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The work ability index and single-item question: associations with sick leave, symptoms, and health – a prospective study of women on long-term sick leave

by Linda Ahlstrom, MSc,¹ Anna Grimby-Ekman, PhLic,¹ Mats Hagberg, MD,¹ Lotta Dellve, PhD¹

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Objectives This study investigated the association between the work ability index (WAI) and the single-item question on work ability among women working in human service organizations (HSO) currently on long-term sick leave. It also examined the association between the WAI and the single-item question in relation to sick leave, symptoms, and health. Predictive values of the WAI, the changed WAI, the single-item question, and the changed single-item question were investigated for degree of sick leave, symptoms, and health.

Methods This cohort study comprised 324 HSO female workers on long-term (>60 days) sick leave, with follow-ups at 6 and 12 months. Participants responded to questionnaires. Data on work ability, sick leave, health, and symptoms were analyzed with regard to associations and predictability. Spearman correlation and mixed-model analysis were performed for repeated measurements over time.

Results The study showed a very strong association between the WAI and the single-item question among all participants. Both the WAI and the single-item question showed similar patterns of associations with sick leave, health, and symptoms. The predictive value for the degree of sick leave and health-related quality of life (HRQoL) was strong for both the WAI and the single-item question, and slightly less strong for vitality, neck pain, both self-rated general and mental health, and behavioral and current stress.

Conclusion This study suggests that the single-item question on work ability could be used as a simple indicator for assessing the status and progress of work ability among women on long-term sick leave.

Key terms cohort study; female; longitudinal data; return to work; sickness absence.

Long-term sick leave has become a main public health problem (1). There is a high prevalence of employees on long-term sick leave in Sweden (2), with the highest prevalence seen among women working in human service organizations (HSO) (3–6). HSO employees encompass, for example, workers in schools, preschools, home care service, and nursing or disabled-care homes who are in direct contact with clients or responsible for cleaning, cooking, or administration. Compared with social insurance systems in other countries, the possible length of sick leave has, until recently, been almost unlimited in Sweden. Partial sick leave is promoted in Sweden and is assumed to have positive effects on the return to full-time work (7). There is now increased focus on return to work among individuals on long-term sick leave.

The main challenge among persons on long-term sick leave is in assessing work ability and how it influences

the return-to-work process. The concept of work ability is broad, comprising the physical, psychological, and social capability (8–10) of a worker to perform and interact within their work, and the individual's specific work demands, health conditions, and mental resources (11, 12). In occupational and primary healthcare, work ability is a multidimensional condition and complex to assess among employees on long-term sick leave.

The work ability index (WAI) is an instrument designed for occupational health services and is used today in clinical practice as well as for research purposes worldwide to assess work ability (8, 13). One of the main criticisms raised against the WAI is that it contains many disparate questions more or less indirectly measuring work ability (eg, relating to diagnosis of chronic conditions and sick leave). This may have implications when the WAI is used among employees already on long-term

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sick leave; also, it may give too much weight to diagnoses not necessarily related to work ability. Due to the theoretical complexity and practical issues, the single-item question on work ability has often replaced the WAI in clinical work and research (9, 14). Using single-item questions can be beneficial in terms of simplicity, cost, and ease of interpretation (15). However, the agreement between the single-item question on work ability and the WAI has not been fully investigated. Radkiewicz & Widerszal-Bazyl (16) and Torgén (17), in their cross-sectional studies of nurses in Europe and among the Swedish population, respectively, showed relatively strong agreement between the WAI and the single-item question on work ability. De Zwart et al (18), in their study of test–retest reliability among elderly construction workers, support the usefulness of the WAI in occupational healthcare and research. However, the authors argue that there is a need for more documented reliability testing of the WAI instrument.

Validity aspects of the WAI with regard to gender, type of diagnosis (8, 19), degree of sick leave, symptoms, and health may differ. It has been found that women often achieve lower WAI scores than men (17, 20). Occupational healthcare providers require effective usable, valid, and reliable instruments to assess work ability status and progress, as well as factors predicting return to work (19, 21, 22).

