Return to activity is a multi-faceted variable not a discrete yes-no.

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Return to Play: Is it the best benchmark of successful treatment?

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Abstract

Objectives: To develop a patient reported outcome that allow for tracking of return to activity after injury. By acknowledging that return to activity is not a discrete Yes/No question where participants return to their baseline activity may be unrelated to their treatment a more comprehensive understanding and measurement of the outcome of treatment after injury as it relates to activity participation was developed and evaluated.

Methods: Item development and evaluation were undertaken with the final version tested in an ongoing observational clinical trial. Descriptive statistics and test-re-test analysis using intra class correlation and percent agreement were used.

Results: A 5-item set of questions was identified that assess return to activity from a multi-faceted perspective. The final 5-items records preferred activity, days and hours per week of participation, impact of change in participation in activity, degree of limitation in participation and if it is related to injury or external factors. Over 30% of the population reported that their participation in their preferred activity was no longer active and not related to their injury but other factors demonstrating the importance of documenting more than one variable.

Conclusion: The Minnesota Activity Scale provides standardized questions to comprehensively assess return to activity as a marker of treatment effectiveness.

Level of Evidence: V

Keywords: Return to activity, return to play, injury, overuse
Introduction/Background:

Return to activity is considered within much of the current literature the standard by which care to patients, in particular athletes, are judged. The use of the term ‘return to activity/play’ has taken an exponential leap in the literature as evidenced by a recent PubMed search. 75% of the articles identified have been published since 2011.[1] Figure 1. The published literature is primarily focused on determinant or criteria for return to activity excluding measurement of the quality of the return (level of participation compared to baseline) and the reason why there is no return. The literature tends to focus on specific populations such as elite athletes[2, 3], specific injuries[4, 5] such as anterior cruciate ligament (ACL), or criteria for clearance[6, 7]. Historically a common measure has included the Tegner scale[8] which groups selected sports and activities into levels of difficulty to grade return to activity regardless of intensity or frequency of participation. While looking at the specific diagnosis of osteochondral lesions of the first metatarsophalangeal joint cartilage Ter Laak Bolk[9] did ask their 9 patients via phone interview questions that addressed the multi-faceted nature of return to activity however their primary outcome was return to sports at any level (Yes/No). The concept of ‘return to activity’ as a criterion for treatment success is more complex than the often assessed “Have you returned to basketball?” (Yes/No). The decision to return to activity,

What are the new findings

- Return to activity should be measured more than just a dichotomous Yes/No
- Return to activity may not occur for reasons unrelated to musculoskeletal concerns.
- Return to activity may occur at higher or lower level of participation
is not solely conditioned on treatment, but on the attitude and aspirations of the patient, which are not assessed by the single item ‘return to play’ approach to measurement. A simplistic operational assessment omits the warranted comprehensive approach to assessing outcomes; i.e. relevant qualifiers to clarify the direction and magnitude of change. Return to activity may occur at a lower skill level due to physical limitations (e.g., loss of motion or strength) or fear of re-injury. In contrast there may be a return to a higher level of activity if a chronic injury has been resolved that had previously limited participation. Operationally ‘return to activity’ is characterized at a minimum by knowing how much change has occurred in four distinct areas: intensity, frequency, duration, and capacity. Outcome measures based on a return to the same activity at the same level, are misguided and fail to account for the role of preferences and personal choice relative to activities. The presumption that change is solely due to injury is a flawed hypothesis when there are many competing rival hypotheses; which compounds issues with data and conclusions which are predicated on such presumptions.

The single Yes/No item presumes that not returning is a negative outcome. To assume that return is the only objective to consider ignores a range of issues associated with the decision to resume participation, particularly that the patient’s psychological status is also a factor in the decision to return as their mental readiness may not align with their physical readiness. Equally important is the consideration that return to activity may not always be the patients’ goal but perhaps return of stability or pain relief with treatment having been delayed until the end of a career.
Determining if return to play has been achieved is complex. The clearance for return to play may come from a variety of sources; the clinician may provide clearance, may defer clearance to a physical therapist, or may rely on external guidelines for injuries that require defined time off like concussions or obtaining functional test markers.[26, 27]

