

The mental health effects of multiple work and family demands: A prospective study of psychiatric sickness absence in the French GAZEL study.

Maria Melchior, Lisa Berkman, Isabelle Niedhammer, Marie Zins, Marcel Goldberg

► **To cite this version:**

Maria Melchior, Lisa Berkman, Isabelle Niedhammer, Marie Zins, Marcel Goldberg. The mental health effects of multiple work and family demands: A prospective study of psychiatric sickness absence in the French GAZEL study.. *Social Psychiatry and Psychiatric Epidemiology*, Springer Verlag, 2007, 42 (7), pp.573-582. 10.1007/s00127-007-0203-2 . inserm-00165556

HAL Id: inserm-00165556

<https://www.hal.inserm.fr/inserm-00165556>

Submitted on 13 Sep 2007

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

The mental health effects of multiple work and family demands: a prospective study of psychiatric sickness absence in the French GAZEL study.

Maria Melchior^{1,2}, Lisa F Berkman³, Isabelle Niedhammer², Marie Zins⁴,
Marcel Goldberg²

¹MRC Centre for Social, Genetic and Developmental Psychiatry, Institute of Psychiatry, King's College, London, United-Kingdom

² INSERM, U687, Saint-Maurice, F-94410, France ;
Université Paris XI, IFR69, Villejuif, F-94807, France

³Department of Society, Human Development and Health, Harvard School of Public Health, Boston, MA, USA

⁴CETAF-RPPC, INSERM U687, Saint-Maurice, F-94410, France

Corresponding author: Maria Melchior (maria.melchior@st-maurice.inserm.fr)

Keywords: work stress; family demands; sickness absence; depression; social disparities

Abstract

Background: Individuals who experience work stress or heavy family demands are at elevated risk of poor mental health. Yet, the cumulative effects of multiple work and family demands are not well known, particularly in men.

Methods: We studied the association between multiple work and family demands and sickness absence due to non-psychotic psychiatric disorders in a longitudinal study conducted among members of the French GAZEL cohort study (8869 men, 2671 women) over a period of 9 years (1995-2003). Work stress and family demands were measured by questionnaire. Medically-certified psychiatric sickness absence data were obtained directly from the employer. Rate ratios (RRs) of sickness absence were calculated using Poisson regression models, adjusting for age, marital status, social support, stressful life events, alcohol consumption, body mass and depressive symptoms at baseline.

Results: Participants simultaneously exposed to high levels of work and family demands (≥ 2 work stress factors and ≥ 4 dependents) had significantly higher rates of sickness absence due to non-psychotic psychiatric disorders than participants with lower levels of demands (compared to participants exposed to 0-1 work stress factors and with 1-3 dependents, age-adjusted rate ratios were 2.37 (95% CI 1.02-5.52) in men and 6.36 (95% CI 3.38-11.94) in women. After adjusting for baseline socio-demographic, behavioral and health characteristics, these RRs were respectively reduced to 1.82 (95% CI 0.86-3.87) in men, 5.04 (95% CI 2.84-8.90) in women. The effect of multiple work and family demands was strongest for sickness absence due to depression : age-adjusted RRs among participants with the highest level of work and family demands were 4.70 (1.96-11.24) in men, 8.57 (4.26-17.22) in women; fully-adjusted RRs: 3.55 (95% CI 1.62-7.77) in men, 6.58 (95%CI 3.46-12.50) in women.

Conclusions: Men and women simultaneously exposed to high levels of work stress and family demands are at high risk of experiencing mental health problems, particularly depression.

Work and family demands and psychiatric sickness absence in the GAZEL cohort.

Research shows that individuals who work in stressful conditions or have extensive family responsibilities are at high risk of poor mental health [1-3], psychosocial strain [4;5], psychosomatic symptoms [6], psychological distress [7;8] and symptoms of depression and anxiety [9;10]. The mental health effects of these stressful conditions are probably related to a decreased sense of control, lowered self-esteem [11-13], social isolation [14] and increased financial strains [12]. Individuals simultaneously exposed to multiple work and family stresses may have an especially high risk of psychiatric disorders, and particularly depression. However, to date, this hypothesis has not been thoroughly examined.

Family responsibilities, including childcare and elderly care, predominantly fall on women [15;16]. However, men also appear vulnerable to the combined effects of work and family stress [17]. Overall, past studies have primarily focused on women and the costs of work and family stress in men are still largely unknown. Across the European Union, 90% of working men and 60% of working women simultaneously care for their children and an increasing proportion of these working adults additionally care for their aging parents [16]. Hence, studying the mental health impact of work and family balance is a key area for research.

In industrialized countries, psychiatric disorders are one of the leading causes of sickness absence from work. Workers who are sick-listed for psychiatric reasons tend to be absent for longer periods of time than workers sick-listed due to other medical conditions and have a high risk of poor social and health outcomes in the long-term [18;19]. This leads not only to individual suffering but also to high costs for employers and social security systems: in Europe, the financial burden of psychiatric sickness absence is estimated at 3-4% of GNP per year (in 2002, 265 billion euros) [20-22]. As a result, reducing the burden of mental health problems and psychiatric sickness absence recently became a key priority for the World Health Organization [23].

In a previous investigation based on the GAZEL cohort study, an occupational cohort set up in France, we found elevated rates of medically-certified psychiatric sickness absence in men and women who experienced low levels of control over their work and who received insufficient social support from colleagues and supervisors [24]. These effects were strongest in manual workers and clerks. In the present study, we hypothesized that workers exposed to work stress would have an especially high risk of poor mental health if they simultaneously experience high

Work and family demands and psychiatric sickness absence in the GAZEL cohort.

levels of family demands. Moreover, we expected that these effects would be strongest among those who belong to low occupational grades and have fewer economic, social and other resources.

Methods

Study population

The GAZEL study is an ongoing occupational cohort set up in 1989 among employees of France's national gas and electricity company (Electricité de France-Gaz de France, EDF-GDF). The cohort's recruitment procedures and main characteristics have been described elsewhere [25].; briefly, at baseline 14 752 men aged 40-50 and 5 317 women aged 35-50 agreed to take part in a longitudinal follow-up (women were purposely oversampled because female employees represent only 20% of EDF-GDF employees). Men were somewhat more likely to participate in the study than women; among men, those who experienced sickness absence in the year prior to the baseline assessment were less likely to take part than those who were sickness absence-free [26]. Since baseline, less than 1% of GAZEL cohort members have been lost to follow-up.