The aims of this study were to investigate the association between the WAI and the single-item question on work ability as well as the association between the WAI and the single-item question in relation to sick leave, symptoms, and health among HSO workers on long-term sick leave.

The following research questions were investigated: (i) Is there an association between the WAI and the single-item question? Is there an association between changes in the WAI and changes in the single-item question? (ii) Is there an association between the WAI and the single-item question with regard to sick leave, symptoms, and health variables in repeated measurements? and (iii) In longitudinal analysis, what are the predictive values of the WAI and the single-item question on work ability for the degree of sick leave, symptoms, and health?

Methods

Study design and setting

Approved by the Ethics Committee of Gothenburg University, this cohort study reports baseline and prospective results, with follow-up at 6 and 12 months.

At the time of this study, the Swedish social security system paid sick leave of >2 weeks, including periods

of almost unlimited length (7). A physician decided on the degree of sick leave, which usually changed in increments of 25%. If sick leave was required, the primary recommendation was usually partial sick leave (25–100% of full-time work).

Sampling process and study sample

Starting in August 2005, we studied a cohort of 35–65-year-old female HSO workers on long-term sick leave and employed by one of Sweden's three metropolitan cities. Half of the councils within the region, representing various socioeconomic statuses, were invited to take part in the study during the first year. Employees on long-term sick leave working for these councils were invited to participate in the study if they met the inclusion criteria of being (i) a woman and (ii) on current long-term (>60 days') sick leave of $\geq 50\%$ work time. All employees meeting these criteria ($N=633$) were sent information about the study. After having answered the baseline questionnaire, participants were mailed a second and third questionnaire at 6 and 12 months, respectively. For all questionnaires, one reminder letter was sent. About 51% ($N=324$) participated in the first wave, while 233 ($233/324=72\%$) participated in the second wave, and 194 ($194/324=60\%$) participated in the third wave. The response from the participants who decided to participate in the second and/or third wave was 76% ($N=246$) of those who participated in the first wave. Altogether, there were 751 questionnaires to analyze. Throughout the study, the questionnaires consisted of the same questions with regard to dependent and independent variables.

Work ability

The WAI instrument consists of seven dimensions, namely: (i) current work ability compared with the lifetime best; (ii) work ability in relation to the demands of the job; (iii) number of current diseases diagnosed by a physician; (iv) estimated work impairment due to disease; (v) sick leave during the past year (12 months); (vi) own prognosis of work ability two years from now; and (vii) mental resources (worker's life in general, both at work and during leisure time) (8). These dimensions are derived as the sum of ten items. Possible scores range from 7–49 and are classified as follows: 7–27 (poor), 28–36 (moderate), 37–43 (good), and 44–49 (excellent) (13, 23, 24).

In this study, the single-item question concerned the WAI item "current work ability compared with the lifetime best", with a possible score of 0 ("completely unable to work") to 10 ("work ability at its best") (8, 14).

The changed WAI/changed single-item question was the difference between one point in time and the previous point in time (ie, the difference between the 6-month score and baseline or the difference between

the 12-month and the 6-month value). Hence, changes represent a 6-month time period.

Sick leave

The degree of sick leave ranged from 0–100%. The categorization for this variable was done based on the response to one item in the questionnaire, namely, “What is your current work status?” [The possible responses were: (i) on full-time/part-time sick leave; (ii) on full-time/part-time temporary disability pension; and (iii) working full-time/part-time. The response specified the percentage of each status and the starting date of the current status]. In two-thirds of the cases, the self-reported data was compared with employers’ register-based data or medical records, to make the data as accurate as possible (25).

Symptoms and health

Pain in the neck was measured using items from an instrument developed by Von Korff et al (26), a numeric pain scale of 0–10 ranging from 0 (“no pain”) to 10 (“worst pain”), and measuring “present pain”, “worst imaginable pain last month”, and “average pain last month”. The calculation is the average of these three measures multiplied by 10 and expressed as a 0–100 score (27).

