Emotional Demands at Work and the Risk of Clinical Depression

A Longitudinal Study in the Danish Public Sector

Marianne Agergaard Vammen, MSc, Sigurd Mikkelsen, MD, Åse Marie Hansen, PhD, Jens Peter Bonde, PhD, Matias B. Grynderup, PhD, Henrik Kolstad, PhD, Linda Kærlev, PhD, Ole Mors, PhD, Reiner Rugulies, PhD, and Jane Frølund Thomsen, PhD

Objective: This study is a 2-year follow-up study of different dimensions of work-related emotional demands as a predictor for clinical depression. **Methods:** In a two-wave study, 3224 (72%) public employees from 474 work-units participated twice by filling in questionnaires. Sixty-two cases of clinical depression were diagnosed. Emotional demands were examined as perceived and content-related emotional demands, individually reported and work-unit based. Support, meaningful work, and enrichment were considered as potential effect modifiers. **Results:** Individually reported perceived emotional demands predicted depression (odds ratio: 1.40; 95% confidence intervals: 1.02 to 1.92). The work-unit based odds ratio was in the same direction, though not significant. Content-related emotional demands did not predict depression. Support, meaningful work, and enrichment did not modify the results. **Conclusions:** The personal perception of emotional demands was a risk factor for clinical depression but specific emotionally demanding work tasks were not.

Learning Objectives

- Become familiar with previous research on the emotional demands of person-related work and the risk of depression.
- Summarize the new findings on the association between individual and work unit emotional demands and the risk of clinical depression.
- Discuss the role of content-related emotional demands as well as potential modifying factors such as workplace support.

Depression constitutes a major burden of disease in middle- and high-income countries assessed by disability-adjusted life years and a large health problem in the working-age population.[1–3] The point prevalence of depression is estimated to be 3.5% to 5% in the Nordic countries and may be increasing.[4]

Person-related work, especially within health care, education, and social work, has repeatedly been identified as a risk factor for depression, other mental disorders, and use of antidepressive medication.[5–8]

Emotional demands at work are a characteristic of person-related work[9] and may be an explanatory factor with respect to developing depression. In three prospective register-based studies of working populations, emotional demands at baseline predicted the subsequent use of antidepressants,[5,10,11] however, not significantly so in one of them.[11] In two prospective questionnaire-based population studies, emotional demands predicted a high level of depressive symptoms.[12,13] Emotional demands were also associated with hospitalization for clinical depression in a case-control study based on a job-exposure-matrix of work-related psychosocial exposures, although only for women.[14]

Emotional demands have been measured by different sets of items.[15–19] Some have relied on perceived emotional demands without considering the content (eg, Is your work emotionally demanding?)[15] and others on assessment of content-related emotional demands without considering how it is perceived (eg, Do you have contact with difficult clients or patients in your work?).[16] Some scales of emotional demands include both types of items.[19] It could be assumed that questions concerning content-related emotional demands would result in a less individual-dependent assessment of exposure than perceived emotional demands.

Measures of work-related psychosocial exposures less dependent on individual assessment may also be achieved by averaging individual self-reported exposures by occupations or work-units assumed to have homogeneous exposures.[20] One study used a job-exposure-matrix in the analyses of the relation between emotional demands and depression[14]; all other studies were based on individual exposure assessments of emotional demands.[5,10–12,21]

There may be significant differences in estimated associations between work environment risk factors and depression, depending on whether the exposure is assessed by individual self-reports or aggregated work-units reports.[20] Individual exposure assessment is a special problem when depression is the outcome, because depression or subclinical depression may influence the perception of the exposure, resulting in inflated exposure-response associations. Individual perceptions may be affected by life circumstances outside the workplace also affecting the person's mood and potentially bias the estimates.

Depression has been defined and measured in different ways in studies of emotional demands. In some studies, self-reported depressive symptoms have been the outcome measure,[13,21] whereas in other studies, psychiatric patient records or, as a proxy for disease, prescription registers have been used.[5,11,14] Self-reported symptoms and the use of prescription registers may lead to misclassification of cases.[5,13] Psychiatric patient-records may include

From the Department of Occupational and Environmental Medicine, Bispebjerg University Hospital, Bispebjerg Bakke (Vammen, Drs Mikkelsen, Bonde, Thomsen); Department of Public Health, University of Copenhagen (Drs Hansen, Grynderup, Rugulies); National Research Centre for the Working Environment, Copenhagen (Drs Hansen, Rugulies); Department of Occupational Medicine, Danish Ramazzini Centre, Aarhus University Hospital (Dr Kolstad); Research Unit of Clinical Epidemiology, Institute of Clinical Research, University of Southern Denmark (Dr Kærlev); Center for Clinical Epidemiology, Odense University Hospital (Dr Kærlev); Research Department P, Aarhus University Hospital, Risskov (Dr Mors); and Department of Psychology, University of Copenhagen, Denmark (Dr Rugulies).

Authors Vammen, Mikkelsen, Hansen, Bonde, Grynderup, Kolstad, Kærlev, Mors, Rugulies, and Thomsen have no other relationships/conditions/circumstances that present potential conflict of interest.

The JOEM editorial board and planners have no financial interest related to this research.

Marianne Agergaard Vammen was funded by Lundbeck A/S. Lundbeck A/S was not involved in any parts of the study or the preparation of the article.

The PRISME study was supported by an unrestricted research grant from the Danish Working Environment Research Fund (j.nr. 5-2005-09) and Lundbeck A/S.

There is no conflict of interest.

Address correspondence to: Marianne Agergaard Vammen, MSc, Department of Occupational and Environmental Medicine, Bispebjerg University Hospital, Bispebjerg Bakke, Copenhagen DK2400 Denmark (marianne.agergaard.vammen@regionh.dk).

