Predictors of Long-Term Return to Work and Symptom Remission in Sick-Listed Patients With Major Depression

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ABSTRACT

Objective: Although major depressive disorder (MDD) has substantial negative effects on work outcomes, little is known regarding how to promote a return to work (RTW) after MDD-related sickness absence. The present study aimed to examine predictors across multiple domains for long-term RTW in patients who are sick-listed because of their MDD, and to compare these with predictors for long-term symptom remission.

Method: Participants (n = 117) were diagnosed with MDD according to *DSM-IV* criteria, absent from work for at least 25% of their contract hours, and referred by occupational physicians to outpatient treatment. Long-term full RTW (working the full number of contract hours for at least 4 weeks) and long-term symptom remission (Hamilton Depression Rating Scale score ≤ 7) were examined during the 18-month follow-up. Potential predictors (diagnostic, sociodemographic, personality, and work-related) were assessed at baseline. Data were collected from December 2007 to March 2011.

Results: Stepwise logistic regression analyses with backward elimination ($P \leq .05$) resulted in a final prediction model including depression severity (odds ratio [OR] = 0.92; 95% CI, 0.87–0.97; $P = .003$), comorbid anxiety (OR = 0.21; 95% CI, 0.05–0.84; $P = .028$), work motivation (OR = 1.87; 95% CI, 1.18–2.96; $P = .008$), and conscientiousness (OR = 1.10; 95% CI, 1.02–1.18; $P = .012$) as predictors of long-term RTW. Long-term symptom remission was only predicted by depression severity (OR = 0.93; 95% CI, 0.89–0.98; $P = .005$).

Conclusions: Whereas long-term symptom remission is only predicted by diagnostic factors, long-term RTW is also predicted by personal and work-related factors. These findings provide suggestions for the development of new interventions to improve both symptom remission and long-term RTW in sick-listed patients with MDD.

Trial Registration: Dutch Trial Register identifier: NTR2057

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Major depressive disorder (MDD) has major negative effects on work outcomes; MDD is associated with a 28 times higher risk of sickness absence[1] and substantial reductions in productivity on the work floor.[2,3] With its high prevalence among the working population,[4] long duration of sickness absence,[5] and high rate of recurrence,[6] MDD incurs major costs not only for the individual, but also for their employers and society.[7]

Despite these costs, our knowledge regarding how to promote a return to work (RTW) after MDD-related sickness absence is limited.[8] Instead, most studies have focused on identifying predictors for symptom remission. These predictors are mainly in the diagnostic domain, such as age at onset, depression severity, duration of depression, and comorbidity.[9–11] Although several studies have found an association between such diagnostic factors and a variety of negative work outcomes,[12–15] previous studies suggest that diagnostic factors alone are not sufficient to predict who will return to work.[16] In fact, a recent study[17] found that diagnostic factors only explained 10% of the variation in work absence, suggesting that other, nondiagnostic characteristics play a role in predicting RTW in sick-listed patients with MDD.

These findings are corroborated by studies across a number of both physical and mental health conditions, suggesting that RTW is a multifactorial outcome, predicted by a combination of diagnostic, sociodemographic (eg, age), personality (eg, coping, self-efficacy), and work-related (eg, job demands, social support) factors.[18–26] However, studies that examined the predictive value of personal and/or work-related factors in MDD patients are scarce.[16] These studies are cross-sectional,[27] focus on predictors for reduced at-work productivity,[28] or are predictors for the receipt of a disability pension.[29] To our knowledge, no study has examined predictors across multiple domains for RTW after MDD-related sickness absence.

Considering that MDD is associated with longer sick leave duration than other common mental disorders,[26] and is currently one of the main causes of disability pensions,[30] it is important to gain more knowledge regarding long-term RTW outcomes. Therefore, in the present study, we aimed to identify what variables, across different domains (sociodemographic, diagnostic, personal, and work-related), predicted long-term RTW in sick-listed patients with MDD. Second, we aimed to compare these variables with predictors for long-term symptom remission, in order to examine the similarities and/or differences between predictors. More knowledge regarding these predictors, and in particular those that are modifiable (eg, coping, support from the work environment), may help to develop new intervention strategies to improve long-term outcomes in sick-listed patients with MDD.[31]

METHOD

Participants and Procedure

Participants (n = 117) were sick-listed because of MDD and took part in a randomized controlled trial (RCT) to examine the effectiveness of adjuvant occupational therapy (treatment as usual [TAU] + occupational therapy), when compared to TAU only. Treatment as usual consisted of treatment by supervised psychiatric residents in an outpatient university clinic according

to a treatment protocol consistent with American Psychiatric Association guidelines.[32] Occupational therapy consisted of 18 sessions (9 individual sessions, 8 group sessions, and a meeting with the employer) over a 22 week-period.

Participants were eligible for the study if they were aged 18–65 years; diagnosed with MDD according to *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition (*DSM-IV*) criteria; and absent from work for at least 25% of their contract hours due to their depression. In addition, the duration of their depressive disorder had to be at least 3 months, or the duration of their sickness absence had to be at least 8 weeks. Participants with severe alcohol or drug dependence, bipolar disorder, psychotic disorder, depression with psychotic characteristics, or an indication for inpatient treatment were excluded from the study.