Current stress was measured with a single-item question (including a description of what is meant by “stress”) taken from the Nordic Questionnaire for Psychological and Social Factors at Work (QPS Nordic), which has been validated in previous studies (28). Current stress was measured on a scale ranging from 0 (“none at all”) to 4 (“very much”). A score of 3–4, indicating the highest stress levels, was used to indicate current stress in this study.

Self-rated general health (5 items), self-rated mental health (5 items), behavioral stress (5 items), and vitality (4 items) were measured with the Copenhagen Psychosocial Questionnaire (29). Each response scale was recalculated to 0–100 points. For health-related quality of life (HRQoL), we used the EuroQol thermometer/EQ-VAS, a global question which is part of the EuroQol-EQ-5D and uses a visual analog scale of 0–100 of the general HRQoL status (30–32).

Analysis

Descriptive statistics of the WAI, the single-item question on work ability, and variables for the factors studied in the cohort are presented in percent, means, and standard deviation (SD). Spearman correlation was used to analyze the association between the two variables – the WAI and the single item variable – as well as for the association between WAI and single-item results regarding sick

leave, symptoms, and health. According to Altman (33), the correlation was evaluated as very strong ($r=0.81$ – 1.00), strong ($r=0.61$ – 0.80), moderate ($r=0.41$ – 0.60), fair ($r=0.21$ – 0.40), or weak ($r\leq 0.20$). To describe the baseline relation between WAI and single-item outcomes, a scatter plot of baseline variables was completed. A scatter plot was also completed for the relation between changed WAI and the changed single-item outcomes. We performed repeated measurements over time and multivariate models on the associations of sick leave, symptoms, and health with WAI and single-item outcomes.

Mixed models were used for a longitudinal analysis of the repeated measurements of prospective degree of sick leave, HRQoL, vitality, and neck pain, as well as self-rated general and mental health, behavioral and current stress. These analyses were performed with four different models where the explanatory variables were the WAI and changed WAI, and the single-item question and changed single-item question outcomes. In models A and B, the values for the changed WAI and changed single-item question were based on the difference between the current outcome and that measured 6 months previously. In models C and D, the values for the changed WAI and changed single-item question were based on the difference between the current outcome and that measured 12 months previously. A stepwise-forward-selection approach was used with a P-value of ≤ 0.10 for the initial selection for variable inclusion in the final model. We checked for multicollinearity. If the correlation was $r>0.7$, we excluded one of the variables. Multicollinearity was found between behavioral stress and self-rated mental health; consequently, the latter was excluded. Results from the regression analysis are presented with parameter estimates, 95% confidence intervals (95% CI), and between-person/within-person variance. In the analyses mentioned, WAI and single-item results were used as if they were continuous and not ordinal variables. Therefore, these results ought to be interpreted with caution and without emphasis on the size of parameter estimates, but rather as indications of associations. All analyses were performed using JMP®, version 7 (SAS Institute Inc, Cary, NC, USA), except for the mixed models Proc Mix analysis, which was performed using SAS, version 9.1 (SAS Institute Cary, NC, USA).

Results

Characteristics of the study population

About one-third (28%) of the participants were 35–44 years of age, 43% were 45–54 years old, and 29% were aged between 55–65 years. At baseline, most (72%) of the participants were on full-time sick leave. Table 1 shows

baseline, 6-month, and 12-month follow-up characteristics of the study population. At the start of the study, the participants had been on long-term sick leave for between just over 60 days and 14 years, with a mean of 458 days.

Altogether 67% of the participants scored within the WAI category “poor”, while 26% had a “moderate” and 7% a “good”-to-“excellent” WAI score. Among individuals on 25–100% sick leave, most scored “poor” (71–78%) or “moderate” (17–29%) work ability. A total of 5% of the participants on 85–100% sick leave scored within the WAI category “good”. For the single-item question, the scores were: 0 (20%), 1 (6%), 2 (9%), 3–8 (61%), and 9–10 (4%). Independent of the degree of sick leave, most participants had a single-item question work ability score of 3–8.