DOI: 10.1097/JOM.0000000000000849

severely ill individuals who may not be comparable to individuals in the working population.[14,22]

Any adverse effects of emotional demands could potentially be buffered by positive work factors. Emotionally demanding work may be emotionally enriching or rewarding.[23] Emotional demanding work may also be felt as very meaningful. Social support by colleagues and superiors is generally considered to counteract negative effects of negative work environment factors. Meaningful work and social support at work has been associated with lower risk of depression.[11,12,21]

The aim of this study was to examine whether work-related emotional demands is a risk factor for the development of clinical depression and whether such a relation is modified by a positive work environment.

The study is a 2-year follow-up study of emotional demands at baseline as a predictor for clinical depression at follow-up. We examined the association for subjectively perceived emotional demands and for work content assumed to be emotionally demanding, including patient-care work. Clinical depression was assessed by a standardized interview of participants with high levels of questionnaire-reported mental symptoms. We examined whether the associations between emotional demands and clinical depression were modified by positive work characteristics in terms of meaningful work, social support from colleagues and supervisors, and emotional enrichment.

METHODS

Design

The design is a 2-year follow-up study on emotional demands at work, measured at baseline, as a predictor for depression at follow-up. Cases with clinical depression were diagnosed by a standardized psychiatric interview of participants with high levels of mental symptoms, at baseline and at follow-up. The study is based on the Danish PRISME cohort study with data collection in 2007 and 2009.[20,24,25]

Population

In January 2007, we invited 10,036 public employees from 502 work-units in Aarhus, Denmark, to participate in the PRISME study. A work unit was defined by the employee's immediate supervisor. The workplaces included hospitals, schools, day care centers, social, technical and environmental services, and administration. The most common professions were nurses (29.2%), social workers and counseling professionals (17.6%), teachers (10.2%), managers (6.6%), medical doctors (5.9%), nursing aids (5.3%), office clerks (4.3%), and preschool teachers (4.2%) (details published in Kolstad et al 2011.[20]

A total of 4489 employees (44.7%) from 474 work-units participated by filling in a postal questionnaire on work, health, lifestyle, and personal circumstances. Participants from 2007 were invited to participate in January 2009 and 3287 (72%) filled in the follow-up questionnaire.

Emotional Demands

We used three measures of emotional demands: perceived emotional demands, content-related emotional demands, and patient-care emotional demands. The items, response options, and item scores are shown in Fig. 1. Each of the measures was scored as the mean of item-scores. If more than half of the items were missing, the score was set to missing.

Perceived emotional demands items were derived from the emotional demands scale of the Copenhagen Psychosocial Questionnaire.[15,19] Content-related emotional demands items were collected from multiple existing questionnaires.[26–29] Patient-care emotional demands items were designed specifically for this study.

Mental Symptoms

We assessed depressive symptoms by the Common Mental Disorder Questionnaire subscale for depression (six items),[30] stress symptoms by the Perceived Stress Scale (four items),[31] and burn-out by the Copenhagen Burn-Out Inventory (six items).[15] All questions

Questions
Perceived emotional demands*
• Is your work emotionally demanding?
• Do you get emotionally involved in your work?
Content-related emotional demands*
• Do you have to care for the emotional needs of others?
• Do you have to deal with others' grieves and worries?
• Do you have to cope with the suffering or death of others?
• Do you have to deal with "difficult" patients, clients, students etc?
• Are you at risk of making mistakes that may hurt other people?
Patient-care emotional demands**
• On average, how many times daily are you involved in procedures that are painful for the patient?
• In the last month, how many consultations have you had with patients or relatives about a poor condition of the patient?
• In the last month, how many patients that you have been in direct contact with have died?
• In the last month, how many times have you participated in surgery that did not work out as planned or had a high risk?

* Introduction text: Please answer the following questions about your work. Scores: 1='to a very large extent', 2='to a large extent', 3='to some extent', 4='to a small extent' and 5='to a very small extent'.
** Introduction text: The following questions are answered only if you have to do with patients in your daily work. Scores: 1='none', 2='one', 3='two-three', 4='four-five', 5='six-ten' and 6='more than ten'.

FIGURE 1. Measures of emotional demands.

concerned the last 4 weeks and responses were given on 5-point ordinal scales (scores 1 to 5). Depression items were dichotomized (0 = item score < 3, 1 = item score ≥3), and summed to a depression symptom scale with scores from 0 to 6. Burn-out and perceived stress scale scores were calculated as the mean of item scores (range 1 to 5). Higher scale scores indicate higher levels of depression, burn-out, and perceived stress, respectively. If responses to more than half of the items of a scale were missing, the scale score was set to missing.

Screening for Clinical Depression

Participants with high levels of mental symptoms were invited to participate in a standardized psychiatric interview. At baseline, we invited participants with a depression symptom score at least 3, a burn-out score at least 4, or a perceived stress score at least 2.5. We further invited a random sample of questionnaire responders. Analyses of these baseline data showed that the screening for cases with clinical depression would be more efficient with slightly changed selection criteria. At follow-up, we invited participants with a high symptom level on at least two of the three mental symptom scales. High symptom levels were defined as a score of at least 2 on the depression symptom scale, at least 2.5 on the burn-out scale, and at least 2.5 on the perceived stress scale.

Diagnosis of Clinical Depression

Clinical depression was diagnosed by a psychiatric SCAN-interview (Schedule for Clinical Assessment in Neuropsychiatry, version 2.1, part I, section 6, 7, and 8 and 10) according to the International Classification of Diseases, Tenth Revision: diagnostic criteria for research (ICD-10-DCR).[32] The interviews referred to symptoms the previous 3 months.[33] Participants fulfilling the criteria for a mild, moderate, and severe ICD-10-DCR depression were categorized as depressed.

