patients	649
2.2.	Questionnaires	649
2.2.1.	2011 Knee Society Score	649
2.2.2.	1989 Knee Society Score (KSS)	650
2.2.3.	Knee injury and Osteoarthritis Outcome Score–Physical Function Short Form (KOOS-PS)	650
2.3.	Statistical analysis	650
2.3.1.	Response and completion rate	650
2.3.2.	Internal consistency	650
2.3.3.	Reliability	651
2.3.4.	Construct validity	651
2.3.5.	Responsiveness	651
3.	Results	651
3.1.	Response and completion rate	651
3.2.	Internal consistency	651

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3.3. Reliability	652
3.4. Construct validity	652
3.5. Responsiveness	652
4. Discussion	652
5. Conclusion	653
References	654

1. Introduction

The Knee Society Scoring System (KSS) has been developed by The Knee Society as a simple rating scale to quantify the outcome of patients before and after total knee arthroplasty (TKA) [1–3]. The KSS is a clinician-administered scale which is concise and user-friendly [1–3]. It consists of a Knee Score, which only rates the knee joint itself (e.g. pain, range of motion, stability and radiographic alignment), and a Function Score (e.g. patient's walking distance, climbing stairs and use of walking aids). Over the years, it has become widely accepted although the reliability and validity of the scale remain a subject of discussion [3–5].

The KSS was introduced in 1989 when TKA was largely performed in patients with a sedentary lifestyle [3]. Evaluation of the knee function on the basis of the patient's ability to walk and climb stairs only was therefore acceptable [3]. However, over the last two decades the

proportion of younger, more physically active patients undergoing TKA has increased [6,7]. Subsequently, these patients live longer after TKA, have higher expectations and are more demanding concerning functional outcome (e.g. stretching exercises, gardening, kneeling) [3,8]. The KSS is limited regarding these features as it measures only simple and low demanding functional aspects (stair climbing, walking etc.) [9]. Besides, studies questioned the responsiveness and reliability of the scale, which may mask functional changes over time or after intervention [4,5,10–12]. When assessing the functional outcome, the inclusion of the patient's opinion on, for example, expectation, satisfaction and an extended set of daily activities (e.g. household, gardening, sports, playing with grandchildren) is important to evaluate the success of medical treatment [3,13].

To deal with the new generation of patients and their rising demands, current clinical scales have been optimized and new scales

Satisfaction subscale (40 points)

How satisfied are you with the pain level of your knee while...

- | | |
|--|-----------------------------|
| 1. sitting? | (8 points = very satisfied) |
| 2. lying in bed? | (8 points) |
| 3. getting out of bed? | (8 points) |
| 4. performing light household duties? | (8 points) |
| 5. performing leisure recreational activities? | (8 points) |

Expectation subscale (15 points)

My expectations for...

- | | |
|---|-----------------------|
| 1. pain relief were... | (5 points = too high) |
| 2. being able to do my normal activities of daily living were... | (5 points) |
| 3. being able to do my leisure, recreational or sports activities were... | (5 points) |

Functional Activity subscale (100 points)

Walking and standing (30 points)

- | | |
|---|--------------------------------|
| 1. Can you walk without any aids (such as a cane, crutches etc)? | (yes/no) |
| 2. If no, which of the following aid(s) do you use? | (-10 = wheelchair, -2 = brace) |
| 3. Do you use these aid(s) because of your knees? | (yes/no) |
| 4. For how long can you stand... | (15 points = >1 hour) |
| 5. How long can you walk...
...(with or without aid) before stopping as a result of knee discomfort? | (15 points = >1 hour) |

Standard activities (30 points)

How much does your knee bother you during each of the following activities?

- | | |
|--|------------------------|
| 1. Walking on a uneven underground | (5 points = no bother) |
| 2. Turning or pivoting on your leg | (5 points) |
| 3. Climbing up or down a flight of stairs | (5 points) |
| 4. getting up from a low couch or a chair without arms | (5 points) |
| 5. Getting into or out of a car | (5 points) |
| 6. Moving laterally (stepping to the side) | (5 points) |

Advanced activities (25 points)

How much does your knee bother you during each of the following activities?

- | | |
|--|------------|
| 1. Climbing a ladder or step stool | (5 points) |
| 2. Carrying a shopping bag for a block | (5 points) |
| 3. Squatting | (5 points) |
| 4. Kneeling | (5 points) |
| 5. Running | (5 points) |

Discretionary activities (15 points)

Please check 3 of the activities below that you consider most important to you. Nine recreational activities [swimming, gardening, etc] and 8 workout and gym activities [weightlifting, stretching exercises, etc].

How much does your knee bother you during each of these activities?

- | | |
|---------------|------------|
| 1. Activity A | (5 points) |
| 2. Activity B | (5 points) |
| 3. Activity C | (5 points) |

Fig. 1. Questions for the patients in the 2011 KSS.

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