Association with work ability

The Spearman correlation between WAI and single-item outcomes on work ability was very strong among all participants at baseline ($r=0.87$). Likewise, the Spearman correlation was strong between the changed WAI and changed single-item question on work ability ($r=0.71$).

The scatter plot of WAI and single-item data reveals a linear relationship between the two variables (figure 1), even though each single item corresponds to a wide range of WAI scores. A single-item score of ≤ 2 corresponds to the WAI category of “poor”, while single-item scores of 3–6 correspond to the WAI categories of “poor” and “moderate”. Of participants with a score of 7 or 8 for the single-item question, 88% were within a “moderate” or “good” WAI category. A single-item score of 9 or 10 could be categorized as “good” or “excellent”

WAI. Furthermore, the scatter plot of changed WAI and changed single-item outcomes (figure 2) shows a linear relationship.

Both the WAI and single-item outcomes were “moderate” for the degree of sick leave ($r=0.43$ and $r=0.47$) and health ($r=0.45$ – 0.66). The correlation varied for different symptoms ($r=0.15$ – 0.45). The WAI association with regard to self-reported symptoms and health was slightly stronger than the single-item association, with the exception of HRQoL.

In the analysis of repeated measurements over time, more explanatory variables were statistically significant for the WAI than the single-item question (table 2). The parameter estimates were slightly higher for the WAI than the single-item results. In case of a change in the explanatory variables, the effect would not be large for either WAI or single-item results. The variables included in the model explain 72% [(59.4–16.4)/59.4] and 93% [(16.4–1.1)/16.4] of the between-person variance for the WAI and the single-item questions, respectively.

With the WAI as the dependent variable and the single-item question as the independent variable, the intercept and slope were at 13.6 and 2.7, respectively, which is close to the baseline values (figure 1). Single-item outcomes explain 84% [(59.4–9.6)/59.4] of the between-person variance for the WAI, and 66% [(30.1–10.4)/30.1] of the within-person variance.

Prospective association

The WAI and changed WAI results, as well as single-item and changed single-item results, predicted the future degree of sick leave, HRQoL, vitality, neck pain,

Table 1. Descriptive characteristics of women working in human service organizations currently on long-term sick leave (at baseline, 6 months, and 12 months). Data are given as means and standard deviation (SD).

	Scale ^a	Baseline			6 months			12 months		
		N ^b	Mean	SD	N ^b	Mean	SD	N ^b	Mean	SD
Sick leave										
Degree of sick leave	0–100	308	79	35	227	53	37	177	46	39
Symptom										
Neck pain	0–100	314	36	30	212	34	30	186	36	29
Current stress	0–4	319	2.2	1.3	218	2.0	1.2	191	2.1	1.3
Behavioral stress	0–100	317	36	28	218	31	26	189	29	25
Health										
Self-rated general health	0–100	317	58	23	218	60	24	182	59	24
Self-rated mental health	0–100	319	54	23	219	60	21	189	60	23
Vitality	0–100	319	40	21	219	44	20	189	44	23
Health-related quality of life	0–100	273	49	22	213	57	21	190	58	23
Work ability										
Work ability index (WAI)	7–49	290	24	9	184	27	10	169	28	10
Single item question	0–10	315	4	3	198	5	3	184	5	3

^a Except for the degree of sick leave, which is scored in percent, the scales show possible range in points.

^b Numbers vary due to missing answers in the questionnaires.

Figure 1. Scatter plot of the work ability index (WAI) and single item on work ability at baseline. The figure shows 95% confidence intervals and the WAI categories “excellent”, “good”, “moderate”, and “poor”.