Cohort members are followed primarily through a yearly, mailed, survey (average response rate: 75%). In addition, data on occupational grade, socio-demographic characteristics and medically-certified sickness absence are obtained directly from company records.

Our study was based on cohort members who responded to the 1995 GAZEL survey, which included measures of work stress (11 183 men and 4 095 women, 75% of the original cohort). We excluded retirees (n=2 050) and cohort members with incomplete work stress data (n=205). In addition, to reduce the possibility that reports of work stress and rates of psychiatric sickness absence in the study were influenced by preexisting psychiatric illness, we excluded cohort members who had a history of psychiatric sick leave prior to the beginning of the follow-up period (1988-1995; n=1 476). Finally, we excluded cohort members who experienced sickness absence due to psychosis or mania during the follow-up period (7 men and 1 woman). Our final sample comprised 8 869 men and 2 671 women. Cohort members included in this analysis were healthier than those who did not respond to the 1995 study survey or those with a history of psychiatric sickness absence.

Work and family demands and psychiatric sickness absence in the GAZEL cohort.

For this analysis, participants were followed from the day on which they completed the 1995 GAZEL survey until the day on which they retired, died, withdrew from EDF-GDF or from the GAZEL cohort, or December 31, 2003, whichever occurred first.

The GAZEL cohort study received the approval of France's national committee for data protection (CNIL: Commission Nationale Informatique et Liberté).

Measures

Work and family demands

Work stress was measured in 1995 using a French-version of the Karasek, Theorell and Johnson work stress questionnaire [27;28]. Three types of work stress were assessed: *decision latitude* (i.e. control over the content and execution of work-related tasks; 6 items); *psychological demands* (i.e. workload and time pressures; 5 items), and *work-related social support* received from colleagues (5 items). All three scales had satisfactory psychometric properties (Cronbach's alpha coefficients: 0.65 for decision latitude, 0.69 for psychological demands, 0.52 for social support). After verifying that the association between work stress factors and sickness absence was graded, we dichotomized each subscale at its median value. We then summed the three subscales to create an index of work stress (range: 0-3).

Family demands were measured by the number of dependents in 1995 (0, 1-3, ≥ 4), obtained from EDF-GDF company records. Dependents are all individuals who do not have an income and are financially supported by the employee (typically children or the spouse). Their number is routinely recorded by the company to calculate employees' 'family benefits'.

Our measure of the total burden of work and family demands was created by summing the number of work stresses and the number of dependents (Table 1). Based on research showing that both social isolation and multiple stressors can affect mental health [29], we studied participants with no dependents as a separate category, regardless of their level of work stress. Participants with 2-3 work stresses and 4 or more dependents were classified in the highest exposure group. The two intermediate groups of exposure each included approximately 40% of study participants.

Information on the relationship between the participant and his/her dependents was not available to us. Thus, we were not able to distinguish dependent children

Work and family demands and psychiatric sickness absence in the GAZEL cohort.

from a dependent spouse. However, dependents' age was recorded and in secondary analyses we tested whether participants with young dependents (aged 25 years or less, aged 15 years or less, or aged 6 years or less), adult dependents (aged 25-60 years) or elderly dependents (aged 60 years or more) had especially poor outcomes. In further analyses we also tested additional measures of family demands: 1) the provision of help to parents or children in case of financial difficulty; 2) the number of individuals living in the participant's household; 3) the number of children living in the participant's household. Participants with young dependents or living with children did not appear at risk of poor mental health, therefore we did not distinguish this group in our main analyses.

Adjustment variables

Our statistical analyses controlled for sociodemographic and health characteristics that are potentially associated with the occurrence of psychiatric sickness absence: age (men: 45-49, 50-54, 55-56, women: 42-44, 45-49, 50-54, 55-56), marital status (single, divorced, married/living with a partner) occupational grade (manual worker/clerk, associate professional/technician; manager), social networks and social support (ascertained by Berkman's Questionnaire on Social Networks and Social Support; insufficient vs. sufficient [30]), stressful life events in the 12 months prior to the beginning of the follow-up (partner separation or divorce, partner's death, death of another family member, partner's hospitalization, partner's unemployment; 0, 1, >=2), alcohol consumption (in servings per week: none, light: 1-13 for men, 1-6 for women, intermediate: 14-27 for men, 7-20 for women, or heavy: >=28 for men, >=21 for women), body mass index (in kg/ m²: underweight: <20, normal: 20 to 24.9, overweight: 25 to 29.9, or obese: >=30), depressive symptoms in the 12 months prior to the beginning of the follow-up (assessed through the following item: 'In the past 12 months have you experienced symptoms of depression? no/yes). All variables were measured in 1995 except for social networks and social support, ascertained in 1994.

Sickness absence due to non-psychotic psychiatric disorders

We studied two outcomes: a) days of sickness absence due to all non-psychotic psychiatric disorders and b) days of sickness absence due to depression (single or recurrent episode). Medically-certified sickness absence data (first day of each absence spell, last day, diagnosis) were obtained from company records [31].

Work and family demands and psychiatric sickness absence in the GAZEL cohort.

Psychiatric diagnoses were established by company physicians using a classification derived from the International Classification of Diseases (ICD) [32;33]. In 1995-1996, psychiatric sickness absences were coded following the 9th version of the ICD: depression (300.4; 311), neurotic disorder other than depression (300.0-300.3; 300.5-300.9); personality disorder (301), alcohol dependence (303), unspecified psychosomatic complaints. From 1997 to 2003, diagnoses were coded following the 10th version of the ICD: depressive episode (F32), recurrent depressive disorder (F33), persistent mood disorder (F34), phobic anxiety disorders (F40), other anxiety disorders (F40-F41), other neurotic stress-related or somatoform disorders (F42-44), organic, including symptomatic mental disorders (F00-09), disorders due to the use of alcohol (ICD-10: F10) or other drugs (ICD-10: F11-19), other mental disorders. Leading causes of psychiatric sickness absence were depression (men: 50% of absence days, women: 78%), anxiety disorders (men: 27%, women: 14%) and alcohol-related disorders (men: 4%, women :< 1%).

