



Short communication

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Prognostic value of self-reported work ability and performance-based lifting tests for sustainable return to work among construction workers

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Objective This study aims to evaluate whether performance-based tests have additional prognostic value over self-reported work ability for sustainable return to work (RTW) in physically demanding work.

Methods A one-year prospective cohort study was performed among 72 construction workers on sick leave for six weeks due to musculoskeletal disorders. The Work Ability Index (WAI) question regarding “current work ability” was used. Three dynamic lifting tests were used from a Functional Capacity Evaluation (FCE). Sustainable RTW was the number of days on sick leave until the first day of returning fully to work for a period of ≥ 4 weeks. Regression models were built to calculate the prognostic values.

Results Self-reported work ability alone predicted sustainable RTW ($R=0.31$, $R^2=0.09$, $P=0.009$). In combination with one lifting test, the explained variance (R^2) increased to 0.16 ($P=0.001$).

Conclusion Combining self-reported work ability and a lifting test nearly doubled the explained variance for sustainable RTW in physically demanding work, although the strength remained modest.

Key terms disability assessment; FCE; functional capacity evaluation; high demand job; RTW; WAI; work ability index.

The assessment of whether a patient is able to participate in work is traditionally based on legislation, administrative rules, and physicians' expertise in Europe (1). For most physicians, these assessments consist of a comparison between the work ability of a patient and the required demands of a job (2, 3). When the work ability matches the required job demands, a patient is considered to be able to participate in work. Especially in so-called high-demand jobs that are characterized by limited opportunities to reduce these demands based on the present ergonomics knowledge (4), the assessment of a patient's work ability needs careful consideration to support return to work (RTW) (5, 6).

For the assessment of work ability among patients with musculoskeletal disorders (MSD), reliable self-reports and performance-based tests are available (7). However, we know that the work ability among patients with MSD assessed by a patient's self-report and performance-based tests show moderate-to-large differences

(8). Self-reports and performance-based tests are seldom used in these assessments. To improve the quality of these assessments, physicians want to know what the prognostic value of these instruments is for RTW (9).

Regarding self-reports, one of the most advocated instruments to assess work ability is the Work Ability Index (WAI) (10). Moreover, the single-item first WAI question on current work ability can be used as an indicator for assessing the status and progress of work ability among women on long-term sick leave (11). Especially in high physically demanding jobs, performance-based tests might have a greater prognostic value than self-reports alone among patients with MSD. Alavinia et al (12) reported that the highest population-attributable fractions for sick leave of >12 weeks in construction work were: age >50 years (18%), manual materials handling (20%), and work ability (up to 28%). In construction work, manual lifting of loads is one of the high physical demands and therefore an important physical work ability

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to take into account. Goutteborge et al (13) showed that dynamic lifting tests of a Functional Capacity Evaluation (FCE) [ie, the ErgoKit (EK)] were related to RTW in this population. In addition, a review on the predictive validity of performance-based tests showed that outcomes of lifting tests appeared to have prognostic value for work participation in 13 of the 14 studies among MSD patients (14). The aim of the present paper was to examine whether performance-based lifting tests from an FCE have additional prognostic value over self-reported work ability for sustainable RTW among Dutch construction workers on sick leave due to MSD.

Methods

Design and participants

A secondary analysis was performed on data from a one-year prospective cohort study among male construction workers (13). The participants were recruited by telephone using a nationwide list of construction workers on sick leave for 3–4 weeks. They had to meet the following inclusion criteria: (i) performing heavy physical work in the construction industry; (ii) aged 18–55 years; and (iii) on sick leave for the last 6 weeks [standard deviation (SD) 1 week] due to MSD. The study was performed in accordance with the Helsinki Declaration (1964) and received approval from the Medical Ethics Committee of the Academic Medical Center in Amsterdam, the Netherlands.

Self-report work ability and performance-based lifting tests

At about six weeks of sick leave (baseline: T0), the self-reported work ability and performance-based lifting were assessed. The single-item WAI question concerning the “current work ability compared with the lifetime best”, with a score of 0 (“completely unable to work”) to 10 (“work ability at its lifetime best”) was used (11, 15, 16). The construction worker self-reported this question.

Three reliable dynamic EK FCE lifting tests were selected for this study: (i) carrying/lifting strength test, (ii) lower lifting strength test, and (iii) upper lifting strength test (17). The assessment of the three EK FCE lifting tests by certified raters took place in a controlled setting according to the EK procedures and lasted approximately ten minutes for each construction worker. The outcome of the lifting tests is in kg.

Sustainable return-to-work

Time to sustainable RTW was defined as the duration of work absenteeism due to MSD in calendar days from 6 weeks after the first day on sick leave until the first day

of returning fully to the worker’s own work or other work for a period of ≥ 4 weeks throughout the 1-year follow-up period (T1) (13). These data were obtained from the medical files of the occupational health service and considered accurate. In case no sustainable RTW was achieved in the 1-year follow up, this participant was assigned the maximum number of days (365 days).

Statistical analysis

First, a simultaneous regression model was built using age, self-reported work ability, and the outcomes of the three lifting tests to explain sustainable RTW. Next, two hierarchical regressions models were built to evaluate whether performance-based tests have greater prognostic value than only self-reported work ability. The variables age and self-reported work ability were selected as input for the first hierarchical regression model for sustainable RTW. The variables age, self-reported work ability, and the outcomes of the three lifting tests were selected as input for the second hierarchical regression model for sustainable RTW. Hierarchical linear regression analyses with forward variable selection (probability-of-F-to-enter ≤ 0.05 , probability-of-F-to-remove ≥ 0.10) were performed to calculate the prognostic value of both models for sustainable RTW. All regression models were built using the statistical software SPSS 16.0 for Windows (IBM Corporation, Armonk, NY, USA).