Positive Work Characteristics

We hypothesized that any adverse effects of emotional demands would be modified by social support from colleagues and superiors, by experiencing the work as meaningful and important, and as emotionally enriching. These aspects of work were measured from questionnaire data in 2007. Social support from supervisors and colleagues was measured separately by five-level items on supervisors and colleagues support[9] and meaningful work was assessed by the mean score of three 5-level items (eg, "Is your work meaningful? "Do you feel that the work you do is important?").[15] Emotional enrichment was measured by 1 question designed for this study: "Do you feel that your work with patients, clients, students etc. is emotionally enriching and satisfying?" scored on a five-level scale from 1 "to a very small extent" to 5 "to a very large extent."

Potential Confounders

We included the following socio-demographic variables as potential confounders: sex, age (continuous), education beyond primary or high school (none or short training (<3 years), medium higher (3 to 4 years) and long higher (>4 years) education), personal annual income in Danish crowns (continuous). As factors related to mental health and social life, we used family history of depression (yes/no), previous episodes of depression (yes/no), traumatic life events during the last 6 months (continuous), cohabitation (yes/no), and loneliness (yes/no). Participants' lifestyle was assessed by alcohol consumption (continuous), smoking (never and former/present smoker), physical activity, and body mass index (BMI, continuous).

Age and sex were recorded from the employee register files. The other information was recorded from the questionnaires. BMI was calculated from self-reported weight and height [BMI = weight (kg)/height^2 (m^2)]. Traumatic life events within the last 6 months were measured in 2009 with nine questions on, for example, death of or serious illness among relatives or friends, marital problems, or financial problems.[34] Items were scored as 0 = "no" or "yes, it was not bad," 1 = "yes, it felt bad," 2 = "yes, it felt very bad." For the analyses, we used the maximum score of the nine items.

Neurotic personality trait (neuroticism) was measured with Eysenck Personality Questionnaire Revised-Abbreviated version (continuous, scale 0 to 1).[35]

Statistical Analysis

We pursued less individual-dependent assessments of emotional demands by calculating the means of the three emotional demands variables for each work-unit. The mean values were then assigned to all employees in a particular work-unit. Positive work characteristics and potential confounders were analyzed at the individual level.

The association between emotional demands at baseline and the risk of clinical depression at follow-up was examined by logistic regression, separately for each of the three individual-based emotional demands variables, and for the three work-unit-based emotional demands variables. Analyses were performed using both continuous-scale exposure information and exposure divided into tertiles forming a low-, medium-, and high-exposure group.

Potential confounders were included in three steps; step one included sociodemographic variables, step two included factors related to mental health and social life, and finally lifestyle factors were included. At each step, we excluded potential confounders if their effect was not statistically significant at P value less than 0.25 unless the exclusion caused the effect estimate of emotional demands to change by more than 10%. The final multivariate logistic regression models of perceived emotional demands and content-related emotional demands (individual-based and work-unit based) included the covariates: personal income, previous episodes of depression, traumatic life events during the last 6 months (at follow-up), loneliness, and smoking. The final models of patient-care emotional demands (individual-based and work-unit-based) included previous episodes of depression, traumatic life events during the last 6 months (at follow-up), and smoking.

We also examined if work-unit clustering had any effects by inclusion of a work-unit random effect term using mixed logistic regression models, but this term had no statistically significant effects and was omitted from the final models.

Linearity of effects of all continuous covariates was examined in preliminary crude analyses by including quadratic and cubic terms, but none of these terms had statistically significant effects.

Finally, neurotic personality trait and depressive symptoms were included as covariates in the final models in sensitivity analyses.

Patient-Care Work

The association of patient-care work (yes/no) with depression, perceived emotional demands, and content-related emotional demands was examined in supplemental analyses. The association with depression was examined in logistic regression models with the dichotomous patient-care variable and potential confounders from the final models of the previous analyses. To these analyses, we added perceived emotional demands or content-related emotional demands as covariates and their interaction term with the dichotomous patient-care variable to examine whether the emotional demands variables had a different effect on depression for participants with and participants without patient-care.

Interactions With Positive Work Characteristics

We tested for effect modification from supervisors' support, colleagues' support, meaningful work, and emotional enrichment (all continuous) by including an interaction term with emotional demands in the final logistic regression models.

TABLE 1. Baseline Characteristics (2007) of Total Population and Participants With or Without a Diagnosis of Depression at Follow-Up (2009)