Statistical analysis

To examine the association between work and family demands and psychiatric sickness absence, we calculated rate ratios of days of sickness absence. We studied the number of days of psychiatric sickness absence rather than the number of spells for two reasons: first, psychiatric diagnoses are recorded more accurately in the case of long absence spells [34]; second, the number of days of sickness absence is generally considered a better indicator of illness severity [20].

The analysis was conducted using log-linear Poisson regression models in which data overdispersion was accounted for by adjusting standard errors by a scale parameter equivalent to the residual deviance divided by the number of degrees of freedom [35]. Our analyses were conducted controlling for age, occupational grade, marital status, social support, stressful life events, alcohol consumption, body mass and depressive symptoms at baseline.

To test whether the effects of work and family demands varied by occupational grade, we conducted a stratified analysis and tested for interactions.

In secondary analyses, we studied alternative measures of family demands. Additionally, to compare our results to prior research, we repeated the analyses studying the number of sickness absence spells [36].

Work and family demands and psychiatric sickness absence in the GAZEL cohort.

Men and women differ with regard to their level of work and family demands and with regard to their baseline rates of psychiatric sickness absence and our analyses were systematically stratified on gender. We used the SAS statistical package (V 8.2); log-linear Poisson regression models were fitted with the PROC GENMOD procedure [37].

Results

In 1995, GAZEL cohort members were aged 41-56 years (Tables 2 and 3). A majority lived with a partner (92.7% of men, 74.1% of women) and worked either as a manager or as an associate professional or technician. Over the 9-year period of follow-up, 5.3% of men and 16.9% of women experienced at least one sickness absence due to non-psychotic psychiatric disorder. The average number of days of psychiatric sickness absence per 100 person-years was 101 in men and 315 in women.

69.1% of men and 86.2% of women in the study were exposed to at least one work stress factor. Work stress was especially frequent among manual workers and clerks. 94.3% of men and 87.1% of women had at least one dependent. In men, the number of dependents was highest among managers. In women, the number of dependents was highest among clerks. Additional analyses revealed that managers were most likely to live with 3 or more children. Overall, 7.7% of men and 12.9% of women were exposed to the highest level of work and family demands (≥ 2 work stress factors and ≥ 4 dependents). Simultaneously high levels of work stress and family demands were especially frequent among manual workers and clerks (men: 10.2%, women: 15.4%).

Adjusting for age, we found a u-shaped relationship between work and family demands and rates of sickness absence days due to all non-psychotic psychiatric disorders (Table 4). Compared to participants exposed to 0-1 work stress factors and with 1-3 dependents, those exposed to ≥ 2 work stress factors and with ≥ 4 dependents were at greatest risk (RRs: 2.37, 95% CI 1.02-5.52, in men, 6.36, 95% CI 3.38-11.94, in women). After adjusting for occupational grade, marital status, social support, stressful life events, alcohol consumption, body mass and depressive symptoms at baseline, these rate ratios were reduced to 1.82 (95% CI 0.86-3.87) in men and 5.04 (95% CI 2.84-8.90) in women.

Work and family demands and psychiatric sickness absence in the GAZEL cohort.

Individuals exposed to multiple work and family demands were especially likely to experience sickness absence days due to depression (age-adjusted RRs in the group exposed to multiple work and family demands were 4.70, 95% CI 1.96-11.24 in men and 8.57, 95% CI 4.26-17.22 in women; fully-adjusted RRs were 3.55, 95% CI 1.62-7.77 in men and 6.58, 95% CI 3.46-12.50 in women).

Additionally, rates of psychiatric sickness absence days were elevated among participants with no dependents. Individuals in this group experienced substantial work demands, which may have partly explained their elevated risk. Because this group is very small, we could not examine the reasons for their elevated rates of sickness absence days in as fine a detail as we would have liked. Importantly, throughout the analyses, the group at greatest risk is consistently those with both heavy work and family demands.

In men, the effect of work and family demands varied across occupational grades (Figure 1). Compared to managers, men who worked as associate professionals/technicians or clerks/manual workers were more likely to experience psychiatric sickness absence days if exposed to multiple stresses (managers: 0.3 days/ person-year, associate professionals/technicians: 3.0 days/person-year, $p=0.014$; clerks/manual workers: 1.8 day per person-year, $p=0.048$). In women, the effect of multiple work and family demands did not significantly vary by occupational grade.

Occupational grade did not significantly modify the effect of work and family demands on rates of sickness absence days due to depression (Figure 2).

Our additional analyses revealed a) elevated rates of psychiatric sickness absence days in men who frequently helped family members in financial difficulty; b) no consistent effect of either the number of individuals in the household or of the number of children in the household; c) elevated rates of psychiatric sickness absence days among women with dependents aged 25-60 years (compared to those with dependents in other age groups the age-adjusted RR was 2.39, 95% CI: 1.37-4.18). Although we cannot identify exactly who these dependents are, it is most likely that they are not participants' children but other dependent adults.

When we repeated the analyses studying the number of sickness absence spells our results were unchanged, except for a stronger effect of occupation grade. We found no significant interactions between multiple work and family stresses and life events.

Discussion

Men and women exposed to multiple work and family demands experience an elevated risk of sickness absence due to non-psychotic psychiatric disorders and especially depression. Our hypothesis that the effects of multiple work and family demands would vary across occupational grades was partially supported in men, but not in women. To date, most research in this area focused on women and our study is one of few to report on the mental health effects of work and family balance in men.

Methodological issues

Our results need to be interpreted in light of several limitations. We measured family demands by the number of dependents, which is a very simple indicator. Previous studies used a wide range of measures of family responsibilities, such as household size, the number of children aged less than 15 in the household, the number of elderly in the household [6;38], the total number of hours spent on caregiving [39-41], the provision of care to an elderly or ill spouse [39;42]. Although there is increasing recognition that excessive work and family demands can be detrimental to health, to our knowledge there is currently no consensus on the optimal way of measuring these exposures. In our secondary analyses, total household size and the number of children in the household were not strongly associated with psychiatric sickness absence, suggesting that household size and the total number of dependents measure different aspects of family demands. Overall, there is a need for additional research on measures of family demands across demographic groups.