Participants were referred by occupational physicians from several occupational health services in the Amsterdam area. After a telephone screening by a senior psychiatrist, participants received a 3-hour psychiatric intake, including the Structured Clinical Interview for *DSM-IV* Axis I Disorders (SCID-I).[33] All participants who were eligible and willing to participate were asked for written consent. After baseline assessment, participants were randomized to either the control (TAU) or the experimental (TAU + occupational therapy) condition according to a 1:2 ratio. The RCT was approved by the Medical Ethics Committee of the Academic Medical Center in Amsterdam, the Netherlands. More details regarding the study design, procedure, and content of the interventions can be found elsewhere.[34] The RCT was registered with the Dutch Trial Register (identifier: NTR2057).

Measures

Dependent variables. Long-term symptom remission was defined as having a score of ≤ 7 on the Hamilton Depression Rating Scale (HDRS) during the 18-month follow-up.[35] Long-term full RTW was defined as working the full number of contract hours in subjects' own or other work for at least 4 weeks before the 18-month follow-up. Sickness absence data were derived from self-report diaries that participants kept on a weekly basis during the 18-month study period.

Potential predictors. We categorized potential baseline predictors from previous mental health literature[16,21–23,26,27,36–41] into 4 domains: diagnostic characteristics, sociodemographic characteristics, personality characteristics, and work-related characteristics. Baseline values are presented in Table 1.

Diagnostic characteristics. Depression severity was assessed by the HDRS[42] and the Inventory of Depressive Symptomatology–Self-Report (IDS-SR).[43] Health-related functioning was assessed with the Medical Outcomes Study 36-item Short Form Health Survey.[44] Other diagnostic characteristics, such as total number of depressive episodes, age at onset, duration of the current depressive episode, and presence of a comorbid anxiety disorder were examined during the psychiatric intake with the SCID-I.[33] Perceived work-relatedness of the depression was assessed with a self-report item ("To what extent was your depression caused by work circumstances?") on a scale of 0%–100%.

Sociodemographic characteristics. Sociodemographic characteristics included gender, age (< 50 and ≥ 50 years), marital status (married/living together, single, widowed/divorced), and highest educational level completed (low, medium, high). Consistent with previous research,[45] low educational level was defined as primary school, lower vocational education, and lower secondary school. Medium educational level was defined as intermediate vocational education and upper secondary school. High educational level was defined as upper vocational education and university.

Personality characteristics. Personality was assessed by the self-report NEO-Five Factor Inventory.[46] Coping with work situations in the 4 weeks *before* start of sickness absence was retrospectively assessed at baseline with an adapted version of the Utrecht Coping List (UCL).[47] Work-related self-efficacy was measured by the 11-item questionnaire, "Expectations Regarding Work Resumption."[48]

Work-related characteristics. Data regarding the total duration of sickness absence (starting date of sickness absence), current percentage of sickness absence, job sector (financial, health care, other), years of work experience, having a supervising job role (yes/no), salary, work motivation (*"On a scale of 1–10, how motivated are you to fully return to work?"*), and recovery expectations for RTW (*"How many months do you think it will take you in order to have fully returned to work?"*) were available from a self-report questionnaire that was administered at baseline. Consistent with previous research,[23] answers to the question regarding recovery expectations were dichotomized into expected duration ≤ 3 months versus > 3 months.

At-work functioning during the 4 weeks before the start of sickness absence was retrospectively assessed with the Work Limitations Questionnaire (WLQ).[49] The patient's perception of the work environment during the 4 weeks before the start of sickness absence was retrospectively assessed with 7 subscales from the Perceptions of the Work Environment Questionnaire (Dutch acronym: VBBA)[50]: job satisfaction,

Clinical Points

- Major depressive disorder (MDD) has substantial negative effects on work outcomes. Little is known regarding how to promote a return to work (RTW) after MDD-related sickness absence.
- Whereas long-term symptom remission was only predicted by diagnostic characteristics, long-term RTW was also predicted by personal and work-related characteristics.
- Although more research is needed, this study suggests that clinical treatment in combination with interventions that target work motivation and planning strategies may facilitate both long-term symptom remission and long-term RTW in sick-listed patients with MDD.

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Table 1. Baseline Values of Potential Predictors for Return to Work and Symptom Remission at 18 Months

Predictor	Total (n = 117)
Demographic	
Gender, male, %	49
Age, mean (SD)	43.0 (9.2)
Educational level, %	
Low	26
Medium	36
High	38
Marital status, %	
Married/living together	58
Single	27
Divorced/widowed	15
Diagnostic characteristics	
Age at onset of first depressive episode, mean (SD), y	35.5 (12.5)
More than 1 depressive episode, %	53
Duration of current depression, median (interquartile range [IQR]), mo[a,b]	8.0 (4.0–13.0)
Hamilton Depression Rating Scale score, mean (SD)	18.7 (5.1)
Inventory of Depressive Symptomatology–Self-Report score, mean (SD)	39.9 (10.6)
Comorbid anxiety disorder, %	26
Medical Outcomes Study 36-Item Short Form subscale score, mean (SD)	
Physical functioning	75.4 (21.3)
Bodily pain	57.2 (24.1)
Role physical	26.5 (39.0)
General health perceptions	45.2 (20.0)
Vitality	24.1 (15.9)
Social functioning	33.8 (23.6)
Mental health	33.6 (15.7)
Role emotional	11.2 (23.9)
Percentage of depression attributed to the work situation, mean (SD)	49.2 (26.2)
Work characteristics	
Percentage of sickness absence, mean (SD)	81.6 (25.3)
Duration of sickness absence, median (IQR), mo[a,b]	4.8 (2.6–10.1)
Job sector, %	
Financial/insurance	57
Health care	12
Other	32
Work experience in the sector, mean (SD), y	15.3 (10.5)
In a supervising job role, %	24
Monthly income, median (IQR), euro[a,c]	€2,000 (€1,575–€2,550)
Self-rated estimation of duration until full return to work (> 3 mo), %	71
Work motivation, mean (SD)	4.1 (3.3)
Work Limitations Questionnaire subscale score, mean (SD)[d]	
Output	58.6 (23.4)
Time work limitations	56.5 (24.3)
Mental/interpersonal	55.3 (19.6)
Physical work limitations	25.7 (18.6)
Perceptions of the Work Environment Questionnaire subscale score, mean (SD)[d]	
Job satisfaction	61.8 (32.6)
Work tempo	56.7 (22.1)
Cognitive workload	75.9 (18.5)
Emotional workload	39.3 (22.9)
Relationship with colleagues	35.7 (17.9)
Relationship with supervisor	36.1 (19.6)
Job control	63.7 (22.0)
Coping and self-efficacy	
Utrecht Coping List subscale score, mean (SD)[d]	
Active problem solving	15.5 (4.1)
Avoidance	17.9 (3.8)
Passive reaction	17.7 (4.3)
Palliative reaction	17.1 (3.8)
Social support	11.1 (3.3)
Comforting ideas	10.5 (2.7)
Expression of emotions	6.3 (2.1)
Self-efficacy, mean (SD)	2.5 (1.0)
NEO Five-Factor Inventory subscale score, mean (SD)	
Neuroticism	44.1 (6.9)
Extraversion	30.8 (6.8)
Openness	36.6 (6.5)
Altruism	42.2 (5.6)
Conscientiousness	39.1 (7.2)

[a]Median values (IQR) were calculated if data were skewed. [b]This variable was not examined as a potential predictor, but included as a covariate in the statistical analyses (see Statistical Analyses). [c]Median monthly income in US dollars, based on the exchange rate in March 2012: $2,630 (IQR: $2,071–$3,353). [d]Baseline measure reflects the last 4 weeks before start of sickness absence (variable time period).

work tempo, cognitive work load, emotional work load, relationship with colleagues, relationship with supervisor, and job control.

Statistical Analyses

For the analyses, we had to take into account that two-thirds of our sample had received an occupational intervention (treatment as usual [TAU] + occupational therapy) in addition to TAU. Although a possible solution is to restrict all analyses to the TAU group, this would result in substantial loss of statistical power. An alternative approach is to assess whether occupational therapy had a modifying effect on the relation between the predictor and outcome variable (ie, long-term RTW and symptom remission). Thus, in preliminary logistic regression analyses, we examined this potential modifying effect of treatment group by a 2-way treatment × predictor interaction (separately for each predictor). In case of no effect modification ($P > .20$), a single odds ratio (OR) was calculated over the pooled experimental and control group data, thereby preserving statistical power. In case of effect modification ($P \leq .20$), the treatment × predictor interaction was retained in the logistic regression analyses, indicating that separate ORs should be calculated for both treatment groups. For these predictors, our primary interest concerned the results in the control group, as these results are generalizable to a wider population.

For our main analyses, we used a 2-step procedure proposed by Hosmer and Lemeshow.[51] First, for each predictor, univariate logistic regression analyses were conducted with long-term RTW as the dependent variable; the potential predictor as independent variable; and treatment group, duration of sickness absence, and duration of the depressive episode as covariates. These latter 2 variables were included as covariates considering the retrospective nature of some predictors (eg, WLQ, VBBA, UCL) and the wide variability in duration of depression and sickness absence at baseline.

In the second step, all potential predictors ($P \leq .20$) related to long-term

Table 2. Predictors for Return to Work at 18 Months[a]

	Univariate Analyses[b]					Final Multiple Regression Model[c]			
Predictor	B (SE)	OR	95% CI	*P*	Nagelkerke R^2	B (SE)	OR	95% CI	*P*
Demographic									
Age,[d] **< 50 y**	−1.49 (0.91)	0.23	0.04–1.32	.100	0.15				
Educational level, **low**	0.43 (0.25)	1.53	0.93–0.25	.091	0.10				
Diagnostic									
HDRS	−0.17 (0.05)	0.85	0.77–0.93	.000	0.23				
IDS-SR	−0.10 (0.02)	0.91	0.87–0.95	.000	0.27	−0.09 (0.03)	0.92	0.87–0.97	.003
Comorbid anxiety disorder, yes/**no**	−1.40 (0.60)	0.25	0.08–0.79	.019	0.13	−1.57 (0.71)	0.21	0.05–0.84	.028
MOS SF-36									
Physical functioning	0.02 (0.01)	1.02	1.00–1.04	.035	0.12				
Bodily pain	0.02 (0.01)	1.02	1.00–1.04	.057	0.11				
General health perceptions	0.04 (0.01)	1.04	1.02–1.07	.001	0.21				
Social functioning	0.03 (0.01)	1.03	1.01–1.05	.001	0.19				
Mental health	0.04 (0.01)	1.04	1.01–1.07	.005	0.16				
Vitality	0.02 (0.01)	1.02	1.00–1.05	.087	0.10				
Work-related									
Percentage of sickness absence	−0.01 (0.01)	0.99	0.97–1.00	.151	0.09				
Recovery expectations, **≤ 3 mo**	−0.68 (0.44)	0.51	0.22–1.19	.118	0.09				
Income,[d] **< median income**	−1.40 (0.79)	0.25	0.05–1.15	.075	0.16				
Work motivation[d]	0.56 (0.20)	1.75	1.18–2.59	.005	0.43	0.63 (0.23)	1.87	1.18–2.96	.008
WLQ									
Physical work limitations	−0.03 (0.01)	0.97	0.95–0.99	.012	0.14				
Time work limitations	−0.02 (0.01)	0.98	0.96–0.99	.009	0.14				
Output	−0.02 (0.01)	0.98	0.96–0.98	.022	0.13				
Mental/interpersonal	−0.03 (0.01)	0.97	0.95–0.99	.006	0.16				
VBBA									
Job satisfaction	−0.02 (0.01)	0.98	0.97–0.99	.007	0.15				
Emotional workload	−0.02 (0.01)	0.99	0.97–1.00	.085	0.10				
Relationship with colleagues	−0.03 (0.01)	0.97	0.95–0.99	.019	0.13				
Relationship with supervisor	−0.02 (0.01)	0.98	0.96–1.00	.067	0.11				
Personality-related									
UCL									
Expression of emotions[d]	−0.60 (0.24)	0.55	0.35–0.87	.010	0.31				
NEO-FFI									
Neuroticism	−0.08 (0.03)	0.93	0.87–0.98	.014	0.14				
Openness	0.06 (0.03)	1.06	1.00–1.12	.069	0.10				
Altruism	0.10 (0.04)	1.11	1.02–1.20	.012	0.15				
Conscientiousness	0.12 (0.03)	1.13	1.06–1.21	.000	0.24	0.09 (0.04)	1.10	1.02–1.18	.012

[a]Both univariate and multiple logistic regression analyses are adjusted for treatment group, duration of sickness absence, and duration of current depressive episode. Reference categories are in bold.
[b]Only predictors with a univariate *P* value of ≤ .20 are included in Table 2. For an overview of all potential predictors, see Table 1.
[c]Final multiple regression model, including covariates: Nagelkerke $R^2 = 48.0\%$. Hosmer and Lemeshow: $\chi^2_8 = 3.10$, $P = .934$.
[d]For this variable, only control group data (n = 39) were used because of significant ($P \leq .20$) predictor × treatment effect modification.
Abbreviations: HDRS = Hamilton Depression Rating Scale, IDS-SR = Inventory of Depressive Symptomatology–Self-Report, MOS SF-36 = Medical Outcomes Study 36-Item Short Form, NEO-FFI = NEO Five-Factor Inventory, OR = odds ratio, SE = standard error, UCL = Utrecht Coping List, VBBA = Perceptions of the Work Environment Questionnaire, WLQ = Work Limitations Questionnaire.

RTW in the univariate regression analyses were entered in a multiple logistic regression model, after having evaluated potential multicolinearity (tolerance < 0.10) between predictors using linear regression analyses.[52] A final prediction model was established using a stepwise procedure with backward elimination ($P < .05$). This 2-step procedure was repeated for examining predictors of long-term symptom remission.

For all analyses, multiple imputation (5 imputed datasets) was used to adjust for potential selection bias caused by selective loss to follow-up. With the assumption that the data are missing at random, multiple imputation gives unbiased results with correct standard errors. Effect estimates (ie, ORs and 95% confidence intervals [CIs]) of the 5 imputation sets were pooled using Rubin's rules.[53] Average Hosmer-Lemeshow goodness-of-fit statistics and Nagelkerke R^2 were used to assess the fit of the model. All analyses were performed using SPSS for Windows, version 18 (SPSS Inc, Chicago, Illinois).

RESULTS

Sample Characteristics

Between December 2007 and October 2009, 224 participants were screened for participation in the study. Of the 135 eligible participants, 13% (n = 18) declined to participate, resulting in a total study sample of 117 participants. Of these, 101 (86%) participants completed the 18-month follow-up (data were collected through March 2011). Table 1 presents the baseline values of the potential predictors for our study sample. At baseline, the median duration of depression was 8 months (interquartile range [IQR]: 4.0–13.0 months) and the median duration of sickness absence was 4.8 months (IQR: 2.6–10.1 months). In addition, 53% of participants

Table 3. Predictors for Symptom Remission (HDRS score ≤ 7) at 18 Months[a]

	Univariate Analyses[b]					Final Multiple Regression Model[c]			
Predictor	B (SE)	OR	95% CI	*P*	Nagelkerke R^2	B (SE)	OR	95% CI	*P*
Diagnostic									
HDRS	−0.08 (0.05)	0.92	0.84–1.01	.074	0.18				
IDS-SR	−0.07 (0.03)	0.93	0.89–0.98	.005	0.25	−0.07 (0.03)	0.93	0.89–0.98	.005
MOS SF-36									
Physical functioning	0.03 (0.01)	1.03	1.01–1.06	.007	0.25				
Bodily pain	0.03 (0.01)	1.03	1.01–1.05	.008	0.23				
General health perceptions	0.03 (0.01)	1.03	1.00–1.06	.025	0.22				
Work-related									
WLQ									
Physical work limitations	−0.03 (0.01)	0.97	0.94–0.99	.012	0.22				
VBBA									
Cognitive workload[d]	−0.03 (0.02)	0.97	0.93–1.01	.172	0.14				
Emotional workload[d]	−0.03 (0.02)	0.97	0.93–1.01	.131	0.16				
Relationship with colleagues	−0.03 (0.01)	0.96	0.95–1.00	.064	0.19				
Personality-related									
UCL									
Expression of emotions[d]	−0.52 (0.24)	0.59	0.37–0.96	.036	0.27				
NEO-FFI									
Neuroticism	−0.08 (0.04)	0.93	0.86–1.00	.060	0.20				
Extraversion	0.05 (0.04)	1.05	0.98–1.14	.182	0.17				
Openness	0.07 (0.05)	1.07	0.98–1.18	.136	0.19				
Altruism	0.08 (0.05)	0.99	0.97–1.01	.104	0.19				
Conscientiousness	0.08 (0.04)	1.08	1.00–1.16	.045	0.21				

[a]Both univariate and multiple regression analyses are adjusted for treatment group, duration of sickness absence, and duration of current depressive episode.
[b]Only predictors with a univariate *P* value of ≤ .20 are included in Table 2. For an overview of all potential predictors, see Table 1.
[c]Final multiple regression model, including covariates: Nagelkerke $R^2 = 25.0\%$. Hosmer and Lemeshow: $\chi^2_8 = 6.34$, $P = .609$.
[d]For this variable, only control group data (n = 39) were used because of significant ($P \leq .20$) predictor × treatment effect modification.
Abbreviations: HDRS = Hamilton Depression Rating Scale, IDS-SR = Inventory of Depressive Symptomatology–Self-Report, MOS SF-36 = Medical Outcome Study 36-Item Short Form, NEO-FFI = NEO Five-Factor Inventory, OR = odds ratio, SE = standard error, UCL = Utrecht Coping List, VBBA = Perceptions of the Work Environment Questionnaire, WLQ = Work Limitations Questionnaire.

(n = 62) had had more than 1 previous depressive episode, and 26% of participants (n = 30) had a comorbid anxiety disorder.

At 18 months, 44% of participants (n = 51) were both remitted and fully returned to work (TAU: 28%; TAU + occupational therapy: 52%). Twenty-nine participants (25%) were remitted but had not fully returned to work (TAU: 24%; TAU + occupational therapy: 25%), and 9 participants (8%) had returned to work but were not yet remitted (TAU: 13%; TAU + occupational therapy: 5%). Twenty-eight participants (24%) were neither remitted nor returned to work (TAU: 35%; TAU + occupational therapy: 19%).

Predictors of Long-Term Return to Work

Univariate logistic regression analyses yielded 28 potential predictors ($P \leq .20$) for long-term RTW (Table 2). After linear regression analyses revealed no indications of multicolinearity (smallest tolerance: 0.32), these predictors were entered into a multiple logistic regression model. Backward elimination ($P < .05$) resulted in a model comprising 2 diagnostic predictors (IDS-SR, comorbid anxiety disorder), 1 work-related predictor (work motivation, treatment × work motivation interaction), and 1 personality-related predictor (conscientiousness), explaining 48% of the variation in RTW outcome at 18 months (see also Table 2). Lower IDS-SR scores, absence of a comorbid anxiety disorder, and higher conscientiousness at baseline increased the odds of long-term RTW. The significant work motivation × treatment interaction (OR = 0.53; 95% CI, 0.32–0.87; $P = .011$) indicated that the effect of baseline work motivation on the odds of full RTW differed for the 2 treatment groups. For patients receiving TAU, higher baseline work motivation increased the odds of full RTW (OR = 1.87, see Table 2), while for patients receiving TAU + occupational therapy, differences in baseline work motivation scores did not change the odds of long-term RTW (OR = 0.99). Forward stepwise logistic regression analyses yielded the same set of predictors.

Predictors of Long-Term Symptom Remission

Univariate logistic regression analyses yielded 15 potential predictors ($P \leq .20$) for long-term symptom remission (Table 3). Linear regression analyses revealed no multicolinearity between predictors (smallest tolerance: 0.38). Backward elimination ($P < .05$) resulted in only 1 diagnostic predictor (IDS-SR), explaining 25% of variation in symptom remission outcome at 18 months (Table 3). Results indicated that lower baseline IDS-SR scores increased the odds of long-term symptom remission. Forward stepwise logistic regression analyses yielded similar results.

DISCUSSION

The present findings indicate that whereas long-term symptom remission was only predicted by a lower level of

baseline depression severity, long-term full RTW was predicted by multiple factors; lower depression severity, absence of a comorbid anxiety disorder, higher work motivation, and higher conscientiousness at baseline increased the chances of long-term RTW in sick-listed patients with MDD. Our finding that 25% of our participants achieved symptom remission without achieving long-term RTW, underlines the importance of targeting these multiple factors in order to promote long-term RTW in sick-listed patients with MDD.

Our results corroborate previous studies, that high depression severity and the presence of a comorbid anxiety disorder are important diagnostic predictors for adverse work outcomes (eg, lower work functioning,[54] more days of sickness absence,[13,17] and receipt of a disability pension[55]). However, our findings also indicate that personal and work-related factors predict long-term RTW, providing support for the multifactorial character of RTW.

Our finding that conscientiousness predicts long-term RTW is consistent with a previous cross-sectional study among 573 MDD patients that found an association between a higher level of conscientiousness and fewer days of sickness absence.[27] As highly conscientious persons are persistent, achievement-oriented, and have a strong sense of responsibility,[56] these personality traits may positively influence the achievement of long-term RTW. Furthermore, highly conscientious individuals tend to use more planning and problem solving strategies,[57] which may facilitate the RTW process.

Work motivation has been found an important predictor for RTW in other health conditions as well,[21,58,59] and underlines the perspectives of vocational rehabilitation professionals,[60] employers,[61] and patients,[62] who all regard work motivation as crucial for achieving a RTW. Interestingly, we found that work motivation only predicted long-term RTW in patients receiving TAU. For patients receiving adjuvant occupational therapy, work motivation did not significantly predict long-term RTW. These findings may be indicative of the working mechanism underlying occupational therapy; by addressing psychosocial problems at the workplace, adjuvant occupational therapy may enhance a patient's low motivation to RTW,[61] thereby mitigating the detrimental effects of low work motivation for achieving long-term RTW. However, for patients with high work motivation, extra occupational therapy may be less needed. This finding corroborates the Readiness for Return to Work model,[63] which postulates that an intervention targeting a RTW should be matched or tailored to the corresponding motivational stages of the individual.

However, in contrast with previous studies,[20,23,25,36,40] both sociodemographic (eg, age, educational level) and certain modifiable factors, such as recovery expectations and self-efficacy, did not significantly predict long-term RTW in the present study. It is possible that our relatively small sample size has resulted in too low power in order to detect these predictors (the univariate ORs for these predictors were all in the expected direction). Furthermore, as self-efficacy and recovery expectations are related to work motivation,[64] this may have caused their deletion from the final model in the stepwise procedure. Another explanation may be that these factors are less important for predicting RTW in a clinical population with MDD. Most previous studies were conducted in the physical health field, and previous studies regarding mental health conditions have mainly focused on less severe populations with shorter duration of sickness absence. However, more research is needed in order to determine whether such factors predict long-term RTW in sick-listed patients with MDD.

Strengths and Limitations

This study has important strengths: the evaluation of a wide variety of predictors in multiple domains, clinically diagnosed MDD according to *DSM-IV* criteria, and a long follow-up period. Furthermore, this study was the first to compare predictors for both a symptomatic (symptom remission) and functional (RTW) outcome.

However, this study also has some limitations. First, we used data from participants who originally participated in a randomized controlled trial. This may have affected the generalizability of our study findings, as these participants were selected according to our inclusion and exclusion criteria and their willingness to participate in the RCT. Thus, the current study results may not apply to patients with substance abuse, bipolar disorder, psychotic disorder, depression with psychotic characteristics, or inpatients. Second, as we mainly used data from self-report, many predictors regarding work-related factors (eg, work environment, work functioning) related to *perceived* characteristics, rather than externally validated characteristics. Third, we did not evaluate the sustainability of the RTW after the 18-month period, nor did we take at-work functioning during the RTW into account. Therefore, we do not know whether some participants may have reported sick again after their long-term RTW or whether they still had reduced at-work productivity. Fourth, the wide variation in duration of sickness absence at baseline may have influenced our results. Although we corrected for this duration in all our analyses, we cannot exclude the possibility that certain predictors vary in their strength of association with RTW outcome according to the duration of sickness absence. Future research should include an inception cohort in order to evaluate potential phase-specificity[19] of predictors. Finally, we used stepwise regression, an exploratory procedure that is prone to chance capitalization. Probably, the resulting model fits better on our specific dataset than on a new dataset with a comparable patient sample. For this reason, the resulting model should first be validated in an independent sample, before the model can be used in clinical practice.

CONCLUSION

This study examined predictors of both long-term RTW and long-term symptom remission in sick-listed patients with MDD across multiple domains. Our results suggest that a combination of clinical treatment and interventions that target work motivation and planning strategies facilitate

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both outcomes. However, more research is needed in order to develop new interventions that promote long-term RTW in sick-listed patients with MDD.

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REFERENCES

1. Kouzis AC, Eaton WW. Emotional disability days: prevalence and predictors. *Am J Public Health*. 1994;84(8):1304–1307.
2. Goetzel RZ, Hawkins K, Ozminkowski RJ, et al. The health and productivity cost burden of the "top 10" physical and mental health conditions affecting six large US employers in 1999. *J Occup Environ Med*. 2003;45(1):5–14.
3. Goetzel RZ, Long SR, Ozminkowski RJ, et al. Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting US employers. *J Occup Environ Med*. 2004;46(4):398–412.
4. Kessler RC, Akiskal HS, Ames M, et al. Prevalence and effects of mood disorders on work performance in a nationally representative sample of US workers. *Am J Psychiatry*. 2006;163(9):1561–1568.
5. Dewa CS, Goering P, Lin E, et al. Depression-related short-term disability in an employed population. *J Occup Environ Med*. 2002;44(7):628–633.
6. Conti DJ, Burton WN. The economic impact of depression in a workplace. *J Occup Med*. 1994;36(9):983–988.
7. Stewart WF, Ricci JA, Chee E, et al. Cost of lost productive work time among US workers with depression. *JAMA*. 2003;289(23):3135–3144.
8. McIntyre RS, Liauw S, Taylor VH. Depression in the workforce: the intermediary effect of medical comorbidity. *J Affect Disord*. 2011;128(suppl 1):S29–S36.
9. Holma KM, Holma IA, Melartin TK, et al. Long-term outcome of major depressive disorder in psychiatric patients is variable. *J Clin Psychiatry*. 2008;69(2):196–205.
10. Penninx BW, Nolen WA, Lamers F, et al. Two-year course of depressive and anxiety disorders: results from the Netherlands Study of Depression and Anxiety (NESDA). *J Affect Disord*. 2011;133(1–2):76–85.
11. Riedel M, Möller HJ, Obermeier M, et al. Clinical predictors of response and remission in inpatients with depressive syndromes. *J Affect Disord*. 2011;133(1–2):137–149.
12. Lexis MA, Jansen NW, van Amelsvoort LG, et al. Depressive complaints as a predictor of sickness absence among the working population. *J Occup Environ Med*. 2009;51(8):887–895.
13. Spijker J, Graaf R, Bijl RV, et al. Functional disability and depression in the general population: results from the Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Acta Psychiatr Scand*. 2004;110(3):208–214.
14. Druss BG, Schlesinger M, Allen HM Jr. Depressive symptoms, satisfaction with health care, and 2-year work outcomes in an employed population. *Am J Psychiatry*. 2001;158(5):731–734.
15. Sorvaniemi M, Helenius H, Salokangas RK. Factors associated with being granted a pension among psychiatric outpatients with major depression. *J Affect Disord*. 2003;75(1):43–48.
16. Lagerveld SE, Bültmann U, Franche RL, et al. Factors associated with work participation and work functioning in depressed workers: a systematic review. *J Occup Rehabil*. 2010;20(3):275–292.
17. van der Werff E, Verboom CE, Penninx BW, et al. Explaining heterogeneity in disability associated with current major depressive disorder: effects of illness characteristics and comorbid mental disorders. *J Affect Disord*. 2010;127(1–3):203–210.
18. Kenny D. Determinants of time lost from workplace injuries: the impact of the injury, the injured, the industry, the intervention and the insurer. *Int J Rehabil Res*. 1994;17(4):333–342.
19. Krause N, Frank JW, Dasinger LK, et al. Determinants of duration of disability and return-to-work after work-related injury and illness: challenges for future research. *Am J Ind Med*. 2001;40(4):464–484.
20. Cornelius LR, van der Klink JJ, Groothoff JW, et al. Prognostic factors of long term disability due to mental disorders: a systematic review. *J Occup Rehabil*. 2011;21(2):259–274.
21. D'Amato A, Zijlstra F. Toward a climate for work resumption: the nonmedical determinants of return to work. *J Occup Environ Med*. 2010;52(1):67–80.
22. Blank L, Peters J, Pickvance S, et al. A systematic review of the factors which predict return to work for people suffering episodes of poor mental health. *J Occup Rehabil*. 2008;18(1):27–34.
23. Nieuwenhuijsen K, Verbeek JH, de Boer AG, et al. Predicting the duration of sickness absence for patients with common mental disorders in occupational health care. *Scand J Work Environ Health*. 2006;32(1):67–74.
24. Beemsterboer W, Stewart R, Groothoff J, et al. A literature review on sick leave determinants (1984–2004). *Int J Occup Med Environ Health*. 2009;22(2):169–179.
25. Kuijer W, Groothoff JW, Brouwer S, et al. Prediction of sickness absence in patients with chronic low back pain: a systematic review. *J Occup Rehabil*. 2006;16(3):430–458.
26. Nielsen MB, Bültmann U, Madsen IE, et al. Health, work, and personal-related predictors of time to return to work among employees with mental health problems [published online ahead of print December 26, 2011]. *Disabil Rehabil*.
27. Verboom CE, Sentse M, Sijtsema JJ, et al. Explaining heterogeneity in disability with major depressive disorder: effects of personal and environmental characteristics. *J Affect Disord*. 2011;132(1–2):71–81.
28. Cocker F, Martin A, Scott J, et al. Factors associated with presenteeism among employed Australian adults reporting lifetime major depression with 12-month symptoms. *J Affect Disord*. 2011;135(1–3):231–240.
29. Holma IA, Holma KM, Melartin TK, et al. A 5-year prospective study of predictors for disability pension among patients with major depressive disorder. *Acta Psychiatr Scand*. 2011;125(4):325–334.
30. Ahola K, Virtanen M, Honkonen T, et al. Common mental disorders and subsequent work disability: a population-based Health 2000 Study. *J Affect Disord*. 2011;134(1–3):365–372.
31. Nieuwenhuijsen K, Franche RL, van Dijk FJ. Work functioning measurement: tools for occupational mental health research. *J Occup Environ Med*. 2010;52(8):778–790.
32. American Psychiatric Association. Practice Guideline for the Treatment of Patients With Major Depressive Disorder (revision). *Am J Psychiatry*. 2000;157(suppl):1–45.
33. First MB, Spitzer RL, Gibbon M, et al. *Structured Clinical Interview for DSM-IV Axis I Disorders (SCID I)*. New York, NY: Biometric Research Department; 1997.
34. Hees HL, Koeter MW, de Vries G, et al. Effectiveness of adjuvant occupational therapy in employees with depression: design of a randomized controlled trial. *BMC Public Health*. 2010;10(1):558.
35. Kearns NP, Cruickshank CA, McGuigan KJ, et al. A comparison of depression rating scales. *Br J Psychiatry*. 1982;141(1):45–49.
36. Brouwer S, Reneman MF, Bültmann U, et al. A prospective study of return to work across health conditions: perceived work attitude, self-efficacy and perceived social support. *J Occup Rehabil*. 2010;20(1):104–112.
37. Brouwers EP, Terluin B, Tiemens BG, et al. Predicting return to work in employees sick-listed due to minor mental disorders. *J Occup Rehabil*. 2009;19(4):323–332.
38. Koopmans PC, Roelen CA, Groothoff JW. Sickness absence due to depressive symptoms. *Int Arch Occup Environ Health*. 2008;81(6):711–719.
39. Norlund S, Reuterwall C, Höög J, et al. Work related factors and sick leave after rehabilitation in burnout patients: experiences from the REST-project. *J Occup Rehabil*. 2011;21(1):23–30.
40. van Rhenen W, Schaufeli WB, van Dijk FJ, et al. Coping and sickness absence. *Int Arch Occup Environ Health*. 2008;81(4):461–472.
41. Sampere M, Gimeno D, Serra C, et al. Return to work expectations of workers on long-term non–work-related sick leave. *J Occup Rehabil*. 2012;22(1):15–26.
42. Hamilton M. A rating scale for depression. *J Neurol Neurosurg Psychiatry*. 1960;23(1):56–62.
43. Rush AJ, Gullion CM, Basco MR, et al. The Inventory of Depressive Symptomatology (IDS): psychometric properties. *Psychol Med*. 1996;26(3):477–486.
44. Aaronson NK, Muller M, Cohen PD, et al. Translation, validation, and norming of the Dutch language version of the SF-36 Health Survey in community and chronic disease populations. *J Clin Epidemiol*. 1998;51(11):1055–1068.
45. Andrea H, Bültmann U, van Amelsvoort LG, et al. The incidence of

anxiety and depression among employees—the role of psychosocial work characteristics. *Depress Anxiety*. 2009;26(11):1040–1048.
46. Hoekstra HA, Ormel H, de Fruyt F. *NEO Persoonlijkheidsvragenlijsten: NEO-PI-R and NEO-FFI*. [NEO Personality Inventories: NEO-PI-R and NEO-FFI]. Lisse, The Netherlands: Swets and Zeitlinger BV; 1996.
47. Schreurs P, van de Willige G, Brosschot J, et al. *De Utrechtse Coping Lijst-Handleiding. Omgaan met problemen en gebeurtenissen* [*Utrecht Coping List-Manual. Coping With Problems and Events*]. Lisse, The Netherlands: Swets and Zeitlinger; 1993.
48. Lagerveld SE, Blonk RW, Brenninkmeijer V, et al. Return to work among employees with mental health problems: development and validation of a self-efficacy questionnaire. *Work Stress*. 2010;24(4):359–375.
49. Lerner D, Amick BC 3rd, Rogers WH, et al. The Work Limitations Questionnaire. *Med Care*. 2001;39(1):72–85.
50. van Veldhoven M, Meijman TF, Broersen JPJ, et al. *Handleiding VBBA* [Manual VBBA], 2nd ed. Amsterdam, The Netherlands: SKB Vragenlijst Services; 2002.
51. Hosmer DW, Lemeshow S. *Applied Logistic Regression. Wiley Series in Probability and Mathematical Statistics*. London, UK: John Wiley and Sons; 1989.
52. Field A. *Discovering Statistics Using SPSS*. 3rd ed. London, UK: Sage Publications; 2009.
53. Enders CK. *Applied Missing Data Analysis*. 1st ed. New York, NY: Guildford Press; 2010.
54. Rytsälä HJ, Melartin TK, Leskelä US, et al. Functional and work disability in major depressive disorder. *J Nerv Ment Dis*. 2005;193(3):189–195.
55. Knudsen AK, Øverland S, Aakvaag HF, et al. Common mental disorders and disability pension award: seven year follow-up of the HUSK study. *J Psychosom Res*. 2010;69(1):59–67.
56. Carver CS, Connor-Smith J. Personality and coping. *Annu Rev Psychol*. 2010;61(1):679–704.
57. Vollrath M. Personality and stress. *Scand J Psychol*. 2001;42(4):335–347.
58. Berglind H, Gerner U. Motivation and return to work among the long-term sicklisted: an action theory perspective. *Disabil Rehabil*. 2002; 24(14):719–726.
59. Olbrich D, Cicholas B, Klenke-Bossek H. [Psychosomatic-psychotherapeutic rehabilitation of social medicine problem patients—an exploratory study of findings, follow-up and treatment outcome] [in German]. *Rehabilitation (Stuttg)*. 1998;37(1):7–13.
60. Dekkers-Sánchez PM, Wind H, Sluiter JK, et al. What promotes sustained return to work of employees on long-term sick leave? perspectives of vocational rehabilitation professionals. *Scand J Work Environ Health*. 2011;37(6):481–493.
61. Gard G, Larsson A. Focus on motivation in the work rehabilitation planning process: a qualitative study from the employer's perspective. *J Occup Rehabil*. 2003;13(3):159–167.
62. Baril R, Clarke J, Friesen M, et al; Work-Ready Group. Management of return-to-work programs for workers with musculoskeletal disorders: a qualitative study in three Canadian provinces. *Soc Sci Med*. 2003;57(11): 2101–2114.
63. Franche RL, Krause N. Readiness for return to work following injury or illness: conceptualizing the interpersonal impact of health care, workplace, and insurance factors. *J Occup Rehabil*. 2002;12(4): 233–256.
64. De Rijk A, Janssen N, Van Lierop B, et al. A behavioral approach to RTW after sickness absence: the development of instruments for the assessment of motivational determinants, motivation and key actors' attitudes. *Work*. 2009;33(3):273–285.

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