One review of definitions for return to play focused on hamstring injuries and found that only 13/25 published articles provided a definition of return to play.[28] A consensus group developed guidelines for return to sport after ACL injury with the definition being pre-injury level of sport participation.[29] A review of 35 articles focused on mid-portion Achilles tendinopathy identified 32 articles with a definition of return to play; all primarily focused on returning to pre-injury activity/sports level.[30] A broad systematic review identified 25/29 articles that defined return to play using 6 different definitions.[31] This continued lack of consistency in the literature indicates that guidelines from a 2016 consensus statement focused on return to sport are slow to be adapted or not accepted in the literature. Furthermore the lack of acceptance may grant consideration that the issue is more complex than defining success as solely due to return to play in the sport, at the level and the frequency of participation that the athlete was at pre-injury.[32] This may not be true or appropriate for all patients; consider that many patients are not athletes and thus, return to sport is irrelevant to many individuals.

Within this work we will refer to everyone as patients to encompass everyone with an active lifestyle that may not include formal sport participation. We will use the terminology of return to activity but this includes return to play, participation, and sport globally.

Operationally, determination of return to activity is complex and the historical tendency of using a single operational measure, particularly those with a simple dichotomous yes/no response
option reflects a lack of accounting for personal preference and decision making [33] [34], the inherent difficulties of assessment of preferences (i.e. desire to return to play) and their relationship to behavior.[17, 35] To address this variability in individual patients’ goals we developed a set of questions that could be used longitudinally to track a patients return to activity and if the return did not match their pre-injury status if it was related to their injury or external factors. That is, account for the fact that ‘return to a specific activity’ may not be the relevant outcome, but a focus on ‘return to activity, be it the same, similar or completely different are relevant outcomes.

Core considerations in development of this instrument were:

- Identification of two most ‘favorite/important’ activities prior to injury.
  - The word activity was chosen over sports to encompass many patients who may participate in physical activities such as hiking or playing in the playground but do not fall under the terminology of sports.
- Assessment of impact of injury on participation
- Frequency/intensity of participation prior to injury

The purpose of this project is to present the development of the Minnesota Activity Scale (MAS) and demonstrate its use in an observational longitudinal trial of patients who sustained patella dislocations and underwent medial patella femoral ligament reconstruction (MPFL).[36] Funding for this phase of the project came from a grant from ISAKOS.

**Methods:**

Using the parameters of specific activity, frequency of play (days per week), and duration of play (time per session) questions were developed by a survey methodologist and an ATC/sports
medicine researcher in 2012 to identify if, over time the index activity was returned to, the level of participation limitation, and if the limitations were related to the injury or external reasons.

Study data were collected and managed using REDCap electronic data capture tools hosted at the University of Minnesota with a mix of fill in, yes/no, and a slider bar which reported the results from 0-100.[37, 38] Basic descriptive statistics were used for analysis (SPSS v 26 @IBM). Six iterations of the scale were trialed to assess the wording and formatting of the scale for patient comprehension and ease of completion.[25, 39] Following the principles of multiple operationalism (2) a 5-item questionnaire, entitled the Minnesota Activity Scale, was adopted for the final instrument. Test re-test using paper and pen was undertaken on a sub-set of general patients from an out-patient orthopedic clinic in 2015 with a 7-day interval between administrations.[40, 41] Reliability was measured by intra-class correlation (ICC) one way effects modeling and consistency agreement as well as percent agreement. The survey was then incorporated into an observational trial of patients who had sustained patella dislocations and were undergoing Medial Patella Femoral Ligament (MPFL) reconstruction. The survey was administered to those participants for whom English was their primary language at time of their surgery, and at one year. To calculate the differences in frequency of participation for those reporting the same preferred activity over the study course, Time 1 was subtracted from Time 2 to create individual subject differences and then averaged as a population. All work was done under Institutional Review Board approval and informed consent forms were collected from each participant. Approval numbers are 1604M86744 and 1406E51581 and 1205E14202.
Results:

The current version of the survey is shown in Figure 2 formatted for one preferred activity.[42] Test-retest occurred in 2015 with 37 subjects repeating the questionnaire over a 1-week period. ICC correlation for time spent participating in an activity was 0.53 and for days spent in an activity was 0.30. Allowing for data collection on two activities per survey taker, of the 74 activities identified all but 6 were identically identified at the time of re-test (92% reliability). 19 patients recorded the same level of limitation with an additional 8 within one point on the 11-point scale (27/34, 79%) for activity 1 and 15 recorded the same level of limitation with an additional 10 within one point on the 11-point scale (25/34, 74%). 32 (86%) patients reported the limitation to participation was tied to their injury at both time points for activity 1 and 28 (76%) reported injury limitation at time 2 for activity 2.