Our study is based on middle-aged men and women and psychiatric sickness absence during the study follow-up could reflect preexisting psychiatric illness. Additionally, psychiatric illness could have also influenced career trajectories as well as assessments of work and family characteristics. To address this issue, we restricted the analysis to participants with no history of psychiatric sick leave 7 years prior to the beginning of follow-up and our analyses controlled for symptoms of depression at study baseline. A downside of this approach is that we reduced our sample size, which decreased the precision of our estimates. Another characteristic of our study population is that all participants were employed. Therefore, the GAZEL

Work and family demands and psychiatric sickness absence in the GAZEL cohort.

cohort is healthier than the general population and associations between work and family demands and mental health in other populations may be stronger than we report [26].

Sickness absence captures not only health but also job characteristics (e.g. whether someone is able to perform their job while ill) and attitudes towards work and health [43]. In the GAZEL study, sick leaves are medically-diagnosed and it is unlikely that employees free from psychiatric illness would be sick-listed with a psychiatric diagnosis [34]. However, physicians may underreport psychiatric illness on sickness absence certificates, particularly among managers. To address this issue, we studied the number of days of sickness absence, considered a better health indicator than the number of spells of absence [20]. In addition, sickness absence trends depend on social policies, work practices, and company characteristics [44;45]. Still, among EDF-GDF employees as well as in occupational cohorts comparable to the GAZEL study, such as the Whitehall II study of British civil servants, psychiatric sickness absence was shown to be valid against measures of psychiatric disorder obtained through standardized psychiatric interviews such as the CIDI or through clinical assessments [43;46]. Because sickness absence is a complex phenomenon, future studies should examine the effects of work and family stress on other mental health outcomes.

Multiple work and family demands and psychiatric sickness absence

Our main finding is that men and women who are simultaneously exposed to high levels of work stress and high family demands have elevated rates of sickness absence due to psychiatric disorders and particularly depression. This association could be mediated by biological, psychological and behavioural mechanisms. Biological mechanisms, suggested by animal and human studies, involve the dysregulation of stress hormones (i.e. glucocorticoids) which can directly influence brain functioning and precipitate the occurrence of affective problems [47]. Psychological mechanisms include a decreased sense of control and lowered self-esteem [11-13]. Behavioural mechanisms include a deterioration of individuals' social interactions with friends and family and individuals' lowered ability to engage in leisure and social activities [14]. Finally, multiple family demands may also be a source of financial difficulties, which have been shown to increase the risk of psychological distress and depression [12].

Work and family demands and psychiatric sickness absence in the GAZEL cohort.

An important question pertaining to our results is whether multiple work and family demands affect the occurrence of mental disorders or encourage individuals who suffer from a mental disorder to take a leave from work. We were not able to examine this question directly, but other researchers have shown that both phenomena are probably at work. On the one hand, multiple demands and work-family conflict may affect the occurrence of psychosomatic symptoms (for example tiredness, difficulty sleeping, difficulty concentrating) and psychiatric distress [6;48;49]. At the same time, when deciding whether to sick list their patients, physicians probably consider their work ability [50]. It is possible that among individuals who exhibit psychiatric symptoms physicians are more likely to sick-list those who report work stress than those who have satisfactory work conditions. Thus, multiple stresses probably influence both the risk of mental health problems and their work impact.

It is important to note that the GAZEL cohort consists of men and women who work for a large public sector company, and who throughout their worklife benefited from job security and opportunities for career development. Additionally, in France numerous social policies aim to address workers' family care needs (childcare provisions, family and parental leave, elderly care programs). Thus, we studied the mental health effects of multiple work and family demands in a rather privileged setting. In particular, social policies may buffer the effects of multiple stressors among the most disadvantaged groups who lack economic, social, and material resources.

Gender differences

Consistent with past research, we found higher rates of psychiatric sickness absence rates in women than in men, probably reflecting women's increased vulnerability to depression, higher levels of exposure to key risk factors, and an elevated probability of being sick-listed [51-53]. In the GAZEL cohort, women's levels of exposure to multiple work and family demands were systematically higher than men's. This is in line with data from French national surveys which report that women are more exposed to job stress factors than men [54] and take on a larger share of family responsibilities. On average, French women who work full-time take on 70% of domestic chores such as food shopping, cooking, cleaning, childcare, which corresponds to 3 hours of daily domestic work for those who live with a partner and

Work and family demands and psychiatric sickness absence in the GAZEL cohort.

have no children (compared to 1 hour in men) and over 4 hours of daily domestic work for those who live with a partner and have 2 children (compared to 1.5 hours in men) [15]. French women are also more likely than men to care for other family members, including elderly parents [55]. It may be that gender disparities in exposure to work and home demands partly shape gender differences in psychiatric sickness absence.

In men, the effects of multiple work and family demands were most pronounced among those employed in non-managerial jobs, yet contrary to our hypothesis they were greatest in the intermediate, not the lowest occupational group. In the GAZEL cohort, men who worked in the lowest occupational groups were most likely to have a history of psychiatric sickness absence and were therefore excluded from our analysis. To fully ascertain the contribution of multiple stresses to social disparities in mental health additional studies following younger cohorts are necessary.

In women, the effects of multiple work and family demands were strong across occupational grades. EDF-GDF is a male-dominated company (women represent less than 20% of the company workforce) and female employees are selected: for example, they are more likely to be single and to have no children than male employees. In addition, as other female workers in male-dominated companies, GAZEL cohort women may be exposed to higher levels of work stress than men, across occupational grades [56]. In addition, across occupational grades, for a given number of dependents, the burden of family responsibilities is probably higher in women than in men.

Conclusion

Men and women who experience high levels of work and family demands are at increased risk of psychiatric sickness absence. At the individual level, physicians may need to be especially attentive to the mental health needs of workers exposed to a combination of work and home stresses. At a population level, mental health appears shaped by policies that influence working conditions and that address family care needs.

Work and family demands and psychiatric sickness absence in the GAZEL cohort.

Acknowledgements: We thank GAZEL cohort participants who contributed data for this study, as well as EDF-GDF (particularly the Service des Etudes Médicales and the Service Général de Médecine de Contrôle) who collected sickness absence data. We also wish to acknowledge the GAZEL cohort study team responsible for data management. We are grateful to Annette Leclerc and to the participants of the Social Epidemiology research seminar in Paris for helpful comments on earlier versions of this work. Maria Melchior was supported by the U.S. National Institute of Mental Health and a fellowship from the French National Institute of Health Research (Programme Sciences Biomédicales, INSERM-CNRS). Additionally, the authors received support from the Russell Sage Foundation and the National Institute of Aging (NIA).

Declaration of interest: none

Reference List

1. Niedhammer I, Goldberg M, Leclerc A, Bugel I, David S (1998) Psychosocial factors at work and subsequent depressive symptoms in the Gazel cohort. *Scand J Work Environ Health* 24.:197-205
2. Stansfeld SA, Fuhrer R, Shipley M, Marmot MG (1999) Work characteristics predict psychiatric disorder: prospective results from the Whitehall II study. *Occup Environ Med* 56:302-307
3. Schulz R, O'Brien AT, Bookwala J, Fleissner K (1995) Psychiatric and physical morbidity effects of dementia caregiving: prevalence, correlates, and causes. *Gerontologist* 35:771-791
4. Hall EM (1992) Double exposure: the combined impact of the home and work environments on psychosomatic strain in Swedish women and men. *Int J Health Serv* 22:239-260
5. Maclean H, Glynn K, Ansara D (2004) Multiple roles and women's mental health in Canada. *BMC Womens Health* 4 Suppl 1:S3
6. Artazcoz L, Artieda L, Borrell C, Cortes I, Benach J, Garcia V (2004) Combining job and family demands and being healthy: what are the differences between men and women? *Eur J Public Health* 14:43-48
7. Matthews S, Power C, Stansfeld SA (2001) Psychological distress and work and home roles: a focus on socio-economic differences in distress. *Psychol Med* 31:725-736
8. Matthews S, Power C (2002) Socio-economic gradients in psychological distress: a focus on women, social roles and work-home characteristics. *Soc Sci Med* 54:799-810
9. Lennon MC, Rosenfield S (1992) Women and mental health: the interaction of job and family conditions. *J Health Soc Behav* 33:316-327
10. Wang JL (2006) Perceived work stress, imbalance between work and family/personal lives, and mental disorders. *Soc Psychiatry Psychiatr Epidemiol* 41:541-548
11. Vilhjalmsson R (1993) Life stress, social support and clinical depression: A reanalysis of the literature. *Soc Sci Med* 45:659-666
12. Mirowsky J, Ross CE (2001) Age and the effect of economic hardship on depression. *J Health Soc Behav* 42:132-150
13. Abramson LY, Seligman ME, Teasdale JD (1978) Learned helplessness in humans: critique and reformulation. *J Abnorm Psychol* 87:49-74
14. Berkman LF, Glass T (2000) Social integration, social networks, social support and health. In: Berkman LF, Kawachi I (eds) *Social Epidemiology*. Oxford University Press, New York: 137-173

15. Degenne, A, Lebeaux, M-O, and Marry, C (2002). Les usages du temps: cumuls d'activité et rythmes de vie. Paris, INSEE. Economie et statistique. 81-99.
16. Aliaga, C (2005). Conciliation entre vie professionnelle et familiale: écarts entre les femmes et les hommes. Source : Eurostat.
http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-NK-05-004/FR/KS-NK-05-004-FR.PDF. [Accessed January 15, 2007]
17. Takeda Y, Kawachi I, Yamagata Z, Hashimoto S, Matsumura Y, Oguri S, Okayama A (2004) Multigenerational family structure in Japanese society: impacts on stress and health behaviors among women and men. Soc Sci Med 59:69-81
18. World Health Organization (2001). World health report 2001-mental health: new understanding, new hope. Source: World Health Organization.
<http://www.who.int/whr/2001/en/> [Accessed January 12, 2007]
19. Alonso J, Angermeyer MC, Bernert S, Bruffaerts R, Brugha TS, Bryson H, Girolamo G, Graaf R, Demyttenaere K, Gasquet I, Haro JM, Katz SJ, Kessler RC, Kovess V, Lepine JP, Ormel J, Polidori G, Russo LJ, Vilagut G, Almansa J, Arbabzadeh-Bouchez S, Autonell J, Bernal M, Buist-Bouwman MA, Codony M, Domingo-Salvany A, Ferrer M, Joo SS, Martinez-Alonso M, Matschinger H, Mazzi F, Morgan Z, Morosini P, Palacin C, Romera B, Taub N, Vollebergh WA (2004) Disability and quality of life impact of mental disorders in Europe: results from the European Study of the Epidemiology of Mental Disorders (ESEMeD) project. Acta Psychiatr Scand Suppl38-46
20. Hensing G, Wahlstrom R (2004) Sickness absence and psychiatric disorders. Scand J Public Health152-180
21. Kessler RC, Frank RG (1997) The impact of psychiatric disorders on work loss days. Psychol Med 27:861-873
22. Henderson M, Glozier N, Holland EK (2005) Long term sickness absence. Br Med J 330:802-803
23. World Health Organization European Ministerial Conference on Mental Health (2004.). Mental health and working life. Source: World Health Organization.
<http://www.euro.who.int/document/mnh/ebrief06.pdf> [Accessed January 12, 2007]
24. Melchior M, Krieger N, Kawachi I, Berkman LF, Niedhammer I, Goldberg M (2005) Work factors and occupational class disparities in sickness absence: findings from the GAZEL cohort study. Am J Public Health 95:1206-1212
25. Goldberg M, Leclerc A, Bonenfant S, Chastang JF, Schmaus A, Kaniewski N, Zins M (2007) Cohort profile: the GAZEL Cohort Study. Int J Epidemiol [Available online]
26. Goldberg M, Chastang J-F, Leclerc A, Zins M, Bonenfant S, Bugel I (2001) Socioeconomic, demographic, occupational and health factors associated with

participation in a long-term epidemiological survey. A prospective study of the French Gazel cohort and its target population. *Am J Epidemiol* 154:373-384

27. Karasek R, Theorell T (1990) *Healthy Work: stress, productivity and the reconstruction of working life*. Basic Books, New York, NY
28. Johnson J, Hall E, Theorell T (1989) Combined effects of job strain and social isolation on cardiovascular disease morbidity and mortality in a random sample of the Swedish male working population. *Scand J Work Environ Health* 15:271-279
29. Kawachi I, Berkman LF (2001) Social ties and mental health. *J Urban Health* 78:458-467
30. Melchior M, Berkman LF, Niedhammer I, Chea M, Goldberg M (2003) Social relations and self-reported health: a prospective analysis of the French Gazel cohort. *Soc Sci Med* 56:1817-1830
31. Chevalier A, Souques M, Coing F, Dab W, Lambrozo J (1999) Absenteeism and mortality of workers exposed to electromagnetic fields in the French Electricity Company. *Occup Med* 49:517-1999
32. World Health Organization (1977) *International classification of diseases. Manual of the international statistical classification of diseases, injuries and causes of death*. World Health Organization: Geneva
33. World Health Organization (1992) *International classification of diseases: tenth revision*. World Health Organization, Geneva
34. Allonier C, Chevalier A, Zins M, Catelinois O, Consoli SM, Goldberg M, Lahon G (2004) Anxiety or depressive disorders and risk of ischaemic heart disease among French power company employees. *Int J Epidemiol* 33:779-786
35. Niedhammer I, Bugel I, Goldberg M, Leclerc A, Guegen A (1998) Psychosocial factors at work and sickness absence in the Gazel cohort: a prospective study. *Occup Environ Med* 55:735-741
36. Stansfeld SA, Feeney A, Head J, Canner R, North F, Marmot M (1995). Sickness absence for psychiatric illness: the Whitehall II study. *Soc Sci Med* 40, 189-197.
37. SAS Institute (1997) *SAS/STAT software: changes and enhancements through release 6.12*. SAS Institute, Cary: NC
38. Artazcoz L, Borrell C, Benach J (2001) Gender inequalities in health among workers: the relation with family demands. *J Epidemiol Community Health* 55:639-647
39. Lee S, Colditz G, Berkman L, Kawachi I (2003) Caregiving to children and grandchildren and risk of coronary heart disease in women. *Am J Public Health* 93:1939-1944

40. Cannuscio CC, Colditz GA, Rimm EB, Berkman LF, Jones CP, Kawachi I (2004) Employment status, social ties, and caregivers' mental health. *Soc Sci Med* 58:1247-1256
41. Kroenke CH, Hankinson SE, Schernhammer ES, Colditz GA, Kawachi I, Holmes MD (2004) Caregiving stress, endogenous sex steroid hormone levels, and breast cancer incidence. *Am J Epidemiol* 159:1019-1027
42. Lee S, Kawachi I, Grodstein F (2004) Does caregiving stress affect cognitive function in older women? *J Nerv Ment Dis* 192:51-57
43. Chevalier A, Goldberg M (1992) L'absence au travail: indicateur social ou indicateur de santé? *Sci Soc Santé* X:47-65
44. Virtanen P, Vahtera J, Nakari R, Pentti J, Kivimaki M (2004) Economy and job contract as contexts of sickness absence practices: revisiting locality and habitus. *Soc Sci Med* 58:1219-1229
45. Prins R, Graaf D (1986) Comparison of sickness absence in Belgian, German and Dutch firms. *Br J Ind Med* 43:529-536
46. Stansfeld SA, Rael E, Head J, Shipley M, Marmot M (1997) Social support and psychiatric sickness absence: a prospective study of British civil servants. *Psychol Med* 27:35-48
47. de Kloet ER, Joëls M, Holsboer F (2005) Stress and the brain: From adaptation to disease. *Nat Rev Neurosci* 6:463-475
48. Emslie C, Hunt K, Macintyre S (2004) Gender, work-home conflict, and morbidity amongst white-collar bank employees in the United Kingdom. *Int J Behav Med* 11:127-134
49. Chandola T, Martikainen P, Bartley M, Lahelma E, Marmot M, Michikazu S, Nasermoddelli A, Kagamimori S (2004) Does conflict between home and work explain the effect of multiple roles on mental health? A comparative study of Finland, Japan, and the UK. *Int J Epidemiol* 33:884-893
50. Wahlstrom R, Alexanderson K (2004) Chapter 11. Physicians' sick-listing practices. *Scand J Public Health Suppl* 222-255
51. Hensing G, Alexanderson K, Allebeck P, Bjurulf P (1996) Sick-leave due to psychiatric disorder: higher incidence among women and longer duration for men. *Br J Psychiatry* 169:740-746
52. Alonso J, Angermeyer MC, Bernert S, Bruffaerts R, Brugha TS, Bryson H, Girolamo G, Graaf R, Demyttenaere K, Gasquet I, Haro JM, Katz SJ, Kessler RC, Kovess V, Lepine JP, Ormel J, Polidori G, Russo LJ, Vilagut G, Almansa J, Arbabzadeh-Bouchez S, Autonell J, Bernal M, Buist-Bouwman MA, Codony M, Domingo-Salvany A, Ferrer M, Joo SS, Martinez-Alonso M, Matschinger H, Mazzi F, Morgan Z, Morosini P, Palacin C, Romera B, Taub N, Vollebergh WA (2004) Prevalence of mental disorders in Europe: results from the European

Work and family demands and psychiatric sickness absence in the GAZEL cohort.

Study of the Epidemiology of Mental Disorders (ESEMeD) project. *Acta Psychiatr Scand Suppl*21-27

53. Kessler RC (2003) Epidemiology of women and depression. *J Affect Disord* 74:5-13
54. Cohidon C, Niedhammer I, Wild P, Gueguen A, Bonenfant S, Chouaniere D (2004) Exposure to job-stress factors in a national survey in France. *Scand J Work Environ Health* 30:379-389
55. Crenner E (1999) *Famille, je vous aide*. INSEE Première, Paris, n 632.
56. Hensing G, Alexanderson K (2004) The association between sex segregation, working conditions, and sickness absence among employed women. *Occup Environ Med* 61:e7

Work and family demands and psychiatric sickness absence in the GAZEL cohort.

Table 1 Measure of multiple work and family demands in the GAZEL cohort study.

| | | <i>N dependents</i> | | |
|------------------------------|----------|---------------------|------------|----------|
| | | <i>0</i> | <i>1-3</i> | <i>4</i> |
| <i>N work stress factors</i> | <i>0</i> | 0 | 1 | 2 |
| | <i>1</i> | 0 | 1 | 2 |
| | <i>2</i> | 0 | 2 | 3 |
| | <i>3</i> | 0 | 2 | 3 |
| | | | | |

Table 2 Demographic, social and behavioral characteristics of men of the GAZEL cohort study (1995).

| | Manager | Assoc prof/ technician | Clerk/ manual worker | p-value |
|--|-------------------------------------|-------------------------------------|--------------------------------------|---------|
| n (p-years) | 3 669 (20 134) | 4 341 (21 503) | 859 (4 472) | |
| Age (%): 46-50 51-55 | 60.0 40.0 | 68.9 31.1 | 73.9 26.1 | <0.0001 |
| Marital status (%): married/living with partner single divorced/widowed/separated | 94.3 1.4 4.3 | 92.2 2.3 5.2 | 91.5 3.4 5.1 | 0.0003 |
| N work stress factors: 0 1 2 3 | 28.2 46.5 21.8 3.5 | 26.2 42.6 25.6 5.6 | 16.5 39.5 31.7 12.3 | <0.0001 |
| N dependents: 0 1 2 3 ≥4 | 4.7 11.7 32.2 24.9 26.5 | 4.8 15.2 35.0 22.0 23.1 | 8.9 14.0 34.0 20.8 22.3 | <0.0001 |
| Work stress factors + n dependents (%) 0 (no dependent) 1 2 3 (≥2 work stress factors + ≥4 dependents) | 4.7 50.7 38.5 6.1 | 4.8 49.5 38.9 6.8 | 8.9 38.9 42.0 10.2 | <0.0001 |
| Depressive symptoms (%): no yes | 96.7 3.9 | 95.6 4.4 | 96.7 3.3 | 0.18 |
| Smoker (%): no Yes | 80.9 19.1 | 79.3 20.7 | 78.1 21.9 | 0.07 |
| Alcohol consumption: none (%) 1-13 drinks/wk 14-27drinks/wk ≥28 drinks/wk Data missing | 5.4 50.1 22.2 12.0 10.3 | 8.0 45.8 19.9 14.1 12.2 | 10.3 43.1 21.2 14.0 11.3 | <0.0001 |
| Underweight (<20 kg/m ²) (%) Body mass 20-24.9 kg/m ² Overweight (25-29.9 kg/m ²) Obese (≥30 kg/m ²) Data missing | 1.2 39.5 45.3 6.6 7.4 | 1.0 35.4 46.1 8.0 9.5 | 1.5 31.4 44.7 9.1 13.3 | <0.0001 |
| Personal social support (%): sufficient insufficient Data missing | 87.5 4.3 8.2 | 85.6 4.4 10.0 | 84.4 4.1 11.5 | 0.005 |
| N stressful life events (%): 0 1 ≥ 2 | 78.6 19.9 1.5 | 79.3 19.4 1.3 | 77.7 20.8 1.5 | 0.78 |
| ≥1 psychiatric sickness absence (SA) 1995-2003 (%) | 2.6 | 5.6 | 7.6 | <0.0001 |
| Days of psychiatric SA 1995-2003/p-year (mean, sd) | 0.49 (8.89) | 1.40 (16.09) | 1.33 (15.55) | 0.006 |

Table 3 Demographic, social and behavioral characteristics of women of the GAZEL cohort study (1995).

| | Manager | Assoc prof/ technician | Clerk | p-value |
|---|----------------|---------------------------|----------------|---------|
| n (p-years) | 387 (2 631) | 1837 (12 095) | 447 (3 099) | |
| Age (%):41-45 | 44.8 | 39.4 | 47.4 | 0.007 |
| 46-50 | 22.4 | 21.0 | 18.9 | |
| 51-55 | 32.8 | 39.6 | 33.7 | |
| Marital status (%): married/living with partner | 68.4 | 78.3 | 75.7 | <0.0001 |
| single | 15.9 | 6.5 | 6.2 | |
| divorced/widowed/separated | 15.7 | 15.2 | 19.1 | |
| N work stress factors: 0 | 15.7 | 16.3 | 9.4 | <0.0001 |
| 1 | 46.7 | 38.4 | 31.8 | |
| 2 | 31.7 | 35.6 | 38.9 | |
| 3 | 5.9 | 9.7 | 19.9 | |
| N dependents: 0 | 20.6 | 11.0 | 7.2 | <0.0001 |
| 1 | 20.1 | 21.0 | 18.8 | |
| 2 | 35.8 | 41.5 | 38.7 | |
| 3 | 14.2 | 15.5 | 19.9 | |
| >=4 | 9.3 | 11.1 | 15.4 | |
| Work stress factors + n dependents (%) | | | | <0.0001 |
| 0 (no dependent) | 20.6 | 11.0 | 7.1 | |
| 1 | 43.0 | 42.3 | 32.7 | |
| 2 | 32.7 | 41.7 | 50.6 | |
| 3 (>=2 work stress factors + >=4 dependents) | 3.6 | 5.0 | 9.6 | |
| Depressive symptoms (%): no | 92.0 | 86.6 | 88.2 | 0.03 |
| yes | 8.0 | 13.4 | 11.8 | |
| Smoker (%): no | 82.9 | 84.9 | 85.6 | 0.53 |
| Yes | 17.1 | 15.1 | 14.4 | |
| Alcohol consumption: none (%) | 19.8 | 21.1 | 26.6 | 0.06 |
| 1-6 drinks/wk | 42.3 | 42.5 | 40.5 | |
| 7-20drinks/wk | 21.1 | 17.5 | 15.0 | |
| >=21 drinks/wk | 3.9 | 2.7 | 2.9 | |
| Data missing | 12.9 | 16.2 | 15.0 | |
| Underweight (<20 kg/m ²) | 13.4 | 13.1 | 11.6 | 0.02 |
| Body mass 20-24.9 kg/m ² | 61.6 | 57.1 | 52.1 | |
| Overweight (25-29.9 kg/m ²) | 13.9 | 15.1 | 18.1 | |
| Obese (>=30 kg/m ²) | 2.6 | 4.8 | 7.4 | |
| Data missing | 8.5 | 9.9 | 10.7 | |
| Personal social support (%): sufficient | 84.8 | 81.9 | 81.2 | 0.12 |
| insufficient | 9.3 | 8.1 | 8.3 | |
| Data missing | 5.9 | 10.0 | 10.5 | |
| N stressful life events (%): 0 | | | | 0.25 |
| 1 | 16.8 | 20.2 | 18.8 | |
| >= 2 | 1.5 | 1.0 | 2.0 | |
| >=1 psychiatric sickness absence (SA) 1995-2003 (%) | 7.7 | 17.9 | 25.3 | <0.0001 |
| Days of psychiatric SA 1995-2003/p-year (mean, sd) | 1.65 (12.24) | 3.01 (18.93) | 5.01 (23.96) | 0.02 |

Work and family demands and psychiatric sickness absence in the GAZEL cohort.