Results

Of the more than 275 contacted construction workers, 72 fulfilled the inclusion criteria and were interested in participating. The median number of days of inclusion was 44. Mean of age, body height, and body weight at 6 weeks of sick leave were 41 (SD 10) years, 1.82 (SD 0.08) m and 87 (SD 14) kg, respectively. Of the participants, 30% had a low-back disorder, 17% had an MSD of the upper extremity, 28% had an MSD of the lower extremity, and 25% a diagnosis that could not be classified into one of these three body regions (“other joint disorder”). Three participants did not perform the lifting tests (drop out <5%) (N=69). Of the participants, a total of 55 achieved sustainable RTW within 6 months and 63 returned to work within 1 year. Nine participants were still on sick leave after the 1-year follow-up period. The descriptions of the self-reported work ability, the outcomes of the three EK FCE lifting tests and the number of days until sustainable RTW are presented in table 1. The Pearson correlation coefficients between self-reported work ability and the carrying/lifting, and lower and upper lifting strength tests were -0.13, 0.20, and -0.40, respectively.

The assumptions for regression analysis were verified.

Table 1. Self-reported work ability and the outcome of the 3 ErgoKit Functional Capacity Evaluation (FCE) lifting tests (kg) of 69 participants at 6 weeks of sick leave and the number of days until sustainable return to work (RTW) from 6 weeks after the first day on sick leave [SD=standard deviation].

At 6 weeks sick leave	Mean	SD	Min	Max
Self-reported work ability (0–10)	5	3	0	10
Upper lifting strength test (kg)	23	9	5	50
Lower lifting strength test (kg)	33	13	0	75
Carrying lifting strength test (kg)	36	13	10	75
Days until sustainable RTW ^a	150	104	42	365

^a From 6 weeks after the first day on sick leave, median=115 days.

Three significant models for sustainable RTW were built (table 2). The explained variance of the simultaneous regression model ($R=0.46$, $F=3.3$, $df=5$, $P=0.010$) was 15% (adjusted R^2) and only the self-reported work ability was significant ($P=0.007$). The first hierarchical model used self-reported work ability only ($R=0.31$, $F=7.3$, $df=1$, $P=0.009$). The second hierarchical model used self-reported work ability and the outcome of the lower lifting strength test ($R=0.43$, $F=7.4$, $df=2$, $P=0.001$). Age was not a significant predictor in either model 1 ($P=0.23$) or 2 ($P=0.13$). The carrying lifting strength test and the upper lifting strength test had no significant effect in the second model. Combining the self-reported work ability and the outcome of the lower lifting strength test increased the explained variance from 9% to 16% for sustainable RTW.

Discussion

This study shows that combining a self-report on current work ability and one performance-based lifting test improved the prognostic value for sustainable RTW from 9% to 16% in high physically demanding work. Overall, the prognostic strength was modest. This study demonstrates that the self-reported work ability is not only predictive for women on sick leave for >60 days but also among male construction workers on sick leave for >6 weeks due to MSD (11). The lower lifting strength test appeared to be the most predictive of the three dynamic EK FCE lifting tests. This is in line with the review of Kuijer et al (14) who found that especially a lifting test from floor-to-waist level among patients with MSD appeared predictive for work participation. One explanation is that lifting reflects a large number of physically strenuous activities such as gripping, holding, bending, and of course lifting and lowering. Another explanation is that most construction workers in the present study reported sick due to a low-back disorder (30%). These FCE lifting tests are strongly related to the maximum biomechanical lumbosacral extension moment of an individual (18).

Table 2. Results of the simultaneous regression analysis including all variables (Model 0) for sustainable return to work (RTW) and the hierarchical multiple regression analyses for sustainable RTW based on Model 1 with the included variable self-reported work ability and Model 2 with the included variables self-reported work ability and the outcome of the lower lifting strength test (N=69). [SE=standard error; 95% CI=95% confidence interval.]

Variable	B	SE	95% CI	P-value	R	R^2_{adj}
Model 0						
Intercept	217.5	62.3	92.9–342.1	0.001	0.46	0.15
Age	1.7	1.2	-0.7–4.1	0.168		
Self-reported work ability	-11.7	4.2	-20.2–-3.3	0.007		
Carrying/lifting strength test	0.3	1.7	-3.1–3.7	0.864		
Lower lifting strength test	-2.7	1.6	-5.8–0.5	0.092		
Upper lifting strength test	-0.03	1.8	-3.6–3.5	0.987		
Model 1						
Intercept	207.1	24.4	158.5–255.7	0.000	0.31	0.09
Self-reported work ability	-11.8	4.4	-20.5–-3.1	0.009		
Model 2						
Intercept	283.4	37.3	208.9–358.0	0.000	0.43	0.16
Self-reported work ability	-11.6	4.2	-19.9–-3.2	0.007		
Lower lifting strength test	-2.3	0.9	-4.1–-0.6	0.011		

An explained variance of 16% for sustainable RTW is only modest. However, **one might argue that two simple tests**, lasting about 5–10 minutes, already explained 16% of a complex multidimensional construct like RTW (19). Taking into account other predictive variables for RTW might increase this percentage. These variables should have little coherence with a self-report on current work ability and a performance-based lifting and thereby measure another aspect of the construct RTW. Possible examples for patients with MSD in high demand jobs are the self-reported likelihood of the work-relatedness of the MSD, rating of the expected effectiveness of work-related interventions, presence of support from supervisors, and presence of modifiable job duties (20, 21). More research should focus on how self-reports on work ability, job-specific performance-based tests, and other relevant variables can improve RTW decisions and disability claim assessments for patients with MSD performing physically demanding work.

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