Collaborative care for sick-listed employees with Major Depressive Disorder

Outcomes of a randomized clinical trial

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Abstract

[English]. Background. Major Depressive Disorder (MDD) has significant consequences for employees as well as for society as a whole. Although evidence-based treatment modes for depression are available in current usual care, its prevalence is not decreasing in the Netherlands. Collaborative care – an integrated care model – may be a solution. The current study evaluates the effectiveness of collaborative care for sick-listed employees with MDD. ***Methods.*** A number of 126 employees who were sick listed between 4 and 12 weeks were included. Data was measured by questionnaires at baseline and at 3, 6, 9 and 12 months after baseline. Depressive symptoms are measured with the PHQ9, defined as the outcome parameters remission, response and reduction of symptoms (continuous outcome measure). Using multilevel analyses, these parameters are compared between the collaborative care group (CC-group) and the group of employees who received care as usual (CAU-group). ***Results.*** Although the severity of depressive symptoms reduced at 3, 6, 9 and 12 months compared to baseline, there were no significant differences in depression between the CC- and CAU-group with the exception of a higher response rate in the CC-group at 3 months. Additional analyses showed that collaborative care was more effective in the reduction of symptoms at 3 months within the sub-group of employees with a baseline PHQ-9 score of 15 or higher. ***Conclusion.*** Collaborative care in the occupational health care setting does not lead to better long-term results in the reduction of symptoms than care as usual. However, it does lead to reduced participation in more expensive intensive outpatient treatment.

[Nederlands]. Achtergrond. Een depressieve stoornis (*Major Depressive Disorder*; MDD) heeft grote gevolgen voor zowel werknemers als voor de gehele maatschappij. Hoewel *evidence-based* behandelingen voor depressie beschikbaar zijn in de huidige zorg, daalt de prevalentie van depressie in Nederland niet. *Collaborative care* – een geïntegreerd zorgmodel – kan een oplossing bieden. De huidige studie evalueert de effectiviteit van *collaborative care* voor ziek gemelde werknemers met MDD. **Methoden.** In totaal namen 126 werknemers deel aan het onderzoek, die ziek waren gemeld tussen 4 en 12 weken. Data werden verkregen met behulp van vragenlijsten; deze werden afgenomen op baseline en op 3, 6, 9 en 12 maanden na baseline. Depressieve symptomen zijn gemeten met behulp van de PHQ-9 en gedefinieerd als de uitkomstmaten remissie, respons en de vermindering van symptomen (continue uitkomstmaat). Met behulp van *multilevel* analyses zijn deze parameters vergeleken tussen de *collaborative care* groep (CC-groep) en de groep werknemers die *care as usual*

(gebruikelijke zorg) ontvingen (CAU-groep). **Resultaten.** Hoewel de ernst van depressieve symptomen na 3, 6, 9 en 12 maanden verminderde ten opzichte van baseline, waren er geen significante verschillen tussen de CC- en CAU-groep aanwezig met uitzondering van een hoger responspercentage in de CC-groep na 3 maanden. Nadere analyses toonden aan dat *collaborative care* effectiever is in symptoomreductie op de 3 maanden follow-up voor werknemers met een PHQ-9 score van 15 of hoger. **Conclusie.** *Collaborative care* leidt niet tot betere resultaten in de vermindering van depressieve symptomen op lange termijn in de bedrijfsgeneeskundige setting. Het leidt echter wel tot een verminderde deelname aan dag- en deeltijdbehandeling.

Introduction

Currently, a leading question within occupational health care settings is how treatment of Major Depressive Disorder (MDD) can be improved. MDD has significant consequences for employees as well as for society as a whole. It often leads to a reduced productivity at work (Adler et al., 2006; Lerner et al., 2004; Stewart, Ricci, Chee, Hahn, & Morganstein, 2003; Wang et al., 2004) and absenteeism (Bijl & Ravelli, 2000; Koopmans, Roelen, & Groothoff, 2007; Kruijshaar, Hoeymans, Bijl, Spijker, & Essink-Bot, 2003). Because of these consequences – and also because of the high lifetime prevalence of MDD of 18.7% in the Dutch population (De Graaf, ten Have, & van Dorsselaer, 2010) – MDD causes extensive financial costs for both patient and society (Henderson, Glozier, & Holland, 2005; Smit et al., 2006; Stewart et al., 2003). For patients, it causes not only financial costs but also social ones because of decrease in quality of life (Bowling, 1995; Szymanski et al., 2003). Prolonged absence from work regularly results in a lack of social structure and meaningful activity (Bilsker, Wiseman, & Gilbert, 2006) and is associated with a reduced probability of eventual return to work and subsequent economic and social deprivation (Bilsker et al., 2006; Henderson et al., 2005). Despite huge investments in care, current management of MDD is considered suboptimal (Ormel, Bartel, & Nolen, 2003; Vlasveld et al., 2008).

Despite the availability of evidence-based treatment modes for depression in current usual care (Bijl, van Marwijk, de Haan, van Tilburg, & Beekman, 2004), the prevalence of MDD is not decreasing in the Netherlands (Ormel, Bartel, & Nolen, 2003, 2004). Possible reasons for this paradox are a delayed treatment, difficult access to specialist services, insufficient adherence to guidelines for treatment, and a lack of monitoring of treatment effects (De Jong et al., 2009; Ormel et al., 2003; Schulberg, 2001). Also, there is inadequate communication and collaboration by Dutch occupational physicians (OPs) and general practitioners (GPs) regarding medical diagnoses and management of employees (Anema et al., 2006). Approaching MDD with the collaborative care model – an integrated care model – might be the solution to these problems.

Although collaborative care interventions vary in content and intensity (Bower et al., 2006; Katon & Seelig, 2008), collaborative care is characterized by four key components. First, there is the introduction of the care manager, who collaborates with other health care professionals and assists in the management of patients through structured and systematic delivery of interventions (Bower et al., 2006). Second, the patient is expected to participate actively. A third key component is the access to a consultant psychiatrist. And finally,

treatment adherence and outcomes are systematically monitored (Katon & Seelig, 2008; Simon, 2008).

The effectiveness of collaborative care in improving outcomes in depression has been demonstrated in the USA (Adli, Bauer, & Rush, 2006; Bower, Gilbody, Richards, Fletcher, & Sutton, 2006; Gilbody, Bower, Fletcher, Richards, & Sutton, 2006; Katon & Seelig, 2008; Simon, 2008). Compared to those in usual care, patients who received collaborative care reported a lower severity of depression (Bower et al., 2006; Gilbody et al., 2006; Unützer et al., 2002) and showed higher rates of treatment response and of complete remission (Gensichen et al., 2006; Unützer et al., 2002). In a meta-analysis of 37 randomized trials, evidence for long-term benefits was found for up to five years (Gilbody et al., 2006). Despite the fact that health care in the USA differs from other Western countries because of an increased focus on diagnosis and a poorer access to care (Vlasveld, van Marwijk, & van der Feltz-Cornelis, 2010), collaborative care has also proven to be effective in reducing depressive symptoms in Great Britain, where access to primary care is easier (Chew-Graham et al., 2007; Richards et al., 2008). However, effect sizes seem to differ between these countries (De Jong et al., 2009; Unützer et al., 2002). Specific features of the health care system in different countries – such as the degree of collaboration between GPs and other disciplines – might influence the degree of effectiveness of collaborative care. Non-USA studies are nevertheless scarce and long-term outcomes in non-USA-countries are still unknown.

In the present study, the collaborative care model is applied to the occupational health care setting in the Netherlands. The aim of collaborative care intervention is to reduce depressive symptoms in sick-listed employees. In the present study the severity of depressive symptoms in employees is examined during a 12 months follow-up, with measurements at baseline and at 3, 6, 9 and 12 months after baseline. Based on positive results in the USA and Great Britain, collaborative care is expected to be more effective in reducing depressive symptoms during this period compared to usual care.

Methods

Study design

The study is a randomized controlled trial (RCT) in which a collaborative care treatment for MDD is compared to care as usual in the Dutch occupational health care setting. Randomization into a collaborative care group (CC-group) and a care as usual group (CAU-

group) took place at the patient level. Both groups received sickness certification as usual from their company's OP. In addition, the CC-group received multidisciplinary treatment as managed by an OP-care manager in contrast to the CAU-group which was not referred to an OP-care manager. Data were obtained by self-reported questionnaires, in order to exclude the possibility of interviewer bias (De Leeuw, Hox, & Dillman, 2008).

Data collection

Data were collected by the Netherlands institute of mental health and addiction, in cooperation with the OHS. Participants were asked to complete a baseline questionnaire (T0), followed by measurements at three (T1), six (T2), nine (T3) and twelve months (T4) after baseline.

Study population

Recruitment of OPs

The OP-care managers were recruited in collaboration with a large occupational health care service (OHS) in the Netherlands. To prepare the OP-care managers for their role, they received training in care management. The training was given by the researchers, who in turn received their training from the developers of the collaborative care model, the IMPACT research group in Seattle (Unützer et al., 2001).

Recruitment of patients

This RCT concentrated on employees on sick leave between four and twelve weeks. The minimum of four weeks was chosen as selection criterion to avoid including too many patients with spontaneous recovery. The maximum of twelve weeks was chosen to prevent the inclusion of patients with a transition to long-term absenteeism. Sick-listed employees received written information about the study in addition to an informed consent form and a screener for depressive symptoms: the PHQ-9. Patients agreeing to participate in the study were asked to fill out the PHQ-9, sign the informed consent form and return both to the researchers. If patients reached a cut-off score of 10 for moderate to severe MDD on the PHQ-9, the mini-International Neuropsychiatric Interview (MINI) was administered for DSM-IV classification (Sheehan et al., 1998; Van Vliet & de Beurs, 2007; Van Vliet, Leroy, & van Megen, 2000). Patients were excluded from the study if the MINI did not confirm MDD, or if the MINI assessed patients as suicidal, psychotic or with a primary diagnosis of

substance abuse or dependence. In addition, those who had insufficient language skills to fill out the questionnaire, those who were pregnant, and those with a legal involvement against their employer were excluded from the study. Patients meeting all inclusion criteria who were willing to participate received a second informed consent form and were assigned randomly to the CC- group or the CAU-group.

Intervention

Treatment in the CC- group

Collaborative care treatment in this study contained the following elements: (1) manual guided self-help, based on several existing self-help books (Cuijpers, 2003; Cuijpers, & Buijssen, 1997), (2) Problem Solving Treatment (PST), in which patients were encouraged to formulate practical ways of dealing with problems in daily life by using their own skills and resources (Cuijpers, van Straten, & Warmerdam, 2007; Mynors-Wallis, 2001; Mynors-Wallis, Davies, Gray, Barbour, & Gath, 1997), (3) a workplace intervention, which consists of workplace assessment and work adjustments (Anema et al., 2007), (4) adherence enhancing techniques and (5) depending on patient preference, prescription of antidepressants according to a treatment algorithm. The treatment was given by the care manager. The five elements run parallel to each other, and are described in more detail by Vlasveld et al. (2008).

Progress of the treatment was monitored every two weeks by the OP-care manager. Based on this monitoring, it was decided whether treatment needed to be intensified. If necessary, OP-care managers could consult a psychiatrist. The maximum duration of the intervention was 18 weeks. If, after 18 weeks, the PHQ-9 did not indicate remission, the patient was referred to specialized mental health care.

Treatment in the usual care group

In Dutch social insurance legislation, treatment is separated from sickness guidance and certification (Willems & Doppegieter, 2007). For sickness guidance and certification, every sick-listed employee has access to an OP. A protocol of the Dutch Board for Occupational Medicine is available for the OP for the sickness certification and guidance of employees with psychological problems (Van der Klink, 2007). Whether sick-listed patients receive treatment for MDD varies considerably. Although they receive no treatment by a care manager, they are free to attend any other care. For this reason, care that was provided in the CAU-group was assessed by questionnaire.

Outcome parameters

The primary outcome measure was severity of depressive symptoms, as measured with the depression sub-scale of the Patient Health Questionnaire (PHQ-9). The PHQ-9 is a brief and valid instrument for detecting and monitoring depression with a focus on the diagnostic criteria for DSM-IV Depressive disorder (Kroenke, Spitzer, & Williams, 2001; Kroenke, Spitzer, Williams, & Löwe, 2010; Löwe, Unützer, Callahan, Perkins, & Kroenke, 2004). Response was defined as a 50% reduction in symptoms (Kroenke, Spitzer, & Williams, 2001; Unützer et al., 2002) and remission as a score of 0 to 4 on the PHQ-9 (Kroenke et al., 2001, 2010; Löwe, Unützer, Callahan, Perkins, & Kroenke, 2004).

Because of comorbidity of depression with various psychiatric and physical disorders and symptoms (Zitman, 2008), several potential covariates were also measured which could possibly influence the effect of collaborative care on the primary outcome measure. Physical symptoms, panic disorder and general anxiety disorder were each measured with a corresponding subscale of the Patient Health Questionnaire (Spitzer, Kroenke, & Williams, 1999) and co-morbid chronic medical illness was measured with the Dutch Central Bureau of Statistic (CBS) list, a questionnaire containing 28 chronic conditions (Hakkaart-van Roijen, 2002). In addition, work-related factors were measured by the Job Content Questionnaire (Karasek et al., 1998). Besides measuring these possible covariates, actual health care utilization was assessed by the Trimbos/iMTA questionnaire for Costs associated with Psychiatric illness (TicP; Hakkaart-van Roijen, 2002).

Statistical analyses

Baseline characteristics and actual care within the CC- and CAU-group were compared using a Chi-square and Independent T-test, performed by the statistical package for the social sciences version 15.0 (SPSS). The analyses of the PHQ-9 and the derived measures response and remission were conducted with MLwiN version 2.5, a statistical package for multilevel analysis. A linear multilevel analysis was used for analyzing the continuous outcome parameter of the PHQ-9 and a logistic multilevel analysis was used for analyzing the derived dichotomous measurements. Patients were nested by location of care managers. If this hierarchical level does not influence the variance significantly, analyses will be performed at patient level. The data were analyzed on an intention-to-treat basis, i.e. the patients remained in the group to which they were randomly allocated at baseline. Multilevel analyses are flexible in handling missing data in longitudinal studies (Twisk, 2006). Moreover, random

intercepts and slopes are taken into consideration in this model. Propensity scores have been calculated to correct for possible bias at randomization (Bartak et al., 2009). Also, all analyses were corrected for the PHQ9-score at screening.

Potential covariates were added to the model following a forward selection procedure. If a covariate contributed significantly to the model, effect modification was subsequently assessed by adding an interaction term between the potential modifier and the intervention to the model. In case of effect modification, a 3-way-interaction term between the potential modifier, the intervention and time was included in the model to assess differences between the CC- and CAU-group at follow-up measurements, taking into account the influence of the covariate. First, respondents as a whole group were analyzed. After that, interaction terms between the intervention and the severity of depression at baseline were examined. All analyses were performed with two-tailed tests at a significance level of 5%.

Results

Employee flow

Recruitment of participants in this study took place over a two-year period. Figure 1 presents the flow of participants in this trial. A number of 14,595 employees who were sick listed between four and twelve weeks were approached. From these, 2955 filled out the screening questionnaire for depressive symptoms (response rate of 20.2%), from which 1404 (47.5%) were screened negatively and 1551 (52.5%) were screened positively for depression. From the 1551 employees who were screened positive, 1425 were excluded from the study because of various reasons (see Figure 1 for a summary of reasons). Finally, 126 employees were included in the study at baseline, of which 61 employees in the usual care group and 65 in de collaborative care group. The response rate at 3, 6, 9 and 12 months was respectively 77.8%, 71.4%, 66.7% and 58.7%. There were no significant differences between the CC- and CAU-group regarding response rates at follow-up measurements ($p > .05$).