Figure 2. Scatter plot of the values for changed work ability index (WAI) and changed single item on work ability (6 months–baseline). The figure shows 95% confidence intervals.

Table 2. Repeated measurements over time. Multivariate models to show the associations between the degree of sick leave, health-related quality of life, self-rated general health, vitality, behavioral stress, neck pain, and current stress using the work ability index (WAI) and the single-item question on work ability among 324 women working in human service organizations. [95% CI=95% confidence interval; b=parameter estimate; NI=not included]

	WAI measurements (N=541)			Single-item question measurements (N=603)		
	Scale	b	95% CI	Scale	b	95% CI
Intercept		20.73	18.03–23.42		2.35	1.57–3.14
Degree of sick leave	0–100	-0.09	-0.10–0.08	0–100	-0.03	-0.034–0.026
Health-related quality of life	0–100	0.10	0.07–0.12	0–100	0.04	0.03–0.05
Self-rated general health	0–100	0.05	0.03–0.08	NI	NI	NI
Vitality	0–100	0.09	0.06–0.12	0–100	0.03	0.026–0.044
Behavioral stress	0–100	-0.02	-0.04–0.002	NI	NI	NI
Neck pain	0–100	-0.03	-0.05–0.02	NI	NI	NI
Current stress	NI	NI	NI	0–4	0.13	-0.01–0.27
Within-person variance		11.41			2.05	
Between-person variance		16.41			1.11	

self-rated general and mental health, and behavioral and current stress (tables 3 and 4). For models A and B (6 months), WAI variables explained 84% [(255.9–41.6)/255.9] of the between-person variance and 14% [(208.0–178.5)/208.0] of the within-person variance in HRQoL, and 63% [(1,075.4–401.1)/1,075.4] of the between-person variance and 34% [(384.6–254.2)/384.6] of the within-person variance in the degree of sick leave. Single-item variables explained 72% [(277.1–78.1)/277.1] of the between-person variance and 6% [(189.1–177.3)/189.1] of the within-person variance for HRQoL, and 67% [(1,044.1–345.9)/1,044.1] of the between-person variance and 31% [(395.7–273.1)/395.7] of the within-person variance for the degree of sick leave. Overall, WAI and single-item variables explained

5–37% of the between-person variance and 4–31% of the within-person variance for vitality, self-rated general health, current stress, behavioral stress, self-rated mental health, and neck pain. Most often, WAI and changed WAI scores explained more of the between-person variance compared with single-item and changed single-item scores. The same pattern was shown for within-person-variance.

For models C and D (12 months), WAI and single-item scores explained 61% [(1581.5–611.4)/1581.5] and 52% [(1331.9–644.6)/1331.9], respectively, of the between-person variance in the degree of sick leave. Also, WAI variables and single-item variables explained 13–36% of the between-individual variance for vitality, behavioral stress, mental health, neck pain, and current

Table 3. Linear regression with repeated measurements (mixed model) analyzing the predictive value of the degree of sick leave, health-related quality of life, vitality, and neck pain (at 6 months and 12 months) among women working in human service organizations. In models A and C, work ability index (WAI) and changed WAI results are explanatory factors. In model B and model D, single-item and changed single-item results are explanatory factors. [95% CI=95% confidence interval; b=parameter estimate; NI=not included]