	Total Population ($n = 4,389$)		Participants ($n = 3,125$)				
Characteristic	***n***	**%**	**Nondepressed at Follow-Up ($n = 3,063$)**	**%**	**Depressed at Follow-Up ($n = 62$)**	**%**	**OR (95% CI)***
Sociodemographic							
Gender							
Male	951	21.7	667	21.8	10	16.1	1
Female	3,438	78.3	2,396	78.2	52	83.9	1.45 (0.73–2.86)
Age†							1.00 (0.97–1.03)
<35 years	964	22.0	602	19.7	14	22.6	
35–44 years	1,073	24.5	733	23.9	13	21.0	
45–54 years	1,528	34.8	1,111	36.3	24	38.7	
≥55 years	824	18.8	617	20.1	11	17.7	
Personal income (DDK)†							0.57 (0.35–0.93)[a]
≤299,999	2,148	51.8	1,435	49.1	36	63.2	
300,000–499,999	1,750	42.2	1,309	44.8	20	35.1	
≥500,000	247	6.0	179	6.1	1	1.8	
Professional education beyond primary or high school							
<3 years	866	19.8	531	17.4	12	19.4	1
3–4 years	3,008	68.8	2,148	70.3	45	72.6	0.93 (0.49–1.76)
>4 years	500	11.4	375	12.3	5	8.1	0.59 (0.21–1.69)
Mental health and social life							
Cohabitation							
Yes	3,544	80.9	2,489	81.4	52	83.9	1
No	836	19.1	570	18.6	10	16.1	0.84 (0.42–1.66)
Family history of depression							
No	2,810	70.8	1,986	71.1	33	60.0	1
Yes	1,161	29.2	808	28.9	22	40.0	1.64 (0.95–2.83)
Previous depression							
No	3,692	86.5	2,619	87.8	32	54.2	1
Yes	574	13.5	364	12.2	27	45.8	6.07 (3.60–10.25)[a]
Traumatic life event							
No events	2,802	64.0	1,990	65.1	26	41.9	1
Yes, felt bad	942	21.5	657	21.5	21	33.9	2.45 (1.37–4.38)[a]
Yes, felt very bad	634	14.5	411	13.4	15	24.2	2.79 (1.47–5.32)[a]
Loneliness							
No	4,200	96.2	2,940	96.4	55	88.7	1
Yes	168	3.9	110	3.6	7	11.3	3.70 (1.52–7.64)[a]
Lifestyle							
Physical activity							
Rarely	2,308	52.9	1,589	52.1	34	54.8	1
Often	2,058	47.1	1,459	47.9	28	45.2	0.90 (0.54–1.49)
Alcohol consumption†							0.88 (0.71–1.10)
Low	3,336	76.9	2,298	75.8	48	77.4	
High	1,002	23.1	735	24.2	14	22.6	
BMI†							1.03 (0.97–1.09)
Low	2,828	65.2	1,983	65.4	38	62.3	
High	1,509	34.8	1,052	34.6	23	37.7	
Smoking							
No/former	3,577	82.0	2,585	85.0	39	62.9	1
Smoker	784	18.0	458	15.1	23	37.1	3.30 (1.95–5.58)[a]
Positive work characteristics†							
Meaning of work (1–5)							0.54 (0.36–0.79)[a]
Low (1 to <4)	941	21.6	607	19.9	21	33.9	
High (4–5)	3,424	78.4	2,447	80.1	41	66.1	
Social support (1–5)							
Colleagues support							0.71 (0.56–0.91)[a]
Low (1 to <4)	1,172	27.0	777	25.5	24	38.7	
High (4–5)	3,180	73.1	2,268	74.5	38	61.3	
Supervisor support							0.65 (0.53–0.79)[a]
Low (1 to <4)	1,988	45.7	1,358	44.7	42	67.7	
High (4–5)	2,358	54.3	1,682	55.3	20	32.3	
Emotional enrichment (1–5)							0.80 (0.61–1.01)
Low (1 to <4)	1,536	35.6	1,050	34.7	29	47.5	
High (4–5)	2,777	64.4	1,975	65.3	32	52.5	

TABLE 1. (*Continued*)

Characteristic	Total Population ($n = 4,389$)		Participants ($n = 3,125$)				
	n	%	Nondepressed at Follow-Up ($n = 3,063$)	%	Depressed at Follow-Up ($n = 62$)	%	OR (95% CI)*
Sensitivity							
Neuroticism (0–1)†							37.2 (15.4–89.7)[a]
No (0)	1,944	44.5	1,418	46.4	2	3.3	
Yes (>0)	2,423	55.5	1,636	53.6	59	96.7	
Depressive symptoms (0–6)							1.74 (1.5–2.02)[a]
Low (0–2)	4,140	94.8	2,915	97.2	53	56.5	
High (3–6)	229	5.2	140	2.8	9	43.6	
Job change							0.83 (0.42–1.66)
No	2,337	79.4	2,268	79.3	46	82.1	
yes	602	20.7	592	20.7	10	18.0	
Emotional demands							
Perceived emotional demands							1.51 (1.13–2.02)[a]
Low (1 to <4)	2,332	52.3	1,620	53.0	27	43.6	
High (4–5)	2,128	48.0	1,434	47.0	35	56.5	
Content-related emotional demands							
Low (1 to <4)	1,337	30.0	909	29.7	21	33.9	1.18 (0.93–1.48)
High (4–5)	3,133	70.0	2,153	70.3	41	66.1	
Patient-care emotional demands							
Low (1 to <4)	1,610	86.1	1,143	86.3	12	75.0	1.04 (0.58–1.85)
High (4–5.5)	256	13.9	182	13.7	4	25.0	

*Calculated by logistic regression.
†Continuous variable in the analysis.
[a]$P < 0.01$.

For all analysis, we used the software SAS 9.3 (proc glimmix; SAS Institute, Cary, NC).

RESULTS

A total of 3209 answered the questionnaire both at baseline and follow-up. We identified 70 participants with depression at baseline. After excluding clinically depressed at baseline and participants not answering questions on perceived emotional demands or content-related emotional demands, our final study population comprised 3125 workers from 455 work-units. Of those, 62 were clinically depressed at follow-up.

TABLE 2. Odds Ratios of Clinical Depression by Increasing Level of Emotional Demands

	Individual-Based				Work-Unit Based				
	OR	95% CI	OR*	95% CI	Tertiles	OR	95% CI	OR*	95% CI
Perceived emotional demands (continuous, 1–5)	1.51	1.13–2.02	1.40	1.02–1.92		1.31	0.82–2.10	1.24	0.75–2.07
Perceived emotional demands (tertiles)									
Low (1–3)	1		1		Low (1–3.14)	1		1	
Medium (>3 to 3.5)	1.28	0.63–2.61	1.43	0.67–3.04	Medium (>3.14 to 3.48)	1.54	0.81–2.94	1.72	0.88–3.39
High (>3.5 to 5)	1.93	0.94–3.94	1.77	0.82–3.82	High (>3.48 to 5)	1.36	0.71–2.59	1.21	0.61–2.41
Content-related emotional demands (continuous)	0.99	0.76–1.28	0.93	0.70–1.24		0.90	0.64–1.27	0.92	0.62–1.35
Content-related emotional demands (tertiles)									
Low (1–3.2)	1		1		Low (1–3.39)	1		1	
Medium (>3.2 to 4)	0.98	0.54–1.76	1.06	0.57–1.98	Medium (>3.39 to 3.9)	1.20	0.66–2.20	1.21	0.64–2.30
High (>4 to 5)	0.82	0.44–1.54	0.77	0.39–1.49	High (>3.9 to 5)	0.94	0.50–1.76	0.93	0.47–1.81
Patient-care emotional demands (continuous)	1.03	0.58–1.85	1.14	0.62–2.09		0.72	0.28–1.81	1.01	0.39–2.68
Patient-care emotional demands (tertiles)									
Low (1–1.75)	1		1		Low (1–2.08)	1		1	
Medium (>1.75 to 2.5)	0.94	0.29–3.10	0.79	0.21–2.90	Medium (>2.08 to 2.36)	0.75	0.24–2.39	0.86	0.23–3.19
High (>2.5 to 5.5)	1.21	0.37–4.00	1.24	0.33–4.66	High (>2.36 to 5.5)	0.59	0.17–2.04	1.00	0.27–3.80

CI, confidence interval; OR, odds ratio.
*Analyses of perceived and content-related emotional demands are in the final model adjusted for personal income, previous episodes of depression, traumatic life events, loneliness, and smoking. Analyses of patient-care emotional demands are adjusted for all the same variables with the exception of personal income and loneliness.

The baseline characteristics of the population with corresponding crude odds ratios (ORs) of depression are summarized in Table 1. The majority of participants were women (78%); the mean age was 45 years (range 20 to 66 years). Smoking, low income, previous depression, and loneliness at baseline and traumatic life events in the previous 6 months were associated with a higher frequency of incident depression at follow-up. Meaningful work and social support from colleagues and social support from supervisor were associated with a lower frequency of depression (Table 1).

Perceived emotional demands were statistically significantly associated with depression in analyses based on individual data [$OR_{adj} = 1.40$ per unit increase in perceived emotional demands 95% confidence interval (95% CI) 1.02 to 1.92), $P = 0.04$] but not in analyses based on work-unit data, although the association was in the same direction (Table 2). The ORs of the associations of the other measures of emotional demands with depression were close to unity and statistically not significant in all analyses (Table 2). These results changed only marginally when the adjusted main models were further adjusted for neurotic personality trait and depressive symptoms (results not shown).

Patient-Care Work

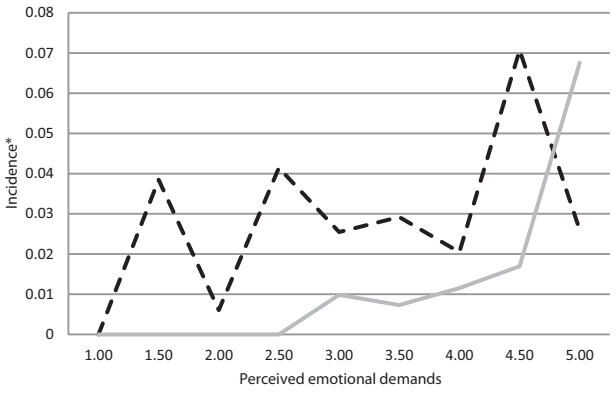
Participants dealing with patients [$n = 1366$ (44%)] reported statistically significantly higher levels of perceived emotional demands and content-related emotional demands than other participants ($P < 0.01$, crude and adjusted for covariates in the final model). Participants dealing with patients, however, had a lower risk of depression crude and adjusted for covariates in the final model [OR = 0.50 (95% CI: 0.27 to 0.94), $P = 0.003$].

This finding was unexpected, and we therefore examined whether individual-based perceived emotional demands and content-related emotional demands had different effects among participants dealing with patients than among those who did not. The patient-care variable was included in the main analyses models for perceived emotional demands and content-related emotional demands together with an interaction term between the patient-care variable and the emotional demands variables.

The interaction term for perceived emotional demands and patient-care was significant in the final model ($P = 0.045$), but the interaction term for content-related emotional demands and patient-care was not. Among patient-care participants, a one unit increase in perceived emotional demands was associated with an OR of depression of 2.92 (95% CI: 1.41 to 6.04). The corresponding OR among participants without patient-care was 1.25 (95% CI: 0.89 to 1.75).

Over the entire range of individually perceived emotional demands, except for the highest level, the incidence rate of depression was lower for participants with patient-care than for those without. The risk of depression increased steeply with perceived emotional demands above 2.5 for patient-care workers. For participants without patient-care, the risk of depression was irregular with only a modest average increase with increasing perceived emotional demands (Fig. 2).

We also examined the patient-care factor work-unit based. The same pattern was seen; however, no interactions were observed.



*Incidence: Calculated as the number of cases divided by the total number of participants within the groups of participants with and without patients, respectively.

FIGURE 2. Proportion with depression at follow-up by categories of individually perceived emotional demands for participants with patient-care work (gray) and without patient-care work (dotted).

Positive Work Characteristics

Meaningful work and supervisor support at baseline predicted a reduced risk of depression at follow-up when added as covariates in the main analyses models. Analyses of colleague support and emotional enrichment showed results in the same direction but did not reach statistical significance. The effect sizes in the adjusted analyses were similar to those of the crude analyses (summarized in Table 1). The associations between the emotional demands variables and depression changed less than 15% by adding positive work characteristics to the other adjustment variables and did not change any significant results of emotional demands.

Interaction terms between the emotional demands variables and positive work characteristics had no statistically significant effects, except for patient-care emotional demands with meaningful work ($P = 0.012$) and with supervisor support ($P = 0.019$), and only for individual-based data. At low levels of patient-care emotional demands, higher levels of meaningful work reduced the risk of depression, and at high levels of patient-care emotional demands, higher levels of meaningful work increased the risk. The same pattern was found for the interaction between supervisor support and patient-care emotional demands (data not shown).

DISCUSSION

Like several previous studies, this study found an increased risk of depression for those who reported high levels of emotional demands when this was measured as responses to generally formulated questions about the individual's perception of the extent of emotional demands at work. When work-unit measures were used, the OR was in the same direction but lower and not statistically significant. These findings could, however, not be reproduced in the individual and group-based analyses of content-related emotional demands. Thus, questions relating directly to the emotional dimensions of work situations, for example, having to deal with other people's grieves or suffering did not show any relationship with the development of depression. We had expected that positive factors such as meaningful work, social support, and enrichment would moderate the effect of the perceived emotional demands, but this was not the case. Meaningful work and supervisor support were both strong independent predictors of a reduced risk of depression.

The results regarding the subjective experience of perceived emotional demands generally corroborate previous findings on the relationship between emotional demands and depression. Wieclaw et al[14] observed an elevated risk of depression among women only (incidence rate ratio 1.39, 95% CI 1.22 to 1.58) in a Danish population-based case-control study with a job exposure matrix used to asses psychosocial working exposures and with cases from psychiatric patients records (14.166 cases). Madsen et al[5] reported an elevated use of antidepressant medicine among employees with high emotional demands (OR: 1.51, 95% CI 1.18 to 1.94) in a follow-up study on a representative sample of working Danes. A recent study with data from the same cohort, supplemented with data from a Swedish cohort, showed similar results (hazard ratio:

1.45, 95% CI 1.24 to 1.66).[10] Another Danish study showed associations in the same direction, although not statistically significant between emotional demands and use of antidepressant in a working population among employees aged 40 and 50 years.[11] All four studies were longitudinal and used the emotional demands questions from COPSOQ, similar to the perceived emotional demands scale in this study with register-based outcomes. Few other longitudinal studies have also dealt with emotional demands at work. In these studies, emotional demands were determined using tools other than COPSOQ and both exposure and outcomes were self-assessed. The findings were in general consistent and showed an association. Thus, Andrea et al[21] observed an association between emotional demands and depression symptoms in a study with 1-year follow-up among men ($n = 7472$ employees men/women). In a later study with 2 years of follow-up time and a population including a subset of the former, they reported an association between emotional demands and depression symptoms in both genders, although not statistically significant when controlled for other psychosocial work factors.[12] In a 6-month follow-up study among homecare workers, Kim et al[13] reported a relationship between a dimension of emotional demands referred to as ''unmet care needs''—involving elements of content-related emotional demands—and depression symptoms. Finally, a small American multilevel follow-up study among nursing assistants ($n = 241$) also demonstrated an association between self-reported emotional demands and depression symptoms.[36] Overall, a possible association between emotional demands and depression may exist, although reporting bias and misclassification may explain the findings.

The present study contributes to the earlier studies in particular by the use of a separate content-related dimension of emotional demands and work-unit based estimates of the exposures. The content-related approach asks specifically for emotionally demanding situations at work assuming that responses would be less influenced by, for example, the mood of the participant. Furthermore, in the work-unit based analyses, measures of exposure represented the average worker and were thus less dependent on the individual worker's interpretation of his/her psychosocial working environment. Overall, these measures of exposure may have the ability to avoid false associations because of ''common method bias,'' occurring when both exposure and mental health problems are self-reported.[11,20,37] Still, if only the exposure and not the outcome are self-reported, as seen in other Danish studies in this area,[5,11] personal affectivity may disturb the individual's reporting on the degree of exposure and compromise the ability to estimate the actual exposure effect.[20] The results of the less individual-dependent exposure analyses (based on content-related emotional demands and work-unit based measures) in the present study did, however, not show a relationship between emotional demands and depression and thus did not support the existing general understanding of a relationship between high emotional demands and the development of depression. Thus, the association found here and in previous studies may be explained by personal perception and not the content of specific emotionally demanding work tasks.

A limitation of the group-based approach is reduced contrasts between groups compared with individual-based analyses, resulting in a possible extension of the confidence intervals but not necessarily an attenuation of the risk estimates.[38] Results of both the individual-based content-related emotional demands and work-unit based measures were all statistically nonsignificant. However, both individual and group-based measures showed positive risk estimates for the dimension of emotional demands concerned with the individual's perception of emotional demands (perceived emotional demands) in work and clinical depression.

Participants working with patients had higher perceived emotional demands and content-related emotional demands than other participants. However, their risk of depression was only half of the risk of other participants. This finding was unexpected, as previous findings have indicated that health care workers have a higher risk of hospitalization for depression[8,14] and of purchasing antidepressant medication.[5] However, both of these outcomes could be inflated by earlier and easier access to treatment as opposed to our outcome that was independent of access to treatment. Another explanation could be selection into the health care professions of persons who are robust to adverse effects of the specific emotional demands in these professions, and selection out of the professions of persons who find themselves uneasy with these demands. Such a selection could possibly also explain why the effect of perceived stress on depression was different for participants with and without patient-care, and why only higher levels of perceived emotional demands were associated with depression among patient-care participants in our study. The risk of depression seemed particularly high at the highest level of perceived emotional demands. However, this level included only four patient-care depression cases, and the result is therefore considered as unstable.

We hypothesized that higher levels of positive work characteristics would buffer any adverse effects of high emotional demands on depression. However, the analyses did not support this hypothesis. In 12 analyses of interaction effects, we observed two significant effects, both of them for patient-care emotional demands, that is, meaningful work and supervisor support. However, the risk of depression for combinations of levels of patient-care emotional demands and the two other work characteristics had no meaningful interpretation. Among participants caring for patients, there were only few cases with depression ($n = 16$) and a few changes in emotional demands scores among these cases could have changed the results. Although formally statistically significant, we consider these findings as probably due to chance.

The analyses, however, demonstrated that meaningful work and supervisor support were two strong independent protectors of depression. This is supported by previous studies in the field.[11,12] The experience of the work as emotionally rewarding tended to reduce the risk of depression, but the results were not statistically significant. These analyses were performed at the individual level. In order to achieve less individual-dependent results, it would be appropriate in future analyses to examine these associations at the work-unit level. Our purpose was here primarily to illustrate possible interaction effects. The individual-level will in this context be most sensitive; as we observed no significant interactions at this level, we have not analyzed it further.

Methodological Considerations

Depression was assessed by guided interviews using a WHO validated instrument and interviewers had received a week's training beforehand. However, we selected the participants to participate in the SCAN-interviews based on their questionnaire responses. In this process, we could have missed depressed people. Furthermore, this method does not allow for continuous identification of cases, as, for example, register studies do, and therefore participants may be in remission at the time of follow-up. Overall, this could lead to a possible loss of power and bias a true effect toward the null.

To achieve the best possible confounder control despite a limited number of cases, we made a careful confounder selection. Thus, it has been possible to include multiple possible confounding factors. Only in sensitivity analyses, we took into account variables regarding personality and depressive symptoms, as we wanted the population to the best extent possible to be comparable to a normal Danish working population. However, these factors did not change the main results.

Participation rate at baseline was only 45%. In previous analyses, however, we found no indications that the low baseline participation distorted the estimates of the associations between other psychological work environment demands and the use of

antidepressants at follow-up.[25] At follow-up, participation rate was higher (72%), but drop-outs may still bias the results. However, emotional demands did not predict participation at follow-up (results not shown) indicating that the drop-out rate did not bias the results.

If selection into and out of the health care profession is taking place, job change may be a factor affecting the relationship between emotional demands and depression. The possibility of making a job change could be a protective factor in relation to the development of a depression when a person experiences high demands at work. We had the opportunity to account for ''job change within the last year'' measured at follow-up. The variable was not significant in any of the final models, neither when included as a potential confounder nor as an interaction term (data not shown). However, it is important to realize that the choice of profession and selection into and out of a job are complex processes that are not covered by this time-limited question alone.

CONCLUSION

Individually reported perceived emotional demands were associated with an increased risk of depression diagnosed by standardized clinical interviews. For perceived emotional demands based on work-unit, the OR was in the same direction but lower and statistically nonsignificant. Depression was not associated with content-related measures of emotional demands. The study may indicate that personal factors and coping with emotional demands are more important as risk factors for depression than emotional demands as such.

REFERENCES

1. World Health Organization. *The Global Burden of Disease: 2004 Update*. Geneva: WHO Press; 2008.
2. Stewart WF, Ricci JA, Chee E, Hahn SR, Morganstein D. Cost of lost productive work time among US workers with depression. *JAMA*. 2003;289:3135–3144.
3. Flachs EM, Eriksen L, Koch MB, Ryd JT, Dibba E, Skov-Ettrup L, et al. *Sygdomsbyrden i Danmark -sygdomme*. Denmark: Danish Health and Medicines Authority; 2015.
4. Vilhelmsson A. *Depression and Antidepressants: a Nordic Perspective*. Front Public Health; 2013, 1–30.
5. Madsen IEH, Diderichsen F, Burr H, Rugulies R. Person-related work and incident use of antidepressants: relations and mediating factors from the Danish work environment cohort study. *Scand J Work Environ Health*. 2010;36:435–444.
6. Wieclaw J, Agerbo E, Mortensen PB, Preben B, Bonde JP. Occupational risk of affective and stress-related disorders in the Danish workforce. *Scand J Work Environ Health*. 2005;31:343–351.
7. Wieclaw J, Agerbo E, Mortensen PB, Bonde JP. Risk of affective and stress related disorders among employees in human service professions. *Occup Environ Med*. 2006;63:314–319.
8. Hannerz H, Tuchsen F, Pedersen BH, Dyreborg J, Rugulies R, Albertsen K. Work-relatedness of mood disorders in Denmark. *Scand J Work Environ Health*. 2009;35:294–300.
9. Soderfeldt B, Soderfeldt M, Muntaner C, O'Campo P, Warg L, Ohlson C. Psychosocial work environment in human service organizations: a conceptual analysis and development of the demand-control model. *Soc Sci Med*. 1996;42:1217–1226.
10. Magnusson Hanson LL, Madsen IE, Westerlund H, Theorell T, Burr H, Rugulies R. Antidepressant use and associations with psychosocial work characteristics. A comparative study of Swedish and Danish gainfully employed. *J Affect Disord*. 2013;149:38–45.
11. Thielen K, Nygaard E, Rugulies R, Diderichsen F. Job stress and the use of antidepressant medicine: a 3.5-year follow-up study among Danish employees. *Occup Environ Med*. 2011;68:205–210.
12. Andrea H, Bultmann U, van Amelsvoort LG, Ludovic GPM, Kant Y. The incidence of anxiety and depression among employees: the role of psychosocial work characteristics. *Depress Anxiety*. 2009;26:1040–1048.
13. Kim IH, Noh S, Muntaner C. Emotional demands and the risks of depression among homecare workers in the USA. *Int Arch Occup Environ Health*. 2013;86:635–644.
14. Wieclaw J, Agerbo E, Mortensen PB, Burr H, Tuchsen F, Bonde JP. Psychosocial working conditions and the risk of depression and anxiety disorders in the Danish workforce. *BMC Public Health*. 2008;8:280.
15. Kristensen TS, Hannerz H, Høgh A, Borg V. The Copenhagen Psychosocial Questionnaire: a tool for the assessment and improvement of the psychosocial work environment. *Scand J Work Environ Health*. 2005;31:438–449.
16. Van Veldhoven M, Meijman T. Questionnaire on the Experience and Assessment of Work. 1994. Available at: http://www.marcvanveldhoven.com/ques.html. Accessed November 27, 2015.
17. Ohlson CG, Søderfeldt M, Søderfeldt B, Jones Ian, Theorell T. Stress markers in relation to job strain in human service organizations. *Psychother Psychosom*. 2001;70:268–275.
18. Notelaers G, De Witte H, van Veldhoven M, Vermunt JK. Construction and Validation of the Short Inventory to Monitor Psychosocial Hazards. *Médecine du travail & ergonomie*. 2007;44:11–18.
19. Pejtersen J, Kristensen TS, Bjorner JB, Bjorner JB. The second version of the Copenhagen Psychosocial Questionnaire. *Scand J Public Health*. 2010; 38(suppl 3):8–24.
20. Kolstad HA, Hansen AM, Kaergaard A, et al. Job strain and the risk of depression: is reporting biased? *Am J Epidemiol*. 2011;173:94–102.
21. Andrea H, Bultmann U, Beurskens AJ, Swaen GMH, Van Schayck CP, Kant IJ. Anxiety and depression in the working population using the HAD Scale: psychometrics, prevalence and relationships with psychosocial work characteristics. *Soc Psychiatry Psychiatr Epidemiol*. 2004;39: 637–646.
22. Gadalla TM. Comparison of users and non-users of mental health services among depressed women: a national study. *Women Health*. 2008;47:1–19.
23. Ebenstein H. They were once like us: learning from home care workers who care for the elderly. *J Gerontol Soc Work*. 1999;30:191–201.
24. Hansen AM, Thomsen JF, Kaergaard A, Kolstad HA, Kaerlev L, Mors O, et al. Salivary cortisol and sleep problems among civil servants. *Psychoneuroendocrinology*. 2012;37:1086–1095.
25. Kaerlev L, Kolstad HA, Hansen AM, Thomsen JF, Kærgaard A, Rugulies R, et al. Are risk estimates biased in follow-up studies of psychosocial factors with low base-line participation? *BMC Public Health*. 2011;11:539.
26. Wolfgang AP. Job stress in the health professions: a study of physicians, nurses, and pharmacists. *Behav Med*. 1988;14:43–47.
27. Agius RM, Blenkin H, Deary IJ, Zealley HE, Wood RA. Survey of perceived stress and work demands of consultant doctors. *Occup Environ Med*. 1996;53:217–224.
28. Ramirez AJ, Graham J, Richards MA, Cull A, Gregory WM. Mental health of hospital consultants: the effects of stress and satisfaction at work. *Lancet*. 1996;347:724–728.
29. Taylor C, Graham J, Potts HWW, Richards MA, Ramirez AJ. Changes in mental health of UK hospital consultants since the mid-1990s. *Lancet*. 2005;366:742–744.
30. Christensen KS, Fink P, Toft T, Frostholm L, Rnbl E, Olesen F. A brief case-finding questionnaire for common mental disorders: the CMDQ. *Fam Pract*. 2005;22:448–457.
31. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav*. 1983;24:385–396.
32. Wing JK, Babor T, Brugha T, Burke J, Cooper JE, Giel R. Schedules for clinical assessment in neuropsychiatry. *Arch Gen Psychiatry*. 1990;47: 589–593.
33. Grynderup MB, Mors O, Hansen AM, Andersen JH, Bonde JP, Kærgaard A, et al. A two-year follow-up study of risk of depression according to work-unit measures of psychological demands and decision latitude. *Scand J Work Environ Health*. 2012;38:527–536.
34. Brugha T, Bebbington P, Tennant C, Hurry J. The List of Threatening Experiences: a subset of 12 life event categories with considerable long-term contextual threat. *Psychol Med*. 1985;15:189–194.
35. Eysenck HJ, Eysenck SBG. *Manual of the Eysenck Personality Questionnaire*. London: Hodder & Stoughton; 1975.
36. Muntaner C, Li Y, Xue X, Thompson T, Chung H, O' Campo P. County and organizational predictors of depression symptoms among low-income nursing assistants in the USA. *Soc Sci Med*. 2006;63:1454–1465.
37. Podsakoff PM, MacKenzie SB, Lee JY, Podsakoff NP, Zedeck S. Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J Appl Psychol*. 2003;88:879–903.
38. Armstrong TW, Zaleski RT, Konkel WJ, Parkerton TJ. A tiered approach to assessing children's exposure: a review of methods and data. *Toxicol Lett*. 2002;127:111–119.