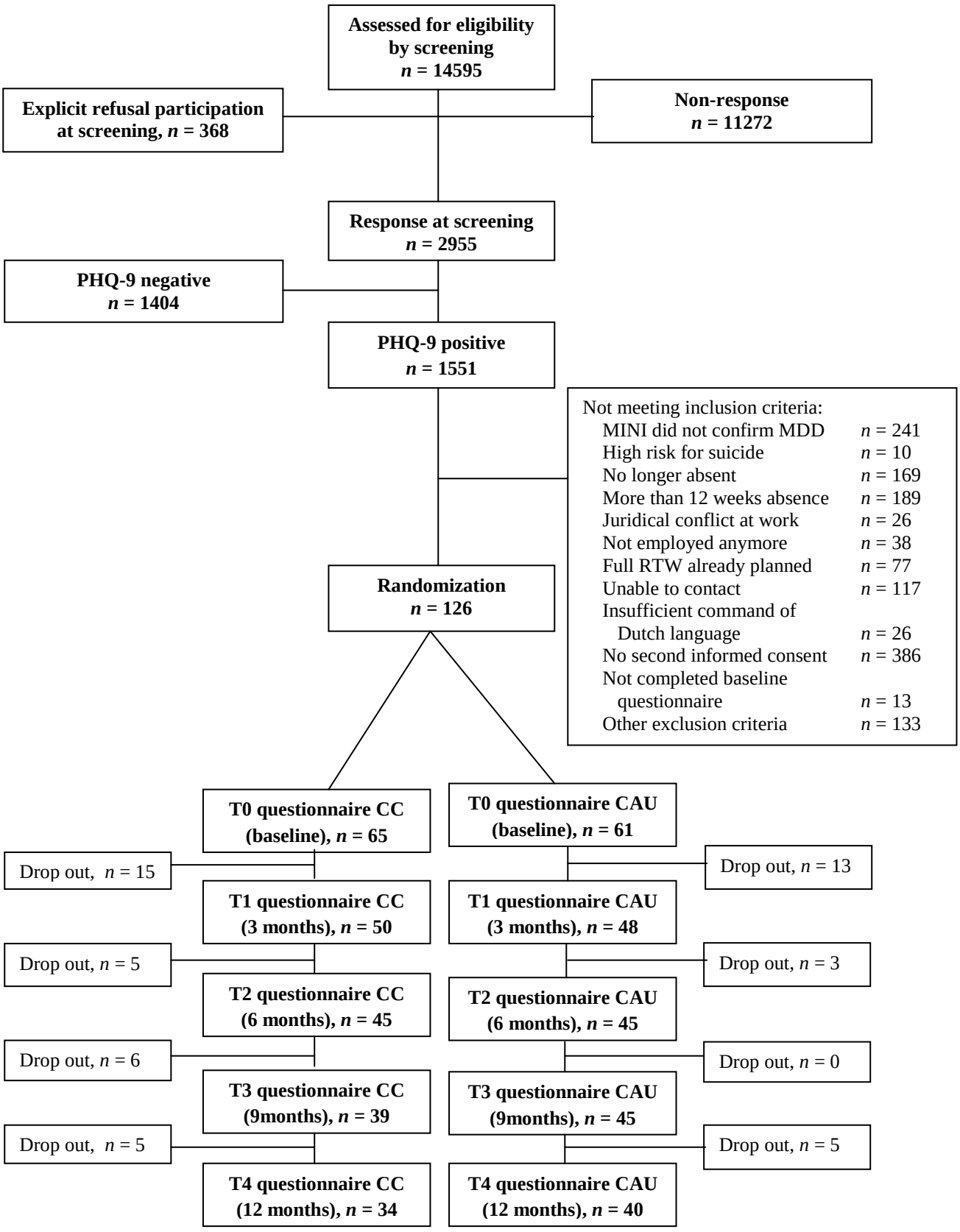

Figure 1. Flowchart of participants, according to CONSORT statement (Schulz, Altman,& Moher, 2010)

Baseline characteristics

Demographic and clinical characteristics at baseline of the CC-group and the CAU-group are shown in Table 1. At baseline, the study population had a mean score of 16 on the PHQ-9, which indicates a (moderately) severe level of depressive symptoms (Kroenke, Spitzer, & Williams, 2001). There were no significant differences in baseline characteristics between both groups, except for physical job demands. Participants in the CAU-group reported more physical job demands than participants in the CC-group.

Table 1. Baseline characteristics of study participants

	CC	**CAU**	***p*-value**
n	65	61	
Age in years	41.9 (11.4)	43.3 (11.4)	0.452
Sex (% man)	46.2	45.9	0.977
Married or cohabited (%)	60.0	73.3	0.115
Dutch Nationality (%)	95.4	91.8	0.410
Depressive symptoms (PHQ9, range 0-27)	15.9 (4.9)	16.0 (5.4)	0.887
Physical symptoms (PHQ15, range 0-30)	13.6 (5.1)	12.3 (5.1)	0.139
Generalized anxiety (PHQ, % positive)	51.6	50.8	0.933
Panic (PHQ, % positive)	15.9	16.9	0.873
Chronic diseases (CBS list)	1.8 (1.3)	2.0 (1.8)	0.540
Decision latitude (JCQ, range 25-96)	67.6 (12.6)	64.2 (12.4)	0.136
Psychological job demands (JCQ, range 14-48)	34.3 (5.7)	35.8 (5.4)	0.139
Physical job demands (JCQ, range 5-20)	9.5 (3.5)	11.3 (3.8)	0.006*
Job insecurity (JCQ. range 3-12)	7.8 (0.9)	7.9 (1.0)	0.686
Social support (JCQ, range 8-32)	21.4 (2.8)	20.5 (3.8)	0.154

Note. Numbers are means and standard deviations (SD), unless specified otherwise; CC = collaborative care; CAU = care as usual.
* $p < 0.05$.

Severity of depression

Response and remission

Response and remission rates increased at T1, T2, T3 and T4 in comparison with baseline (see Table 2). However, there was no significant difference in remission between the CC- and CAU-group at any of the follow-up measurements. With regard to response rate, both groups differed significantly at T1; compared to the CAU-group, there was a 2.8 times larger odds for response in the CC-group. The corresponding NNT (number needed to treat) at T1 was 4.5, which indicates that 4.5 extra patients needed collaborative care in comparison with usual care to achieve response in one additional person at T1. There was no significant difference in response rates at T2, T3 and T4.

Table 2. Rates of remission and response as well as odds ratio's at T1, 2, 3 and 4

		CC		CAU			95% CI	
		%	*n*	*%*	*n*	*OR*	LL	UL
Remission	**T1 (3 months)**	14.0	50	14.6	48	0.865	0.217	3.451
	T2 (6 months)	35.6	45	22.2	45	2.153	0.476	9.740
	T3 (9 months)	48.7	39	40.0	45	1.652	0.376	7.256
	T4 (12 months)	32.4	34	52.5	40	0.442	0.094	2.076
Response	**T1 (3 months)**	50.0	50	27.7	48	2.824*	1.148	6.942
	T2 (6 months)	62.2	45	57.8	45	1.111	0.455	2.710
	T3 (9 months)	66.7	39	57.8	45	1.548	0.608	3.943
	T4 (12 months)	55.9	34	75.0	40	0.357	0.121	1.052

Note. OR = odds ratio; CI = confidence interval, LL = lower limit, UL = upper limit. Analyses are corrected for propensity scores.
* $p < .05$

Reduction of depressive symptoms (continuous outcome parameter)

The mean scores of the PHQ-9 of the CC- and the CAU-group are presented in Table 3. In both groups severity of depressive symptoms reduced significantly at T1, T2, T3 and T4 compared to baseline. The reduction at these follow-up measurements was clinically relevant (≥ 5 points; Löwe, Unützer, Callahan, Perkins, & Kroenke, 2004). However, there were no significant differences in reduction between the CC- and CAU-group at any of the follow-up measurements.

Additional analyses showed that collaborative care is more effective than usual care for participants with a PHQ-9 score of 15 or higher at baseline indicating (moderately) severe depressive symptoms (Table 4). The difference in effectiveness between collaborative care and usual care within this subgroup was only significant at T1. Although the subscales of physical complaints, general anxiety and panic disorder on the PHQ-15 covaried with the PHQ-9 score ($p < .05$), none of them interacted with the intervention ($p > .05$). Also, physical job demands – a variable whereupon a significant difference between both groups was found at baseline – did not influence PHQ-9 outcomes ($p > .05$).

Table 3. Depressive symptoms of the study population

PHQ-9	CC		CAU			95% CI	
	M (SD)	*n*	*M (SD)*	*n*	*p*	*LL*	*UL*
T0	15.9 (4.9)	65	16.0 (5.4)	61	.887	-1.680	1.939
T1	8.9 (5.0)	50	9.9 (5.7)	48	.518	-2.773,	1.397
T2	7.1 (4.9)	45	7.8 (7.1)	45	.491	-2.892,	1.388
T3	7.3 (6.7)	39	6.9 (6.1)	45	.855	-1.987,	2.395
T4	7.7 (5.8)	34	5.9 (7.7)	40	.258	-0.972	3.626

Note. As the level of location of care manager did not influence variance, analyses were performed at patient level corrected for propensity scores; CI = confidence interval; LL = lower limit; UL = upper limit; T0 = baseline; T1 = 3 month follow-up; T2 = 6 month follow-up; T3 = 9 month follow-up; T4 = 12 month follow-up. * $p < .05$.

Table 4. Depressive symptoms of the subgroup with baseline-PHQ9 score ≥ 15

PHQ-9	CC		CAU			95% CI	
	M (SD)	*n*	*M (SD)*	*n*	*p*	*LL*	*UL*
T0	19.2 (2.9)	39	19.4 (3.3)	37	.735	-1.176	1.656
T1	8.9 (5.0)	31	12.1 (6.2)	27	.041*	-8.081	-.175
T2	7.6 (5.3)	26	9.8 (6.4)	27	.113	-7.280	0.768
T3	8.7 (6.6)	22	8.6 (6.9)	24	.575	-5.291	2.937
T4	9.0 (6.5)	20	6.9 (6.2)	19	.643	-3.289	5.323

Note. As the level of location of care manager did not influence variance, analyses were performed at patient level corrected for propensity scores; CI = confidence interval; LL = lower limit; UL = upper limit; T0 = baseline; T1 = 3 month follow-up; T2 = 6 month follow-up; T3 = 9 month follow-up; T4 = 12 month follow-up. * $p < .05$.

Actual care

Patients in the CC- and CAU-group visited various health care professionals in the 12 months after baseline (Table 5). Generally, there were no significant differences between the CC- and CAU-group in consulting health care professionals. However, more patients in the CC-group did consult the OP-care manager in comparison with the CAU-group and fewer patients in the CC-group participated in intensive outpatient treatment than in the CAU-group.

Table 5. Actual care during 12-month period

	CC-group % (*n*)	CAU-group % (*n*)	*p*-value
Contact general practitioner (GP)	97.9 (46/47)	96.1 (49/51)	0.607
Contact occupational physician (OP)	98.0 (49/50)	98.0 (48/49)	0.988
Contact OP-care manager	82.5 (33/40)	9.1 (3/33)	0.000*
Contact psychologist, psychiatrist or psychotherapist	76.1 (35/46)	90.7 (39/43)	0.066
Participation in intensive outpatient treatment for psychological problems	3.4 (1/29)	22.9 (8/35)	0.026*
Participation in inpatient treatment for psychological problems	3.4 (1/29)	9.4 (3/32)	0.350
Contact social worker	26.5 (9/34)	28.9 (11/38)	0.815
Contact medical specialist	53.1 (17/32)	50.0 (20/40)	0.792
Contact paramedic	50.0 (18/36)	61.0 (25/41)	0.333
Contact alternative healer	29.4 (10/34)	26.5 (9/34)	0.787
Contact self-help group	9.7 (3/31)	23.5 (8/34)	0.137

Note. % = percentage of patients that had contact with the health care professional (if all follow up forms contained only missing data and no contact answers, in the analyses these were included as missing). *n* = amount of people who consulted the health care professional, followed by the total amount of patients who filled out the TicP regarding the health care professional.
* $p < .05$.

Discussion

Effectiveness of collaborative care

The main objective of this study was to evaluate the effectiveness of collaborative care compared to usual care for sick-listed employees with MDD. The study showed a higher response rate at 3 month follow-up for employees who received collaborative care. No differences in response rate were found at 6, 9 and 12 month follow-up and no differences were found in remission. During all four follow-ups, collaborative care did not show a superior effect regarding the continuous outcome parameter of the PHQ-9. Nevertheless, ancillary analyses suggested that collaborative care is more effective in reducing symptoms of depression for employees with (moderately) severe symptoms (PHQ9 $\geq$ 15). Employees within this subgroup reported fewer depression symptoms at 3 months compared to usual care. However, this difference in symptom reduction was not present anymore at 6 months.

The study results differ from previous studies, which were mainly conducted within the primary care system in the USA (Bower, Gilbody, Richards, Fletcher, & Sutton, 2006; Gilbody, Bower, Fletcher, Richards, & Sutton, 2006; Gensichen et al., 2006). Although collaborative care was more effective with regard to the response rate at 3 months, the present study – in contrast to other studies – did not show a superior effect of collaborative care in

reducing depressive symptoms. This discrepancy may be explained as follows. First, patients may have distrusted the OP-care manager. In contrast to other studies, the role of the care manager in the present study was fulfilled by an OP, whereas in various countries patient-OP distrust is recognized (Buijs, 2006) and confidence in a mental health care professional is necessary for successful treatment (Hermans, Eelen, & Orlemans, 2006; Noorlander & de Niet, 2009). Second, implementation of the collaborative care intervention may have been insufficient. Previous research shows that guideline adherence by Dutch OP's is minimal in sickness-certification and guidance (Rebergen et al., 2006). Possibly, guideline adherence in treating patients with MDD is also minimal because the role of the OP-care manager is new to them. They had no experience with treating patients conform protocol. Third, there may not have been sufficient contrast in treatment effectiveness between the CC- and CAU-group because in the present study usual care seems to be more effective with regard to response rates than in other studies (Gensichen et al., 2006; Unützer et al., 2002).

Although the present study showed no effect of collaborative care in the reduction of depressive symptoms, collaborative care seems effective at 3 months for patients with (moderately) severe depressive symptoms. This confirms findings of previous studies showing that collaborative care improved outcomes only in subgroups of patients with a higher severity of depression (Craven & Bland, 2006; Walker et al., 2000). The superior effect of collaborative care had disappeared at 6 months. Possibly, after the intervention ceased and the support of the psychiatrist discontinued, pharmacotherapy alone was not adequate to maintain a superior effect of collaborative care compared to care as usual. Patients with more severe depression may need more intensive clinician follow-up and/or psychotherapy to achieve sustained improvement (Walker et al., 2000).

Actual care

Although the CC- and CAU-group contacted similar health professionals, they differed in their contact with the OP-care manager and in participation in intensive outpatient treatment. As expected, more patients in the CC-group reported visiting the OP-care manager. However, the fact that only 82.5% of people in the CC-group reported visiting the OP-care manager indicates that 17.5% reported not visiting the OP-care manager in spite of having been referred to an OP-care manager. Due to the way missing items were allocated in the analysis procedure regarding actual care (see subscript of Table 5), the percentage of 17.5% may even be a slight underestimation. Possibly, not all people knew the term used for the OP-care

manager, leading to a negative answer on the question regarding contact with him. Moreover, it is conceivable that patients refrained from collaborative care, because they were already treated by another health care professional at the moment of inclusion in the study. Besides difference in contact with the OP-care manager, participation in intensive outpatient treatment differed between both groups; fewer patients in the CC-group participated in intensive outpatient treatment. This indicates that collaborative care may prevent the transfer of depressive patients to expensive secondary mental health care.

Strengths and limitations of the study

The present study provides a valuable contribution to the evaluation of the effectiveness of collaborative care. As far as we know, this study is the first RCT in which collaborative care is evaluated in the occupational health care setting for patients with MDD. Furthermore, it was possible to follow patients for a relatively long period of 12 months. A large geographical area of the Netherlands was covered in this study because of collaboration with the OHS.

Despite these strengths, this study has a few limitations. First, it is not possible to specifically attribute outcomes to particular components of the collaborative care intervention because the intervention contains many components which run parallel to each other. Second, data are obtained by self-report questionnaires. Although interviewer bias is excluded in this type of questionnaire, it is sensitive for bias of respondents; respondents may fail to understand questions, which may not be visible to the researcher (De Leeuw, Hox, & Dillman, 2008). Finally, generalization to other countries may be limited because treatment is separated from sickness certification in Dutch social insurance legislation and countries differ in their level of occupational health care coverage (Buijs, van Dijk, Evers, van der Klink, & Anema, 2007).

The present study leads to a number of recommendations for future research. First, a per-protocol analysis of the data can be performed. In the present study it was not possible to conduct a per-protocol analysis, because the power of the analysis would be too small if only patients were taken into consideration who had completed all measurements. Second, more research is needed within the subgroup of employees with (moderately) severe depressive symptoms, because collaborative care seems effective for this sub-group in reducing depressive symptoms. Third, qualitative research is desirable to acquire a broader

understanding of the limits, obstacles and strengths of collaborative care in the occupational health care setting.

Conclusion

Although collaborative care leads to a higher response rate at short term, it seems that collaborative care does not lead to better results in the reduction of depressive symptoms for Dutch employees who reported depressive symptoms in general. However, it does lead to reduced participation in expensive intensive outpatient treatment which indicates that collaborative care is possibly cost-effective.

Abbreviations

MDD	Major depressive disorder
CAU-group	Care as usual group (control group)
CC-group	Collaborative care group
GP	General practitioner
MINI	mini-International Neuropsychiatric Interview
OHS	Occupational health care service
OP	Occupational physician
PST	Problem solving treatment
RCT	Randomized controlled trial
TicP	Trimbos/iMTA questionnaire for Costs associated with Psychiatric illness

References

Adler, D. A., McLaughlin, T. J., Rogers, W. H., Chang, H., Lapitsky, L., & Lerner, D. (2006). Job performance deficits due to depression. *American Journal of Psychiatry, 163,* 1569-1576.

Adli, M., Bauer, M., & Rush, A. J. (2006). Algorithms and collaborative-care systems for depression: are they effective and why? A systematic review. *Biological Psychiatry, 59,* 1029-1038. doi: 10.1016/j.biopsych.2006.05.010

Anema, J. R., Jettinghoff, K., Houtman, I., Schoemaker, C. G., Buijs, P. C., & Berg, R. van den (2006). Medical care of employees long-term sick listed due to mental health problems: a cohort study to describe and compare the care of the occupational physician and the general practitioner. *Journal of Occupational Rehabilitation, 16,* 41-52. doi: 10.1007/s10926-005-9001-4

Anema, J. R., Steenstra, I. A., Bongers, P. M., Vet, H. C. de, Knol, D. L., Loisel, P., Mechelen, W. van (2007). Multidisciplinary rehabilitation for subacute low back pain: graded activity or workplace intervention or both? A randomized controlled trial. *Spine, 32,* 291-298.

Bartak, A., Spreeuwenberg, M. D., Andrea, H., Busschbach, J. J. V., Croon, M. A., Verheul, R., . . . Stijnen, T. (2009). The use of propensity score methods in psychotherapy research: a practical application. *Psychotherapy and Psychosomatics, 78,* 26-34. doi: 10.1159/000162298

Bijl, D., Marwijk, H. W. van, Haan, M. de, Tilburg, W. van, & Beekman, A. T. F. (2004). Effectiveness of disease management programmes for recognition, diagnosis, and treatment of depression in primary care. *European Journal of General Practice, 10,* 6-12.

Bijl, R. V. & Ravelli, A. (2000). Current and residual functional disability associated with psychopathology: findings from the Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Psychological Medicine, 30,* 657-668.

Bilsker, D., Wiseman, S., & Gilbert, M. (2006). Managing depression-related occupational disability: a pragmatic approach. *Canadian Journal of Psychiatry, 51,* 76-83.

Bower, P., Gilbody, S., Richards, D., Fletcher, J., & Sutton, A. (2006). Collaborative care for depression in primary care. Making sense of a complex intervention: systematic review and meta-regression. *British Journal of Psychiatry, 189,* 484-493. doi: 10.1192/bjp.bp.106.023655

Bowling, A. (1995). What things are important in people's lives? A survey of the public's judgements to inform scales of health related quality of life. *Social Science and Medicine, 41,* 1447-1462.

Buijs, P., Anema, H., Evers, M., Dijk, F. van, & Klink, J. van der (2006). How general practitioners can manage work-related psychological complaints. Design and pilot of a guideline: a contribution towards solving a huge problem. *European Journal of General Practice, 12,* 138-141. doi: 10.1080/13814780600881201

Buijs, P. C., Van Dijk, F. J. H., Evers, M., Klink, J. J. L van der, & Anema, H. (2007). Managing work-related psychological complaints by general practitioners, in coordination with occupatinal physicians: a pilot sttudy. *Industrial Health, 45,* 37-43.

Chew-Graham, C. A., Lovell, K., Roberts, C., Baldwin, R., Morley, M., Burns, A., . . . Burroughs, H. (2007). A randomised controlled trial to test the feasibility of a collaborative care model for the management of depression in older people. *British Journal of General Practice, 57,* 364-370.

Craven, M. A., & Bland, R. (2006). Better practices in collaborative mental health care: an anlysis of the evidence base. *The Canadian Journal of Psychiatry, 51,* 1-72.

Cuijpers, P (2003). *In de put, uit de put: zelf depressiviteit overwinnen.* Baarn: HB Uitgevers.

Cuijpers, P. & Buijssen, H (1997). *Werkboek ik zie het weer zitten: omgaan met depressiviteit.* Utrecht: Teleac/NOT.

Cuijpers, P., Straten, A. van, & Warmerdam, L. (2007). Problem solving therapies for depression: a meta-analysis. *European Psychiatry, 22,* 9-15. doi: 10.1016/j.eurpsy.2006.11.001

Gensichen, J., Beyer, M., Muth, C., Gerlach, F. M., Korff, M. von, & Ormel, J. (2006). Case management to improve major depression in primary health care: a systematic review. *Psychological Medicine, 36,* 7-14. doi: 10.1017/S0033291705005568

Gilbody, S., Bower, P., Fletcher, J., Richards, D., & Sutton, A. J. (2006). Collaborative care for depression: a cumulative meta-analysis and review of longer-term outcomes. *Archives of Internal Medicine, 166,* 2314-2321.

Graaf, R. de, Have, M. ten, & Dorsselaer, S. van (2010). *De psychische gezondheid van de Nederlandse bevolking. NEMISIS: opzet en eerste resultaten.* Utrecht: Trimbos-instituut.

Hakkaart-van Roijen (2002). Handleiding Trimbos/iMTA questionnaire for costs associated with psychiatric illness. Rotterdam: Institute for Medical Technology Assessment.

Henderson, M., Glozier, N., & Holland, E. K. (2005). Long term sickness absence. *British Medical Journal, 330,* 802-803. doi: 10.1136/bmj.330.7495.802

Hermans, D., Eelen, P., & Orlemans, J. W. G. (2007). *Inleiding in de gedragstherapie (6e druk).* Houten: Bohn Stafleu Van Loghum.

Jong, F. J. de, Steenbergen-Weijenburg, K. M. van, Huijbregts, K. M., Vlasveld, M. C., Marwijk, H. W. van, Beekman, A. T., & Feltz-Cornelis, C. M. van der (2009). The depression initiative: description of a collaborative care model for depression and of the factors influencing its implementation in the primary care setting in the Netherlands. *International Journal of Integrated Care, 9,* 1-9.

Karasek, R., Brisson, C., Kwakami, N., Houtman, I., Bongers, P., & Amick, B. (1998). The job content questionnaire (JCQ): an instrument for internationally comparative assessments of psychosocial job characteristics. *Journal of Occupational and Health Psychology, 3,* 322-255.

Katon, W. J. & Seelig, M. (2008). Population-based care of depression: team care approaches to improving outcomes. *Journal of Occupational and Environmental Medicine, 50,* 459-467. doi: 10.1097/JOM.0b013e318168efb7

Klink, J. J., van der, Ausems, C. C. M., Beijderwellen, B. D., Blonk, R., Bruinvels, D. J., Dogger, J., . . . Roos, L. de (2007). *Guideline for the occupational physician in workers with mental health problems*. Utrecht: NVAB (Dutch Association of Occupational Physicians).

Koopmans, P. C., Roelen, C. A., & Groothoff, J. W. (2007). Sickness absence due to depressive symptoms. *International Archives of Occupational and Environmental Health, 81,* 711-719. doi: 10.1007/s00420-007-0243-7

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine, 16,* 606-613.

Kroenke, K., Spitzer, R. L., Williams, J. B., & Löwe, B. (2010). The Patient Health Questionnaire somatic, anxiety and depressive symptom scales: a systematic review. *General Hospital Psychiatry, 32,* 345-359. doi: 10.1016/j.genhosppsych.2010.03.006

Kruijshaar, M. E., Hoeymans, N., Bijl, R. V., Spijker, J., & Essink-Bot, M. L. (2003). Levels of disability in major depression: findings from the Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Journal of Affective Disorders, 77,* 53-64. doi: 10.1016/S0165-0327(02)00099-X

Leeuw, D. de, Hox, J. J., & Dillman, D. A. (Eds.). (2008). *International Handbook of Survey Methodology*. New York: Psychology Press.

Lerner, D., Adler, D. A., Chang, H., Lapitsky, L., Hood, M. Y., Perissinotto, C., . . . Rogers, W. H. (2004). Unemployment, job retention, and productivity loss among employees with depression. *Psychiatric Services, 55,* 1371-1378.

Löwe, B., Unützer, J., Callahan, C. M., Perkins, A. J., & Kroenke, K. (2004). Monitoring depression treatment outcomes with the patient health questionnaire-9. *Medical Care, 42,* 1194-1201.

Mynors-Wallis, L. (2001). Problem solving treatment in general psychiatric practice. *Advances in Psychiatric Treatment, 7,* 417-425. doi: 10.1192/apt.7.6.417

Mynors-Wallis, L., Davies, I., Gray, A., Barbour, F., & Gath, D. (1997). A randomised controlled trial and cost analysis of problem-solving treatment for emotional disorders given by community nurses in primary care. *British Journal of Psychiatry, 170,* 113-119. doi: 10.1192/bjp.170.2.113

Noorlander, R. & De Niet, G. (2009). De therapeutische relatie als middel tegen therapieontrouw bij depressie. *Psychopraktijk, 2,* 15-17.

Ormel, J., Bartel, M., & Nolen, W. A. (2003). Onderbehandeling bij depressie. *Nederlands Tijdschrift voor Geneeskunde, 147,* 1005-1009.

Ormel, J., Bartel, M., & Nolen, W. A. (2004). De depressieparadox: werkzame behandelingen, maar geen dalende prevalentie. *Tijdschrift voor Psychiatrie, 46,* 237-246.

Rebergen, D. S., Hoenen, J. A. H. J., Heinemans, A. M. E. C., Bruinvels, D. J., Bakker, A. B., & Mechelen, W. van (2006). Adherence to mental health guidelines by Dutch occupational physians. *Occupational Medicine, 56,* 461-468.

Richards, D. A., Lovell, K., Gilbody, S., Gask, L., Torgerson, D., Barkham, M., . . . Richardson, R. (2008). Collaborative care for depression in UK primary care: a randomized controlled trial. *Psychological Medicine, 38,* 279-287. doi: 10.1017/s0033291707001365

Schulberg, H. C. (2001). Treating depression in primary care practice. *The Journal of Family Practice, 50,* 535-537.

Schulz, K. F., Altman, D. G., & Moher, D. (2010). CONSORT 2010 Statement: updated guidelines for reporting parallel group randomied trials. *BMC Medicine, 8,* 1-9.

Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., . . . Lépine, J. P. (1998). The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry, 59,* 22-33.

Simon, G. (2008). Collaborative care for mood disorders. *Current Opinion in Psychiatry, 22,* 37-41. doi: 10.1097/YCO.0b013e328313e3f0

Smit, F., Cuijpers, P., Oostenbrink, J., Batelaan, N., Graaf, R. de, & Beekman, A. (2006). Costs of nine common mental disorders: implementations for curative and preventive psychiatry. *Journal of Mental Health Policy and Economics, 9,* 193-200.

Spitzer, R. L., Kroenke, K., & Williams, J. B. W. (1999). Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. *JAMA, 282(18),* 1737-1744.

Stewart, W. F., Ricci, J. A., Chee, E., Hahn, S. R., & Morganstein, D. (2003). Cost of lost productive work time among US workers with depression. *JAMA, 289,* 3135-3144.

Szymanski, E. M., Parker, R. M., Ryan, C., Merz, M. A., Trevino-espinoza, B., & Johnson-Rodriquez, S. (2003). Work and disability: basic constructs. *Work and disability,* 1-26.

Twisk, J. W. R. (2006). *Applied multilevel analysis: a practical guide.* New York: Cambridge University Press.

Unützer, J., Katon, W., Callahan, C. M., Williams, J. W., jr., Hunkeler, E., Harpole, L., . . . Langston, C. A. (2002). Collaborative care management of late-life depression in the primary care setting: a randomized controlled trial. *JAMA, 288,* 2836-2845.

Unützer, J., Katon, W., Williams, J. W. jr., Callahan, C. M., Harpole, L., Hunkeler, E. M., . . . Langston, C. A. (2001). Improving primary care for depression in late life: the design of a multicenter randomized trial. *Medical Care, 39,* 785-799.

Vlasveld, M. C., Anema, J. R., Beekman, A. T. F., van, Hoedeman, R., Marwijk, H. W. J. van, Rutten, F. F., . . . Feltz-Cornelis, C. M. (2008). Multidisciplinary collaborative care for depressive disorder in the occupational health setting: design of a randomised controlled trial and cost-effectiveness study. *BMC Health Services Research, 8.* doi: 10.1186/1472-6963-8-99

Vlasveld, M. C., Marwijk, H. W., van & Feltz-Cornelis C. M. van der (2010). Depressie te lijf met het 'collaborative care'-model. *Nederlands Tijdschrift voor Geneeskunde, 154*.

Vliet, I. van & Beurs, E. de (2007). Het Mini Internationaal Neuropsychiatrisch Interview: een kort gestructureerd diagnostisch interview voor DSM-IV en ICD-10 psychiatrische stoornissen. *Tijdschrift voor Psychiatrie, 49,* 393-397.

Vliet, I. van, Leroy, H., & Megen, H. van (2000). *De MINI-Internationaal Neuropsychiatrisch interview: een kort gestructureerd diagnostisch interview voor DSM-IV en ICD-10 psychiatrische stoornissen.* Leiden: LUMC.

Waddell, G. & Burton, A. K. (2001). Occupational health guidelines for the management of low back pain at work: evidence review. *Occupational Medicine, 51,* 124-135.

Walker, E. A., Katon, W. J., Russo, J., Korff, M. von, Lin, E., Simon, G., . . . Unützer, M. D. (2000). Predictors of outcome in a primary care depression trial. *Journal of General Internal Medicine, 15,* 859-867.

Wang, P. S., Beck, A. L., Berglund, P., McKenas, D. K., Pronk, N. P., Simon, G. E., & Kessler, R. C. (2004). Effects of major depression on moment in time work performance. *American Journal of Psychiatry, 161,* 1885-1891.

Willems, J. H. B. M. & Doppegieter, R. M. S. (2007). De scheiding van 'behandeling en controle': aan actualisering toe? *Tijdschrift voor bedrijfs- en verzekeringsgeneeskunde, 15,* 164 - 167.

Zitman, F. (2008). Comorbiditeit van depressie. In Huyser, J., Schene, A.H., Sabbe, B., & Spinhoven, Ph. (eds). *Handboek depressieve stoornissen* (pp. 69-80). Utrecht: de Tijdstroom.