	Degree of sick leave			Health-related quality of life			Vitality			Neck pain		
	N	b	95% CI	N	b	95% CI	N	b	95% CI	N	b	95% CI
6-month follow-up												
Model A ^a	285	..	..	288	..	..	293	..	..	283	..	..
Intercept	–	132.6	122.30–142.95	–	15.5	9.88–21.01	–	10.8	4.14–17.50	–	61.8	50.97–72.56
WAI	–	-3.1	-3.45–2.70	–	1.6	1.37–1.77	–	1.2	0.92–1.40	–	-1.0	-1.38–0.60
Changed WAI	–	-2.4	-2.83–2.00	–	1.5	1.20–1.75	–	2.4	1.46–3.26	–	-1.2	-1.62–0.82
WAI × changed WAI	–	NI	NI	–	NI	NI	–	-0.03	-0.04–0.00	–	NI	NI
Between-person variance	–	401.1	..	–	41.6	..	–	141.2	..	–	547.0	..
Within-person variance	–	254.2	..	–	178.5	..	–	141.9	..	–	190.3	..
Model B ^a	327	..	..	329	..	..	336	..	..	326	..	..
Intercept	–	101.5	95.36–107.72	–	32.1	28.25–35.96	–	25.6	21.13–30.11	–	43.6	36.40–50.78
Single item	–	-10.6	-11.75–9.48	–	5.1	4.37–5.79	–	3.7	2.83–4.48	–	-1.9	-3.17–0.66
Changed single item	–	-7.1	-8.20–5.90	–	4.7	3.85–5.51	–	3.4	2.55–4.31	–	-0.2	-2.10–1.65
Single item × changed single item	–	NI	NI	–	NI	NI	–	NI	NI	–	-0.3	-0.64–0.03
Between-person variance	–	345.9	..	–	78.1	..	–	157.4	..	–	636.1	..
Within-person variance	–	273.2	..	–	177.3	..	–	184.7	..	–	186.3	..
12-month follow-up												
Model C ^a	146	..	..	155	..	..	156	..	..	151	..	..
Intercept	–	127.5	114.14–140.93	–	13.8	5.21–22.42	–	14.7	4.90–24.47	–	65.4	50.87–79.88
WAI	–	-2.9	-3.38–2.37	–	1.6	1.25–1.90	–	1.0	0.62–1.35	–	-1.0	-1.58–0.47
Changed WAI	–	-3.0	-3.53–2.55	–	1.2	1.36–1.97	–	1.5	1.14–1.82	–	-1.2	-1.70–0.66
Between-person variance	–	611.4	..	–	260.3	..	–	336.6	..	–	711.7	..
Model D ^a	168	..	..	179	..	..	181	..	..	175	..	..
Intercept	–	94.6	85.93–103.27	–	26.6	21.40–31.74	–	20.7	14.54–26.76	–	51.0	42.21–59.70
Single item	–	-10.1	-11.67–8.52	–	6.0	5.05–6.95	–	4.1	3.01–5.25	–	-3.0	-4.64–1.30
Changed single item	–	-7.5	-9.83–5.12	–	6.7	5.45–7.99	–	6.2	4.72–7.73	–	-2.8	-4.37–1.26
Single item × changed single item	–	-0.6	-1.05–0.14	–	-0.2	-0.47–0.01	–	-0.3	-0.61–0.62	–	NI	NI
Between-person variance	–	644.6	..	–	250.8	..	–	350.8	..	–	772.9	..

^a Numbers vary due to missing answers in the questionnaires.

stress. With regard to the dependent variables, the WAI variables explained the between-individual variance slightly better than the single-item question variables.

Both models A and B explained more of the between-person variance for the dependent variables degree of sick leave, HRQoL, and vitality, compared with models C and D. The reverse applied to the dependent variables of self-rated mental health, and both behavioral and current stress.

Discussion

The results of this study demonstrate that, in occupational and primary healthcare, a single-item question on work ability may be a good alternative to the WAI for assessing the status and progress of work ability among women on long-term sick leave.

The single-item question on work ability had a strong correlation with the WAI among all participants.

The results cohere with data from a general working population, showing that WAI and single-item results for women with lower work ability scores had a rank correlation of 0.7, which was higher than among men and those with higher work ability scores (17).

Several cross-sectional studies have shown a relation with health conditions. For example, the WAI has been found to be related to mental and physical well-being, general health perception, emotional exhaustion, and disability in ten European countries (16). A recent review of factors associated with the WAI showed the multifactorial nature of work ability measured with the WAI. Physical conditions, demands at work, individual characteristics, and lifestyle were most strongly associated with the index (34). The results of our study showed similar patterns of relations to sick leave, symptoms, and health for both the WAI and the single-item question. The degree of sick leave and HRQoL had the strongest relation. Furthermore, in the multivariate models, the explained variance was higher for the WAI than for the single-item question in the stratified models.