From the study of 279 patients undergoing MPFL reconstruction 248 (89%) patients completed the survey pre-operatively and 147 (59%) of those completed the survey at one year. For this specific study, subjects were only asked to identify their top favorite sport or activity and were not asked to record the number of hours per week they participated in their chosen sport or activity. At the pre-operative time point 109 (44%) of the subjects reported still playing their self-identified preferred sport or activity, albeit with some limitation. On a scale of 1 (not limited) -10 (completely limited) the reported limitation in activity participation for the 109 was a mean 5.7 (std 3.1, 0-100). Of the 139 who reported that they were not active in their preferred activity only 17% attributed the lack of participation to factors other than their injury. On the one-year survey of the 147 respondents, 99 (67%) reported participating in their favorite activity. 24 (26%) reported no limitations to activity participation in their preferred activity. Of
the 75 who reported a limitation to participation to their preferred activity 46 (46%) reported participation limitations due to their injury with 29 (39%) reporting limitations or no participation due to factors unrelated to their injury. The reported limitation of those still reporting activity participation was a median of 1.4 (mean 2.8, 3.1 std, 0-100).

**Discussion:**

The Minnesota activity scale demonstrates the importance of evaluating return to activity beyond yes/no. From the MAS one can determine if there is a return to a baseline activity and at the same, worse, or better level. One can also determine if the cessation of participation is due to injury or external factors. The MAS addresses a variable often not fully clarified in the literature. The goal of return to the same activity at the same level of intensity may not be everyone’s’ goal. This data demonstrates that while a proportion of participants did return to their pre-surgical preferred activity not all achieved the same level of participation. This set of questions allows for participants to document return to higher level activities that they may have given up as well as cease participation for reasons unrelated to their injury. Not achieving this standard may not be indicative of a poor treatment result but rather a realistic outcome based on the injury or reflective of external factors especially over the long term or depending on the activity. Activities such as football or gymnastics may not have many opportunities for participants after collegiate graduation and thus changing activities is a choice not a failure of treatment.

As a research tool this survey was modified to use activities instead of sports to reflect the broader spectrum of patients who sustain musculoskeletal injuries that require treatment that
may limit participation. In the more global sense this scale could be applied to any group of
injured patients including other system injuries.

Difficulties encountered with the survey included that patients did not answer every question.
Some did not consider their patellofemoral disease an injury, listing it as a reason under other.
While the ICC’s were not high the actual agreement between each participant was excellent
with most reporting minimal change in days or time spent on an activity over a week. For this
presentation those who listed their injury as other were recoded to injury for causation of
limitations. Some indicated they were no longer participating but still answered the reason for
limitation. For clinical research use this scale benefits from being administered within a
computer system where the original activities can be carried forward (piped in) for consistency’s
sake and the skip pattern can be forced.

**Conclusion**

The Minnesota Activity Scale provides a standardized set of questions for determining changes
in participation level and frequency and whether the changes are related to the injury or
external life factors which may provide patients with a more realistic assessment of future
participation and may provide clinicians with a more reliable knowledge bank of recovery of
participation.

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Declaration of Competing Interest

The authors declared no potential conflicts of interests relevant to this article.
References


Figure Legend

Figure 1: PubMed results by year timeline graph.

Figure 2: Minnesota Activity Scale

No color should be used for any figures in print.
Number of Publications with Return to Play

Year of Publications

Number of Publications
Minnesota Activity Scale

The following questions are about the most important recreational activity (sports, hobbies, etc.) you did prior to your injury.

Q1 What is this activity?

Prior to Your Injury

Q2

a. On average how many days a week would you participate in this activity? □ Days per Week

b. On average, how long would you normally participate in this activity? □ □ □ Hours per session

Current Time

Q3 Do you still engage in this sport activity?

1 □ Yes
2 □ No

Q4 How much is your ability to participate in this activity limited by your injury?

0 1 2 3 4 5 6 7 8 9 10

None Completely

→If none (0) you are finished, if not please answer the next question

Q5 What is the primary reason you are limited in this sport or activity?

1 □ Your Injury
2 □ Other Reason - please describe below

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Declaration of interests

☒ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☐ The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: