



Scand J Work Environ Health 2010;36(6):435-444

<https://doi.org/10.5271/sjweh.3049>

Published online: 02 Jun 2010, Issue date: Nov 2010

Person-related work and incident use of antidepressants: relations and mediating factors from the Danish work environment cohort study

by [Madsen IEH](#), [Diderichsen F](#), [Burr H](#), [Rugulies R](#)

Affiliation: National Research Centre for the Working Environment, Lerso Park Allé 105, DK-2100 Copenhagen, Denmark. ihm@nrcwe.dk

Refers to the following texts of the Journal: [2009;35\(4\):294-300](#)
[2005;31\(5\):343-351](#) [2003;29\(4\):270-279](#) [2005;31\(6\):438-449](#)

The following articles refer to this text: [2010;36\(6\):433-434](#);
[2012;38\(3\):218-227](#); [2012;38\(3\):187-192](#); [2012;38\(6\):527-536](#);
[2017;43\(4\):294-306](#); [2022;48\(4\):302-311](#)

Key terms: [antidepressant](#); [cohort study](#); [Denmark](#); [depressive disorder](#); [emotional demand](#); [emotional labor](#); [human service work](#); [incident use](#); [mediating factor](#); [occupational health](#); [threat](#); [violence](#); [work](#); [work environment](#); [work environment cohort study](#); [work environment study](#); [work use](#)

This article in PubMed: www.ncbi.nlm.nih.gov/pubmed/20517584



This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

Person-related work and incident use of antidepressants: relations and mediating factors from the Danish work environment cohort study

by Ida EH Madsen, MSc,¹ Finn Diderichsen, PhD,² Hermann Burr, PhD,¹ Reiner Rugulies, PhD^{1, 2, 3}

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(6):435–444.

Objectives Previous Danish studies have shown that employees who “work with people” (ie, do person-related work) are at increased risk of hospitalization with a diagnosis of depression. However, these studies were purely register-based and consequently unable to point to factors underlying this elevated risk. This paper examines whether person-related work is associated with incident use of antidepressants, and whether this association is mediated by several work environment exposures.

Methods Self-reported data from the Danish work environment cohort study in 2000 were linked with the use of antidepressants between 2001–2006. We included 4958 respondents in our study after excluding those with severe depressive symptoms or use of antidepressants at baseline.

Results Compared to employees doing non-person-related work, the use of antidepressants was increased statistically significantly for healthcare workers and statistically non-significantly for educational workers. The use of antidepressants was not elevated for social or customer service workers, or those doing “other” types of person-related work. The increased risks of antidepressant-use for healthcare and educational workers were attenuated when adjusted for emotional demands at work.

Conclusions The results imply that healthcare and educational workers in Denmark are at increased risk of depression and that this risk is partly mediated by the high emotional demands of the work.

Key terms depressive disorder; emotional demand; emotional labor; human service work; occupational health; threat; violence.

Depressive disorders are costly, both for those afflicted and society at large (1, 2). The causes of depression are, as yet, poorly understood but thought to involve an interplay of biological, psychological and social factors (3).

Work environment factors such as high demands, low control and low social support have been associated with depression in longitudinal studies; however, knowledge is scarce concerning the potential role of other work environment factors (4, 5). Previous Danish studies (6–8) have found increased hospitalization with depression for employees doing person-related work [ie, work that requires face-to-face or voice-to-voice interactions with clients (9)]. However, as these studies were register-based, exposure was defined solely by job group and not the actual amount of time spent with clients.

Furthermore, the studies could not point to specific work environment exposures mediating the risk.

Several characteristics of person-related work could be involved in an increased risk of depression. Firstly, it has been argued that such work is particularly emotionally demanding (6, 10), for instance due to confrontation with clients’ problems and suffering (9, 10). Previous research has related emotional demands at work [ie, aspects of the job that require sustained emotional effort (10)] to depression (11), depressive- and anxiety-symptoms (12), fatigue (13–15), psychological distress (13, 15), emotional well-being (14), and burnout (10, 16, 17). Secondly, employees doing person-related work must manage (ie, induce or reduce) their emotions in order to express organization-

¹ The National Research Centre for the Working Environment, Copenhagen, Denmark.

² Institute of Public Health, University of Copenhagen, Denmark.

³ Department of Psychology, University of Copenhagen, Denmark.

ally required emotions, which – according to Hochschild's (18) theory of emotional labor – puts them at risk of mental health problems. Emotional labor has been linked to mental health outcomes such as reduced well-being (19), emotional exhaustion (20–23), psychosomatic complaints, and irritation (23). Finally, person-related work has been associated with exposure to work-related threats and violence (24–27), which in turn has been related to depression (26), fatigue (27), and general mental health (28).

Inspired by the previous Danish studies relating person-related work to hospitalization for depression (6–8), this paper examines: (i) whether different types of person-related work, defined by a combination of job groups and self-reported client-contact, are associated with the increased incident use of antidepressants and (ii) whether this association is mediated by one or more of the following work environment exposures: emotional demands, demands for hiding emotions, threats, and violence.

As the interaction between employee and client could differ according to the characteristics of the client (9, 29, 30), we distinguished between five types of person-related work: (i) healthcare, (ii) education, (iii) social, (iv) customer service, and (v) other person-related work.

Methods

Study design

We merged data from the Danish work environment cohort study (DWECS) from 2000 with the register of medicinal product statistics, by the participants' unique personal identification number. The register contains all purchases of prescription drugs at pharmacies in Denmark since 1 January 1995 (31).

DWECS is a work environment survey administered to representative samples of the working population in Denmark every five years. Data from 2000 were gathered through telephone interviews, between October 2000 and January 2001 (32). The response-rate was 75%. Differences between respondents and non-respondents were minor, and DWECS 2000 is considered representative of the Danish working population (32). A detailed description of DWECS 2000 has been published elsewhere (32).

Population

There were 6166 participants of DWECS 2000 who were active in the labor market. We excluded self-employed respondents (N=530) as this group was small and social conditions of self-employed and employees

differ (33). We also excluded apprentices (N=233) and those missing data on key variables (N=162). To ensure a prospective study design (ie, that respondents were not suffering from depression at baseline), we additionally excluded 143 respondents with severe self-reported depressive symptoms at baseline, and 140 respondents who had purchased antidepressants during the 12 months prior to the start of follow-up. The final study population was 4958 respondents. The mean age was 40.3 years and 51.5% of the participants were male. Most respondents (65.3%) were white-collar workers.

Operationalizations

Person-related work. We created five categories of person-related work: (i) healthcare (eg, doctors, nurses), (ii) education (eg, teachers, pedagogues), (iii) social (eg, police officers, social workers), (iv) customer service (eg, sales personnel, wait staff), and (v) other person-related work. These were compared to the reference group comprising individuals doing non-person-related work.

Respondents were classified as doing person-related work if they reported contact with clients at least $\frac{3}{4}$ of the time. Contact with clients was assessed by one item in the interview: "Do you, in relation with your work, deal with people who are not employed at the workplace? (eg, customers, clients, passengers, students)", with the responses: "almost always", " $\frac{3}{4}$ of the time", " $\frac{1}{2}$ of the time", " $\frac{1}{4}$ of the time", "rarely/very little", and "never". Some contact with clients was common and 64.7% of all respondents reported working with clients at least $\frac{1}{4}$ of the time (data not shown).

In order to define respondents mainly working with clients (ie, doing person-related work), we established a cut-off point for client contact, by examining its distribution in occupations commonly associated with person-related work (ie, doctors, dentists, nurses, teachers, and wait staff). This was skewed towards working with clients $\frac{3}{4}$ of the time or more (data not shown); this was, therefore, applied as the cut-off point.

The type of person-related work was determined by occupation and the type of clients with whom the respondent interacted (see appendix, p444). Thus, healthcare work was defined as "working with clients who were ill", educational work as "working with clients who were 'normally functioning' students", and social work as "working with clients who had social problems". Other person-related work encompassed those occupations where the characteristics of clients were uncertain. The classification of occupation was based on a modified version of the International Standard of Classification of Occupations (ISCO-68) (34).

Work environment exposures. Emotional demands were measured using a scale of three items: “Does your work bring you in emotionally taxing situations?”, “Is your work emotionally taxing?”, and “Are you emotionally affected by your work?”. The scale was dichotomized into high versus low emotional demands by the median of the DWECS 2000 population. Demands for hiding emotions, as an indication of emotional labour (18), were measured by one item: “Does your job require you to hide your emotions?”. This was dichotomized into high (“partially”, “to a high extent”, or “to a very high extent”) versus low (“to a small extent” or “to a very small extent”). Exposure to threats and violence was assessed by asking: “Have you within the past 12 months been exposed to threats of violence in your workplace?” and “Have you within the past 12 months been exposed to physical violence in your workplace?”. The possible responses were “yes” or “no”.

Potential confounders. As potential confounders we included: gender, age, cohabitation (ie, living with partner/spouse, yes/no), parental status (ie, having children living at home, yes/no), and socioeconomic position, as these factors have been associated with depression (3, 35, 36).

Age and gender were retrieved from the central population register. Cohabitation and parental status were self-reported. Socioeconomic position was obtained from DWECS, by a standard composite measure of five groups (I–V), based on employment grade, job title and education (37): group I: executive managers and/or having a university degree, group II: middle managers and/or 3–4 years of further education, group III: other white-collar workers, group IV: skilled blue-collar workers, and group V: semi-skilled or unskilled workers.

Depression at baseline. Baseline mental health was assessed in DWECS, using the 5-item mental health inventory of the 36-item short-form (SF-36) health survey (38), which is valid for assessing mood disorders (39). In accordance with previous studies (40–42), respondents scoring ≤ 52 points were considered to suffer from severe depressive symptoms, and excluded from the analyses.

Incident use of antidepressants. Antidepressants were defined as medications coded N06a by the anatomical therapeutic chemical classifications system (43). Follow-up of purchases of antidepressants was 5 years, starting on 15 March 2001, 1.5 months after the last baseline interviews were conducted. We inserted the lag-time between baseline and the start of follow-up because the outcome is treatment-related, and treatment often is not initiated immediately with the onset of depression

(44). Incident use of antidepressants (caseness) was defined as at least one purchase of antidepressants during follow-up.

Data analysis

Data were analyzed by logistic regressions. Cox regression analysis was considered, but could not be applied due to non-proportional hazards (data not shown). We assessed both the crude association between person-related work and the use of antidepressants in addition to the risk estimates adjusted for potential confounders (model I).

Mediation. Mediation by work environment exposures was assessed in three steps, examining whether (i) person-related work was associated with increased exposure, (ii) the exposures were associated with incident use of antidepressants, and (iii) the risk estimates for person-related work and use of antidepressants were attenuated, when adjusting for the exposures. For this, we applied three statistical models: model IIA (adjusting model I for emotional demands), model IIB (adjusting model I for demands for hiding emotions), and model III (adjusting model I for both emotional demands and demands for hiding emotions).

Post hoc analyses. We applied the Hosmer-Lemeshow goodness-of-fit test to evaluate the statistical models. As risks related to person-related work could be modified by gender (6) we furthermore exploratively stratified analyses by this factor. All analyses were carried out in SAS, version 9.1.3 (SAS Institute, Cary, NC, USA).

Table 1. Type of work and incident use of antidepressants. [Res=respondents; OR=odds ratio; 95% CI=confidence interval]

	Cases (N)	Res (N)	Crude analysis ^a		Model I ^b	
			OR	95% CI	OR	95% CI
Type of work						
Healthcare	31	277	1.85	1.24–2.76	1.70	1.12–2.60
Education	32	383	1.34	0.91–1.98	1.37	0.91–2.05
Social	2	75	0.40	0.10–1.65	0.40	0.10–1.64
Customer service	33	474	1.10	0.75–1.61	1.07	0.73–1.58
Other-person-related	46	644	1.13	0.81–1.58	1.18	0.84–1.65
Non-person-related	198	3105	1.00 ^c	.	1.00 ^c	.
Total	342	4958	.	.	.	.

^a Calculated by multivariable logistic regression.

^b Calculated by multivariable logistic regression and adjusted for gender, age, cohabitation, parental status, and socioeconomic position. Hosmer-Lemeshow goodness-of-fit test, $P=0.3959$.

^c Reference

Results

A total of 342 respondents (6.9%) started using antidepressants during follow-up (cases). Odds ratios (OR) of caseness for the different types of person-related work, compared to non-person-related work, are shown in table 1 on the previous page.

There was an elevated risk for healthcare workers, with an OR of 1.70 [95% confidence interval (95% CI) 1.12–2.60]. Also, educational workers had an elevated risk, though not statistically significant, with an OR of 1.37 (95% CI 0.91–2.05).

Further analyses on the degree of contact with the client (data not shown), showed the greatest use of antidepressants for those healthcare and educational workers who had the most contact with clients. For instance, compared to respondents doing non-person-related work, healthcare workers working with clients “all the time” had an OR of 1.73 (95% CI 1.11–2.70), whereas healthcare workers working with clients “3/4 of the time” had an OR of 1.45 (95% CI 0.50–4.17).

Person-related work and work environment exposures

Table 2 shows the associations between type of work and work environment exposures, adjusted for confounders. Healthcare, educational, and social workers and those doing other person-related work were more likely than those doing non-person-related work to report all four exposures. Customer service workers only had increased risks of reporting high demands for hiding emotions and exposure to threats.

Work environment exposures and antidepressants use

Table 3 shows the relations between work environment exposures and the incident use of antidepressants. High emotional demands were related to increased use of antidepressants, with an OR of 1.51 (95% CI 1.18–1.94). High demands for hiding emotions were also associated with the use of antidepressants, although not statistically significantly, with an OR of 1.26 (95% CI 1.00–1.59). There was no increased use of antidepressants among those exposed to threats or violence.

Mediation

Risk estimates for the use of antidepressants in relation to the type of work adjusted for emotional demands, demands for hiding emotions, and both factors, respectively, are shown in table 4. As no increased use of antidepressants was found for exposure to threats and violence, these factors were not included as mediators.

When adjusted for emotional demands (model IIA), the risk estimate for healthcare work was reduced from 1.70 to 1.47 and became statistically insignificant. Also, the risk estimate for educational work was reduced from 1.37 to 1.18. Adjustment for demands for hiding emotions (model IIB) resulted in a less-pronounced reduction of risk. When adjusting for the two exposures simultaneously (model III), risk estimates were similar to those obtained when adjusting only for emotional demands. In this final model, emotional demands (OR=1.43) predicted the use of antidepressants, but demands for hiding emotions (OR=1.07) did not.

Table 2. Type of work and work environment exposures. [N=number of respondents; OR=odds ratio; 95% CI=95% confidence interval]

Type of work	High emotional demands				High demands for hiding emotions				Exposure to threats				Exposure to violence			
	N	%	OR ^a	95% CI	N	%	OR ^a	95%CI	N	%	OR ^a	95%CI	N	%	OR ^a	95%CI
Healthcare	182	65.7	5.63	4.23–7.45	196	70.8	5.32	4.01–7.06	51	18.4	5.56	3.77–8.20	34	12.3	8.95	5.24–15.29
Education	255	66.6	5.76	4.53–7.34	239	62.4	3.61	2.86–4.55	50	13.1	3.40	2.34–4.94	17	4.4	3.15	1.71–5.82
Social	57	76.0	9.91	5.70–17.22	50	66.7	4.48	2.73–7.36	29	38.7	14.24	8.48–23.92	14	18.7	14.67	7.32–29.41
Customer service	69	14.6	0.84	0.63–1.11	194	40.9	2.42	1.96–2.98	27	5.7	1.64	1.06–2.55	3	0.6	0.48	0.15–1.56
Other person-related	191	29.7	1.44	1.18–1.75	297	46.1	2.14	1.79–2.56	46	7.1	1.98	1.38–2.84	11	1.7	1.41	0.71–2.80
Non-person-related	629	20.3	1.00 ^b	.	808	26.0	1.00 ^b	.	109	3.5	1.00 ^b	.	36	1.2	1.00 ^b	.
Total	1383	27.9	.	.	1784	36.0	.	.	312	6.3	.	.	115	2.3	.	.
Goodness-of-fit, P-value ^c			0.3522	.			0.0044	.			0.7838	.			0.7661	.

^a Calculated by multivariable logistic regression and adjusted for gender, age, cohabitation, parental status, and socioeconomic position.

^b Reference

^c P-value calculated using Hosmer-Leweshow test.

Post-hoc analyses

The Hosmer Lemeshow tests showed acceptable fits for the models, except for the association between person-related work and demands for hiding emotions (see tables 1–4). This was due to interactions (departure from multiplicativity) between covariates. Stratified analyses yielded patterns similar to the presented results, with the exception that customer service work was not associated with demands for hiding emotions for those of higher socioeconomic position (groups I and II, data not shown).

Table 3. Work environment exposures and use of antidepressants. [N=number of respondents; OR=odds ratio; 95% CI=95% confidence interval]

	Cases (N)	%	OR ^a	95% CI	Goodness-of-fit, P-value ^b
Emotional demands					0.8379
High	120	8.7	1.51	1.18–1.94	.
Low	222	6.2	1 ^c	.	.
Demands for hiding emotions					0.9289
High	138	7.7	1.26	1.00–1.59	.
Low	204	6.4	1 ^c	.	.
Threats					0.8572
Yes	21	6.7	0.99	0.63–1.58	.
No	321	6.9	1 ^c	.	.
Violence					0.8101
Yes	7	6.1	0.81	0.37–1.76	.
No	335	6.9	1 ^c	.	.

^a Calculated by multivariable logistic regression and adjusted for gender, age, cohabitation, parental status, and socioeconomic position.

^b Value for "goodness of fit" calculated using Hosmer-Leweshow test.

^c Reference.

When analyses were stratified by gender, the respective OR for use of antidepressants among men and women were: 2.66 (95% CI 0.78–9.11) and 1.53 (95% CI 0.97–2.41) for healthcare work; 2.20 (95% CI 1.10–4.39) and 1.11 (95% CI 0.67–1.83) for educational work; 0.98 (95% CI 0.56–1.73) and 1.17 (95% CI 0.68–1.99) for customer service work, and 1.59 (95% CI 0.98–2.56) and 0.90 (95% CI 0.56–1.45) for other person-related work. A gender-stratified risk estimate for social work was not obtained due to lack of statistical power.

Discussion

This study showed an increased use of antidepressants among employees doing certain types of person-related work and indicated that this risk is partially mediated by the emotional demands of these types of work. The use of antidepressants was statistically significantly increased among healthcare workers and statistically non-significantly increased among educational workers. We found no increased use of antidepressants among employees doing customer service or other person-related work. Nor did we find increased use among employees doing social work; the sample size, however, was very small for this group (75 respondents).

Human service work

Healthcare and educational work (along with social work) have been termed *human service work* (29). It has been argued that this work is particularly emotion-

Table 4. Type of work and use of antidepressants adjusted for work environment exposures. [OR=odds ratio; 95% CI=confidence interval]

	Model I		Model IIA ^a		Model IIB ^b		Model III ^c	
	OR ^d	95% CI	OR ^d	95% CI	OR ^d	95% CI	OR ^d	95% CI
Type of work								
Healthcare	1.70	1.12–2.60	1.47	0.95–2.26	1.60	1.04–2.46	1.44	0.93–2.24
Educational	1.37	0.91–2.05	1.18	0.78–1.79	1.30	0.86–1.96	1.17	0.77–1.78
Social	0.40	0.10–1.64	0.33	0.08–1.35	0.38	0.09–1.55	0.32	0.08–1.34
Customer service	1.07	0.73–1.58	1.08	0.73–1.59	1.04	0.70–1.53	1.07	0.72–1.58
Other person-related	1.18	0.84–1.65	1.15	0.82–1.61	1.15	0.82–1.61	1.14	0.81–1.60
Non-person-related	1.00 ^e	.	1.00 ^e	.	1.00 ^e	.	1.00 ^e	.
Emotional demands (high versus low)	.	.	1.47	1.13–1.90	.	.	1.43	1.09–1.89
Demands for hiding emotions (high versus low)	.	.	.	.	1.19	0.93–1.52	1.07	0.83–1.38
Goodness-of-fit, P-value ^f	0.3959	.	0.2049	.	0.7894	.	0.3492	.

^a Adjusted for emotional demands.

^b Adjusted for demands for hiding emotions.

^c Adjusted for emotional demands *and* demands for hiding emotions.

^d Calculated by multivariable logistic regression and adjusted for gender, age, cohabitation, parental status, and socioeconomic position.

^e Reference

^f Value for "goodness-of-fit" calculated using Hosmer-Leweshow test.

ally demanding (47). Also, such work implies taking responsibility for the fundamental human needs of the client (48), experiencing a lack of reciprocity in relations with clients (49), and being confronted by the clients' problems and suffering (10).

Our results, in line with previous research (50), support the notion that human service work is more emotionally demanding than other types of work and indicated that these emotional demands are related to a risk of depression. According to Brown & Harris (51, p 233), the "inability to hold good thoughts about ourselves, our lives, and those close to us" is a central characteristic of depression. It could be reasoned, that witnessing human suffering first hand and having to help and care for others who do not reciprocate accordingly might affect this ability. Further research examining mechanisms between human service work and depression is, therefore, warranted.

The results support a distinction between human and customer service work, as the latter was associated with neither emotional demands nor the use of antidepressants. This finding suggests that it is not the interaction with the client per se that put employees who work with people at risk of depression, but rather the quality and content of the relationship.

Mediation

The results suggest that emotional demands partly mediate the relation between person-related work and depression. However, underlying mechanisms remain unclear as the items used to measure emotional demands in DWECs 2000 were generic. Qualitative research examining the construct of emotional demands in different work-contexts could help further elucidate this issue and explain our results.

In contrast, our results do not support an effect of emotional labor on depression. This could be due to a poor operationalization of emotional labor, as this involves not only hiding emotions, but the active management of emotions (18). Alternatively, it could be argued that demands for hiding emotions more purely measures the work environment context than the measure for emotional demands; because the items measuring the latter reflect the experience of the situation as emotionally demanding, this measurement is likely affected by the emotional and cognitive processing of the respondent. However, we found a close relation between type of work and reports of emotional demands, suggesting that this experience is highly related to the work environment of the employee.

Because the measure of emotional demands applied was generic, it could be relevant to examine how more specific work environment exposures, such as witnessing the pain and suffering of clients, relate to the experience

of emotional demands. Such research could help disclose factors that give rise to emotional demands at work. The correlations between emotional demands and the other work environment exposures included in the present paper were modest; the Pearson correlation coefficients ranged from 0.17 for violence and 0.23 for threats to 0.52 for demands for hiding emotions (data not shown). These correlations suggest that emotional demands and demands for hiding emotions are interrelated constructs, although they have been conceptualized separately. Such interrelation could exist because hiding emotions requires sustained emotional effort (ie, is emotionally demanding).

In contrast to a previous Danish study (26) that related threats and violence (measured by job exposure matrix) to depression, we found no increased use of antidepressants for those exposed to threats or violence. We measured threats and violence at the level of the individual and therefore avoided ecological fallacy (52). Our null-finding, however, could be due to a lack of statistical power. Alternatively, threats and violence could be related to anxiety disorders rather than depression, as dangerous events have been related to episodes of anxiety but not depression (53). We plan to examine this issue further in future analyses.

We did not examine mediation by "classic" work environment constructs, such as the demands-control-support model (54), as the choice of potential mediators was guided by existing literature characterizing person-related work (eg, 9, 18, 29, 30), rather than a specific theoretical model. However, the increased use of antidepressants associated with person-related work could also be explained by other work environment factors not examined in this study. Following this vein, it should be noted that most Danish employees undertaking healthcare and educational work are employed within the public sector. Due to the high correlation (data not shown) between our exposure and public employment, we did not adjust for employment sector, as it could lead to overadjustment. However, work environment factors disproportionately prevalent within the public sector could bias our results.

Methodological considerations

We applied the use of antidepressants as a proxy-measure of depression, because it yields three methodological advantages over questionnaire-based symptom rating scales. Firstly, it is "objective" (ie, not self-reported) and avoids bias due to common method variance (55). Secondly, no active participation from respondents is required after baseline assessment. Attrition during follow-up, which could be differential according to health status (56), is thereby prevented. Thirdly, use of antidepressants is measured continuously and cumulated. Most other measures of depression obtain outcome status at a fixed time, and non-cases could have experienced

depression during follow-up, were they in remission at the time of follow-up.

Misclassification of outcome. However, applying the use of antidepressants as a proxy-measure of depression results in some misclassification of outcome; firstly, antidepressants are used to treat disorders other than depression (eg, anxiety disorders) (57), causing false-positive classification. If this is non-differential to exposure, it could cause an underestimation of effect (52).

Secondly, not all persons suffering from depression are treated with antidepressants (35, 58), affecting the sensitivity of the measure. The use of mental health services has been associated with age, educational level, social support, and physical health (58), and differential sensitivity of antidepressants as a proxy for depression has been shown in relation to gender and socioeconomic position (59).

We found the greatest use of antidepressants among healthcare workers. Employees in this sector could be more likely than others to enter treatment with antidepressants when depressed, causing differential misclassification, biasing our estimates. However, because we found the greatest use of antidepressants among healthcare workers with the most contact with clients, we consider it unlikely that treatment-seeking behaviors fully explain our results, as this would imply differential treatment-seeking related to the degree of contact with clients.

Misclassification of exposures. Exposure status was only obtained at baseline, and respondents could have changed status during follow-up; if non-differential, this misclassification could bias our results towards the null. Also, reports of work environment exposures could be biased by subclinical depressive symptoms. We excluded respondents suffering from severe depressive symptoms at baseline, and those using antidepressants within 12 months prior to follow-up, but residual depressive symptoms could confound the associations of the use of antidepressants with both client contact and emotional demands. We consider it unlikely that reports of client contact were substantially biased by such symptoms, as we did not see an increased use of antidepressants for all types of person-related work, but only in relation to certain types of work. Regarding emotional demands, the strong (and expected) associations with human service work suggest that these reflect the external environment. However, selection into human service work, of persons who experience high emotional demands and are particularly at risk of depression, cannot be ruled out.

Causality. Although we adjusted for confounding by gender, age, cohabitation, parental status, and socioeconomic position, other risk factors for depression (eg, events in private life, childhood experiences, alcohol, and genetics) could confound results, were they related to type of

work. Particularly, individuals who choose to do certain types of person-related work may be especially at risk of depression. It has been proposed that choosing a career within caretaking professions could be motivated by personality traits related to childhood roles of taking care of other family members' needs to an excessive extent (parentification) (60). This has been corroborated empirically by increased levels of traumatic childhood events among psychotherapists (61) and psychology students with clinical aspirations (62), in addition to increased levels of parentification among counseling psychology trainees (63). Other studies have shown high degrees of parentification (60, 64) and childhood separation from parents (64) among social workers; unfortunately, these studies did not apply appropriate reference populations. However, one should take into account that the results of our study could reflect pre-existing characteristics of individuals who do certain types of person-related work, rather than a causal effect of these types of work.

Concluding remarks

We found an increased incident use of antidepressants among employees doing certain types of person-related work (ie, healthcare and educational work) in a representative sample of the Danish working population. These effects were partly mediated by the emotional demands of the work. The methodological issues discussed above should be taken into consideration when interpreting the findings.

Acknowledgements

The Danish Data Protection Agency approved this study (45). [Approval from the Danish National Committee on Biomedical Research Ethics is not required for Danish questionnaire- and register-based studies (46).] This work was supported by the Danish Working Environment Authority, the Ministry of Labor, and the Danish Working Environment Research Fund (grant numbers 5-2006-04 and 03-2008-09). The authors would like to thank Dr Harald Hannerz for his assistance, facilitating the analyses of this paper.

References

1. Simon GE. Social and economic burden of mood disorders. *Biol Psychiatry*. 2003;54:208–15.
2. Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJL. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. *Lancet*. 2006;367:1747–57.

3. Harris T. Recent developments in understanding the psychosocial aspects of depression. *Br Med Bull.* 2001;57:17–32.
4. Bonde JPE. Psychosocial factors at work and risk of depression: a systematic review of the epidemiological evidence. *Occup Environ Med.* 2008;65:438–45.
5. Netterstrøm B, Conrad N, Bech P, Fink P, Olsen O, Rugulies R, et al. The relation between work-related psychosocial factors and the development of depression. *Epidemiol Rev.* 2008;30:18–32.
6. 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;63:314–9.
7. Hannerz H, Tüchsen F, Pedersen BH, Dyreborg J, Rugulies R, Albertsen K. Work-relatedness of mood disorders in Denmark. *Scand J Work Environ Health.* 2009;35(4):294–300.
8. Wieclaw J, Agerbo E, Mortensen PB, Bonde JP. Occupational risk of affective and stress-related disorders in the Danish workforce. *Scand J Work Environ Health.* 2005;31(5):343–51.
9. Zapf D. Emotion work and psychological well-being: a review of the literature and some conceptual considerations. *Hum Resour Manage Rev.* 2002;12:237–68.
10. van Vegchel N, de Jonge J, Söderfeldt M, Dormann C, Schaufeli W. Quantitative versus emotional demands among Swedish human service employees: moderating effects of job control and social support. *Int J Stress Manag.* 2004;11:21–40.
11. Wieclaw J, Agerbo E, Mortensen PB, Burr H, Tüchsen F, Bonde JP. Psychosocial working conditions and the risk of depression and anxiety disorders in the Danish workforce. *BMC Public Health.* 2008;8:280.
12. Andrea H, Bültmann U, Beurskens AJHM, Swaen GMH, van Schayck CP, Kant IJ. Anxiety and depression in the working population using the HAD Scale. *Soc Psychiatry Psychiatr Epidemiol.* 2004;39:637–46.
13. Bültmann U, Kant IJ, Schröer CAP, Kasl SV. The relationship between psychosocial work characteristics and fatigue and psychological distress. *Int Arch Occup Environ Health.* 2002;75:259–66.
14. Vanroelen C, Levecque K, Moors G, Gadeyne S, Louckx F. The structuring of occupational stressors in a Post-Fordist work environment: moving beyond traditional accounts of demand, control and support. *Soc Sci Med.* 2009;68:1082–90.
15. Burr H, Albertsen K, Rugulies R, Hannerz H. Do dimensions from the Copenhagen Psychosocial Questionnaire predict vitality and mental health over and above the job strain and effort-reward imbalance models? *Scand J Public Health.* 2010;38:59–68.
16. Borritz M, Rugulies R, Bjorner JB, Villadsen E, Mikkelsen OA, Kristensen TS. Burnout among employees in human service work: design and baseline findings of the PUMA study. *Scand J Public Health.* 2006;34:49–58.
17. Sundin L, Hochwälder J, Bildt C, Lisspers J. The relationship between different work-related sources of social support and burnout among registered and assistant nurses in Sweden: a questionnaire survey. *Int J Nurs Stud.* 2007;44:758–69.
18. Hochschild A. *The managed heart : commercialization of human feeling.* London: University of California Press; 1983.
19. Giardini A, Frese M. Reducing the negative effects of emotion work in service occupations: Emotional competence as a psychological resource. *J Occup Health Psychol.* 2006;11:63–75.
20. Brotheridge CM, Grandey AA. Emotional labor and burnout: comparing two perspectives of “people work”. *J Vocat Behav.* 2002;60:17–39.
21. Grandey AA. When “the show must go on”: surface acting and deep acting as determinants of emotional exhaustion and peer-rated service delivery. *Acad Manage J.* 2003;46:86–96.
22. Johnson HAM, Spector PE. Service with a smile: do emotional intelligence, gender, and autonomy moderate the emotional labor process? *J Occup Health Psychol.* 2007;12:319–33.
23. Zapf D, Vogt C, Seifert C, Mertini H, Isic A. Emotion work as a source of stress: the concept and development of an instrument. *Eur J Work Organ Psychol.* 1999;8:371–400.
24. Menckel E, Viitasara E. Threats and violence in Swedish care and welfare – magnitude of the problem and impact on municipal personnel. *Scand J Caring Sci.* 2002;16:376–85.
25. Rippon TJ. Aggression and violence in health care professions. *J Adv Nurs.* 2000;31:452–60.
26. Wieclaw J, Agerbo E, Mortensen PB, Burr H, Tüchsen F, Bonde JP. Work related violence and threats and the risk of depression and stress disorders. *J Epidemiol Community Health.* 2006;60:771–5.
27. Høgh A, Borg V, Mikkelsen KL. Work-related violence as a predictor of fatigue: a 5-year follow-up of the Danish Work Environment Cohort Study. *Work Stress.* 2003;17:182–94.
28. Høgh A, Mikkelsen EGE. Is sense of coherence a mediator or moderator of relationships between violence at work and stress reactions? *Scand J Psychol.* 2005;46:429–37.
29. Hasenfeld Y, English RA. Human service organizations: a conceptual overview. In: Hasenfeld Y, English RA, editors. *Human service organizations: a book of readings.* Ann Arbor (MI): University of Michigan Press; 1974. p 1–24.
30. Morris JA, Feldman DC. The dimensions, antecedents, and consequences of emotional labor. *Acad Manage Rev.* 1996;21:986–1010.
31. Lægemedelstyrelsen [Danish Medicines Agency]. About the Register of Medicinal Product Statistics [Internet]. Copenhagen: Lægemedelstyrelsen [Danish Medicines Agency]; [cited 1 December 2009]. Available from: <http://www.dkma.dk/1024/visUKLSArtikel.asp?artikelID=10895>
32. Burr H, Bjorner JB, Kristensen TS, Tüchsen F, Bach E. Trends in the Danish work environment in 1990–2000 and their associations with labor-force changes. *Scand J Work Environ Health.* 2003;29(4):270–9.
33. Rose D, Harrison E. The European Socio-Economic Classification: a new social class schema for comparative European research. *Eur Soc.* 2007;9:459–90.
34. International Labour Organization (ILO). ISCO-68 – major, minor and unit groups [Internet]. ILO; [cited 1 December 2009]. Available from: <http://www.ilo.org/public/english/bureau/stat/isco/isco68/major.htm>

35. Olsen LR, Mortensen EL, Bech P. Prevalence of major depression and stress indicators in the Danish general population. *Acta Psychiatr Scand.* 2004;109:96–103.
36. Simon RW. Revisiting the relationships among gender, marital status, and mental health. *AJS.* 2002;107:1065–96.
37. Borg V, Kristensen TS. Social class and self-rated health: can the gradient be explained by differences in life style or work environment? *Soc Sci Med.* 2000;51:1019–30.
38. Bjorner JB, Thunedborg K, Kristensen TS, Modvig J, Bech P. The Danish SF-36 Health Survey: translation and preliminary validity studies. *J Clin Epidemiol.* 1998;51:991–9.
39. Rumpf HJ, Meyer C, Hapke U, John U. Screening for mental health: validity of the MHI-5 using DSM-IV Axis I psychiatric disorders as gold standard. *Psychiatry Res.* 2001;105:243–53.
40. Strand BH, Dalgard OS, Tamsb K, Rognerud M. Measuring the mental health status of the Norwegian population: a comparison of the instruments SCL-25, SCL-10, SCL-5 and MHI-5 (SF-36). *Nord J Psychiatry.* 2003;57:113–8.
41. Holmes WC. A short, psychiatric, case-finding measure for HIV seropositive outpatients: performance characteristics of the 5-item Mental Health Subscale of the SF-20 in a male, seropositive sample. *Med Care.* 1998;36:237–43.
42. Rugulies R, Bültmann U, Aust B, Burr H. Psychosocial work environment and incidence of severe depressive symptoms: prospective findings from a 5-year follow-up of the Danish Work Environment Cohort Study. *Am J Epidemiol.* 2006;163:877–87.
43. World Health Organization (WHO). The Anatomical Therapeutic Chemical Classification System with Defined Daily Doses (ATC/DDD) [Internet]. Geneva: WHO [cited 7 September 2009]. Available from: <http://www.who.int/classifications/atcddd/en/>
44. Angst J, Gamma A, Gastpar M, Lépine JP, Mendlewicz J, Tylee A. Gender differences in depression. *Eur Arch Psychiatry Clin Neurosci.* 2002;252:201–9.
45. Datatilsynet [The Danish Data Protection Agency]. Introduction to the Danish Data Protection Agency [Internet]. Copenhagen: Datatilsynet; [cited 1 December 2009]. Available from: <http://www.datatilsynet.dk/english/>
46. Den Centrale Videnskabetiske Komité [The Danish National Committee on Biomedical Research]. Frequently asked questions on application [Internet]. Copenhagen: Den Centrale Videnskabetiske Komité; [cited 1 December 2009]. Available from: <http://www.cvk.sum.dk/CVK/Home/English.aspx>
47. Söderfeldt B, Söderfeldt M, Jones K, O'Campo P, Muntaner C, Ohlson CG, et al. Does organization matter?: a multilevel analysis of the demand-control model applied to human services. *Soc Sci Med.* 1997;44:527–34.
48. Dybbroe B. Omsorg i skæringspunktet mellem arbejde og liv [Care in the intersection between work and life]. *Tidsskr Arbejdsliv.* 2006;8:67–81.
49. Schaufeli WB. The balance of give and take: toward a social exchange model of burnout. *Int Rev Soc Psychol.* 2006;19:87–131.
50. 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(4):438–49.
51. Brown GW, Harris TO. Social origins of depression. A study of psychiatric disorder in women. London: Tavistock; 1978
52. Rothman KJ, Greenland S, Lash TL. Modern epidemiology. Philadelphia (PA): Wolters Kluwer; 2008.
53. Kendler KS, Hettema JM, Butera F, Gardner CO, Prescott CA. Life event dimensions of loss, humiliation, entrapment, and danger in the prediction of onsets of major depression and generalized anxiety. *Arch Gen Psychiatry.* 2003;60:789–96.
54. Karasek R, Theorell T. Healthy work: stress, productivity, and the reconstruction of working life. New York (NY): Basic Books; 1990.
55. Podsakoff PM, MacKenzie SB, Jeong-Yeon L, Podsakoff NP. Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J Appl Psychol.* 2003;88:879–903.
56. Goldberg M, Chastang JF, Zins M, Niedhammer I, Leclerc A. Health problems were the strongest predictors of attrition during follow-up of the GAZEL cohort. *J Clin Epidemiol.* 2006;59:1213–21.
57. Trifirò G, Barbui C, Spina E, Moretti S, Tari M, Alacqua M, et al. Antidepressant drugs: prevalence, incidence and indication of use in general practice of Southern Italy during the years 2003–2004. *Pharmacoepidemiol Drug Saf.* 2007;16:552–9.
58. Gadalla TM. Comparison of users and non-users of mental health services among depressed women: a national study. *Women Health.* 2008;47:1–19.
59. Thielen K, Nygaard E, Andersen I, Rugulies R, Heinesen E, Bech P, et al. Misclassification and the use of register-based indicators for depression. *Acta Psychiatr Scand.* 2009;119:312–9.
60. Lackie B. The families of origin of social-workers. *Clin Soc Work J.* 1983;11:309–22.
61. Fussell FW, Bonney WC. A comparative study of childhood experiences of psychotherapists and physicists: implications for clinical practice. *Psychother Theory Res Pract Train.* 1990;27:505–12.
62. Nikcevic AV, Kramolisova-Advani J, Spada MM. Early childhood experiences and current emotional distress: what do they tell us about aspiring psychologists? *J Psychol.* 2007;141:25–34.
62. DiCaccavo A. Investigating individuals' motivations to become counselling psychologists: the influence of early caretaking roles within the family. *Psychol Psychother.* 2002;75:463–72.
63. Vincent J. Why ever do we do it?: unconscious motivation in choosing social work as a career. *J Soc Work Pract.* 1996;10:63–9.

Received for publication: 14 December 2009

Appendix. Categorization of type of person-related work

Type of work	Job group according to International Standard of Classification of Occupations (ISCO-68)
Healthcare	Caring personnel (hospital); caring personnel (retirement homes); caring personnel (homecare); caring personnel (low skilled); doctors and dentists; nurses; physio-/ergotherapists; firefighters; and paramedics.
Education	Primary school teachers; secondary school teachers; teachers on educations of medium length; pedagogues (day care); pedagogues (low skilled); and daycare workers.
Social work	Social workers; pedagogues (24-hour institution); and police and prison personnel.
Customer service	Librarians and museum employees; doctors' secretaries; bank assistants; sales assistants; spouses helping (sales); waiting personnel; hairdressers; bus drivers; taxi drivers; mechanics; plumbers; electricians; carpenters; construction workers (skilled); construction workers (unskilled); and truck drivers.
Other	Academics (natural sciences); academics (human and social sciences); engineers and architects; IT employees; researchers (university); technicians and constructors; laboratory technicians; media employees; managing clerks; office assistants (private sector); office assistants (public sector); accountants; mail deliverers; warehouse clerks; kitchen staff; cleaning staff; janitors; agricultural workers; farmers; spouses helping (agriculture); forest workers; tool-room workers; metalworkers (low skilled); electronics workers (low skilled); industrial workers (wood); slaughterhouse workers; food workers; wrappers (bottling workers); warehouse and harbor workers; seamstresses; factory workers (concrete); trainees and students (service, office etc.); trainees and students (industrial, crafts); managers (private sector); managers (public sector); store managers; foremen; and others.