Table 4. Linear regression with repeated measurements (mixed model) analyzing the predictive value of self-rated general and mental health and behavioral and current stress. In models A and C, work ability index (WAI) and changed WAI results are explanatory factors. In models B and D, single-item and changed single-item results are explanatory factors, among women working in human service organizations. [95% CI=95% confidence interval; b=parameter estimate; NI=not included]

	Self-rated general health			Self-rated mental health			Behavioral stress			Current stress		
	N	b	95% CI	N	b	95% CI	N	b	95% CI	N	b	95% CI
6-month follow-up												
Model A ^a	289	..	..	293	..	..	292	..	..	291	..	..
Intercept	–	27.5	19.01–36.02	–	30.6	22.94–38.17	–	62.4	53.39–71.41	–	3.2	2.78–3.69
WAI	–	1.2	0.07–1.48	–	1.0	0.75–1.30	–	-1.1	-1.45–0.80	–	-0.04	-0.06–0.03
Changed WAI	–	1.3	0.93–1.60	–	1.3	0.97–1.55	–	-1.3	-1.65–0.97	–	-0.06	-0.08–0.04
Between-person variance	–	302.4	..	–	259.5	..	–	366.3	..	–	0.78	..
Within-person variance	–	152.9	..	–	113.4	..	–	154.5	..	–	0.53	..
Model B ^a	330	..	..	336	..	..	335	..	..	334	..	..
Intercept	–	45.0	39.45–50.46	–	42.6	37.83–47.43	–	48.7	43.06–54.40	–	2.7	2.38–2.96
Single item	–	3.0	1.98–3.97	–	3.3	2.45–4.20	–	-3.6	-4.61–2.56	–	-0.1	-0.18–0.07
Changed single item	–	2.8	1.84–3.80	–	3.3	2.45–4.12	–	-3.1	-4.12–2.17	–	-0.1	-0.19–0.09
Between-person variance	–	349.5	..	–	258.2	..	–	361.3	..	–	0.86	..
Within-person variance	–	151.6	..	–	127.2	..	–	172.3	..	–	0.54	..
12-month follow-up												
Model C ^a	152	..	..	156	..	..	156	..	..	155	..	..
Intercept	–	27.8	16.84–38.75	–	35.2	24.85–46.18	–	56.7	45.11–68.32	–	3.4	2.70–4.00
WAI	–	1.2	0.80–1.62	–	0.8	0.45–1.24	–	-1.0	-1.40–0.53	–	-0.04	-0.07–0.02
Changed WAI	–	0.8	0.44–1.22	–	0.3	-0.84–1.48	–	-1.3	-1.73–0.92	–	-0.06	-0.08–0.04
WAI × changed WAI	–	NI	NI	–	0.04	-0.01–0.08	–	NI	NI	–	NI	NI
Between-person variance	–	401.5	..	–	382.3	..	–	473.5	..	–	1.46	..
Model D ^a	174	..	..	181	..	..	181	..	..	180	..	..
Intercept	–	40.5	33.83–47.14	–	40.4	34.43–46.41	–	48.0	41.29–54.71	–	2.8	2.44–3.12
Single item	–	3.8	2.49–5.04	–	3.7	2.54–4.83	–	-3.7	-5.01–2.45	–	-0.1	-0.22–0.07
Changed single item	–	3.3	2.13–4.55	–	4.4	3.32–5.45	–	-4.4	-5.56–3.17	–	-0.2	-0.25–0.11
Between-person variance	–	434.8	..	–	372.7	..	–	467.7	..	–	1.48	..

^a Numbers vary due to missing answers in the questionnaires.

Despite numerous studies of the WAI, few studies have investigated its predictive value for future sick leave (35). In our study, both the WAI and the single-item question strongly predicted the future degree of sick leave among women on current long-term sick leave. In two previous studies, the WAI was shown to predict future sick leave among those with lower work ability scores (35, 36). In one of these, the WAI predicted future long-term sick leave (>9 days) among young workers scoring low work ability (36). In the other study, the index predicted long-term sick leave (>12 weeks) among male construction workers with a less-than-excellent work ability initially (35). Prediction of sick leave, especially long-term sick leave, is multidimensional. This study agrees with previous studies reporting that the WAI is better for predicting future scores among those with low scores, arguing for the usefulness of the single-item question. However, as Ilmarinen recently pointed out, there is a need for more longitudinal studies on work ability (8, 13).

In our study, the WAI and changed WAI as well as the single-item and changed single-item question predicted the future degree of sick leave and HRQoL in particular, but also vitality, self-rated general and

mental health, stress, and pain. There is research stating that it is difficult to change the pattern of work ability. It either declines or improves (8), and this can make it difficult for workers already scoring low to change their work ability pattern. In agreement with this research, in our study we can see the linearity effect of changed work ability. There were small steps of change of WAI results, especially between waves two and three of the study, which agrees with results reported by Feldt et al (37). In their study of Finnish managers, five patterns of development trajectories were identified and investigated. Younger age, high job control, higher position (ie, managerial position), supportive organizational work climate, and less physical work were predictors for improved work ability, while aging and low position at work were a risk for declined WAI (37).

Practical implementation

The results suggest that using a single-item question on work ability in occupational and primary care may be a good alternative to using the WAI. The benefits of using single-item questions in practice are argued by authors such as Bowling, especially in situations where the patient

is vulnerable, time is short, and cost effectiveness and easy interpretation by the professional is an issue (15). Research within cancer care suggests that occupational health services use an instrument to measure work ability. To enable the individual to return to work, a standardized tool is needed to assess work ability in practice (38). Additionally, there is a need for more longitudinal research (39). In an in-depth review, Munir et al (38) mention the use of researcher-formulated, own work ability questions, or parts of the WAI not stating concerns of validity or reliability, in order to be able to draw conclusions and make comparisons with other research. Today, work ability research already includes work with single-item questions, although this is not explicitly mentioned, for example within cancer research (40, 41). Both the single-item question and the WAI may help the occupational healthcare professional in their daily work with patients on long-term sick leave, in assessing present status and the patients' possible progress in the return-to-work process, keeping in mind that prediction should be used with caution and merely as an indicator. It is, however, important to consider whether occupational healthcare practitioners may lose essential information when using the single-item question.

The predictability of work ability could be used as a guide in tailoring interventions and rehab activities. However, it is important to consider individuals' limitations in functions in relation to health and the possibility to cope with work as a unit (42), as well as lifestyle and the role of the close community (8) in promoting individuals' return to work.

Methodological considerations

The study raises several methodological issues – some of them already mentioned others to be discussed here. Firstly, the slightly higher variance in WAI results could be explained by the fact that items of sick leave and health are included in the WAI. The variance could also be explained by psychometric strengths due to the number of items. One limitation is the fact that the WAI includes the single-item question. However, we believe that the alternative, to exclude the single-item question from the WAI, would be less accurate as it would not reflect the complete measurement.

Secondly, the data in this study are mostly based on questionnaire results. However, for about two-thirds of the study group, the degree and status of sick leave were controlled by register-based data and medical records, with good agreement. Furthermore, a recent study comparing self-reported data on the degree of sick leave and register information concluded that self-reported data are valuable in epidemiological studies (43).

The findings can be generalized to women on long-term sick leave working within HSO, who make up the

largest group of employees in Sweden and have shown the highest prevalence of long-term sick leave.

Concluding remarks

This study suggests that the single-item question on work ability could be used as a simple indicator for assessing the status and progress of work ability among women on long-term sick leave.

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