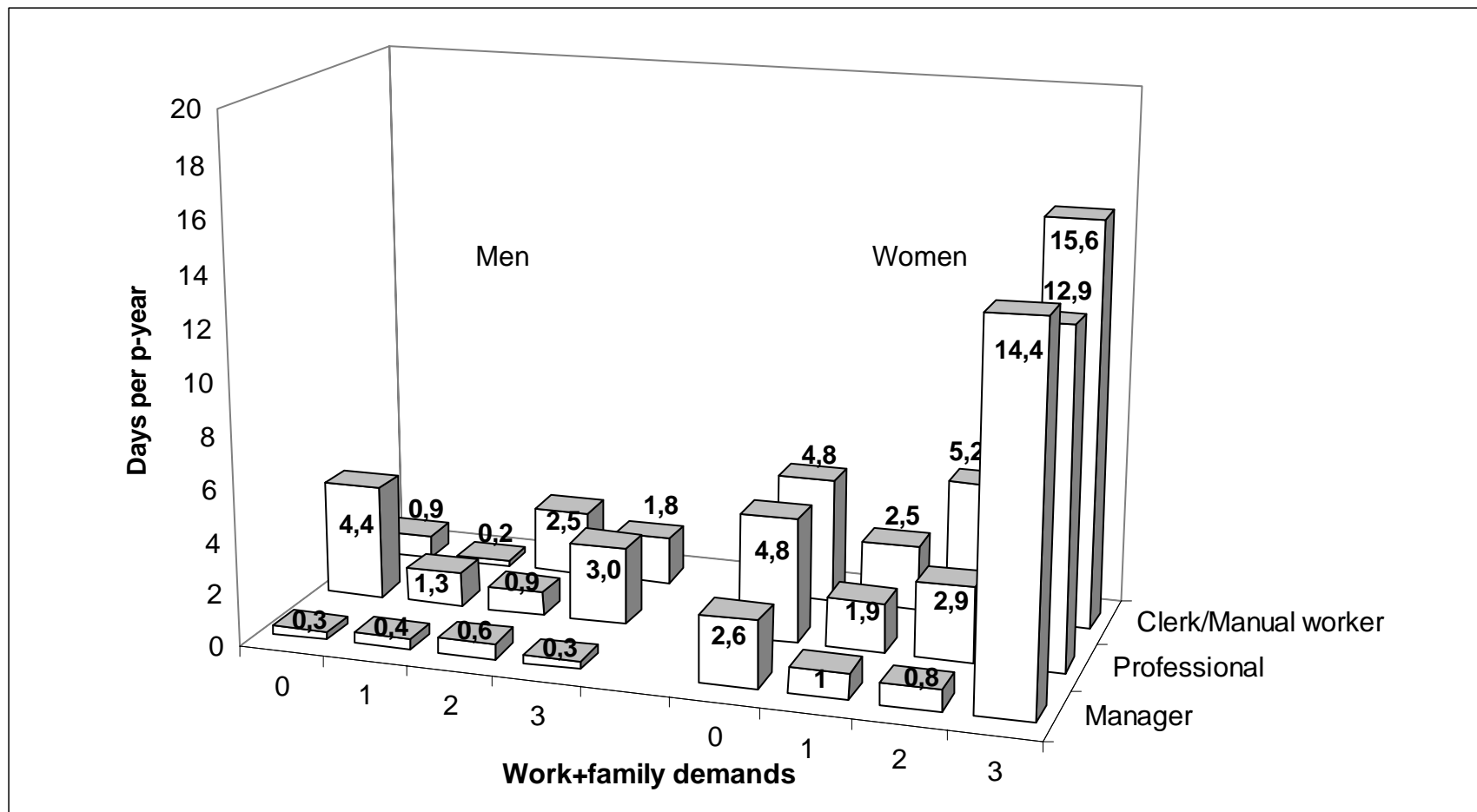
Table 4. Multiple work and family demands and psychiatric sickness absence in the GAZEL cohort study (1995-2003).

| | MEN n=8875, 46 152 p-yrs | | WOMEN n=2672, 17 835 p-yrs | |
|--|---------------------------------|--|---------------------------------|--|
| | Age-adjusted RR 95% CI | Fully-adjusted RR ¹ 95% CI | Age-adjusted RR 95% CI | Fully-adjusted RR ¹ 95% CI |
| All non-psychotic psychiatric diagnoses | 52 173 days of sickness absence | | 56 853 days of sickness absence | |
| Work stress factors + n dependents | | | | |
| 0 (no dependent) | 2.69 (1.22-5.91) | 1.85 (0.74-4.64) | 2.28 (1.23-4.20) | 2.95 (1.61-5.42) |
| 1 | 1.0 | 1.0 | 1.0 | 1.0 |
| 2 | 1.19 (0.69-2.05) | 1.03 (0.63-1.67) | 1.69 (1.03-2.74) | 1.52 (0.98-2.37) |
| 3 (>=2 work stress factors + >=4 dependents) | 2.37 (1.02-5.52) | 1.82 (0.86-3.87) | 6.36 (3.38-11.94) | 5.04 (2.84-8.90) |
| Depression | 23 418 days of sickness absence | | 44 342 days of sickness absence | |
| Work stress factors + n dependents index | | | | |
| 0 (no dependent) | 0.81 (0.14-4.74) | 0.53 (0.07-4.28) | 1.72 (0.79-3.78) | 1.81 (0.80-4.11) |
| 1 | 1.0 | 1.0 | 1.0 | 1.0 |
| 2 | 1.27 (0.63-2.60) | 1.12 (0.59-2.10) | 1.65 (0.93-2.92) | 1.48 (0.87-2.51) |
| 3 (>=2 work stress factors + >=4 dependents) | 4.70 (1.96-11.24) | 3.55 (1.62-7.77) | 8.57 (4.26-17.22) | 6.58 (3.46-12.50) |

¹ Adjusted for age, occupational grade, marital status, personal social support, life events, alcohol consumption, body mass, depressive symptoms at baseline.

Work and family demands and psychiatric sickness absence in the GAZEL cohort.

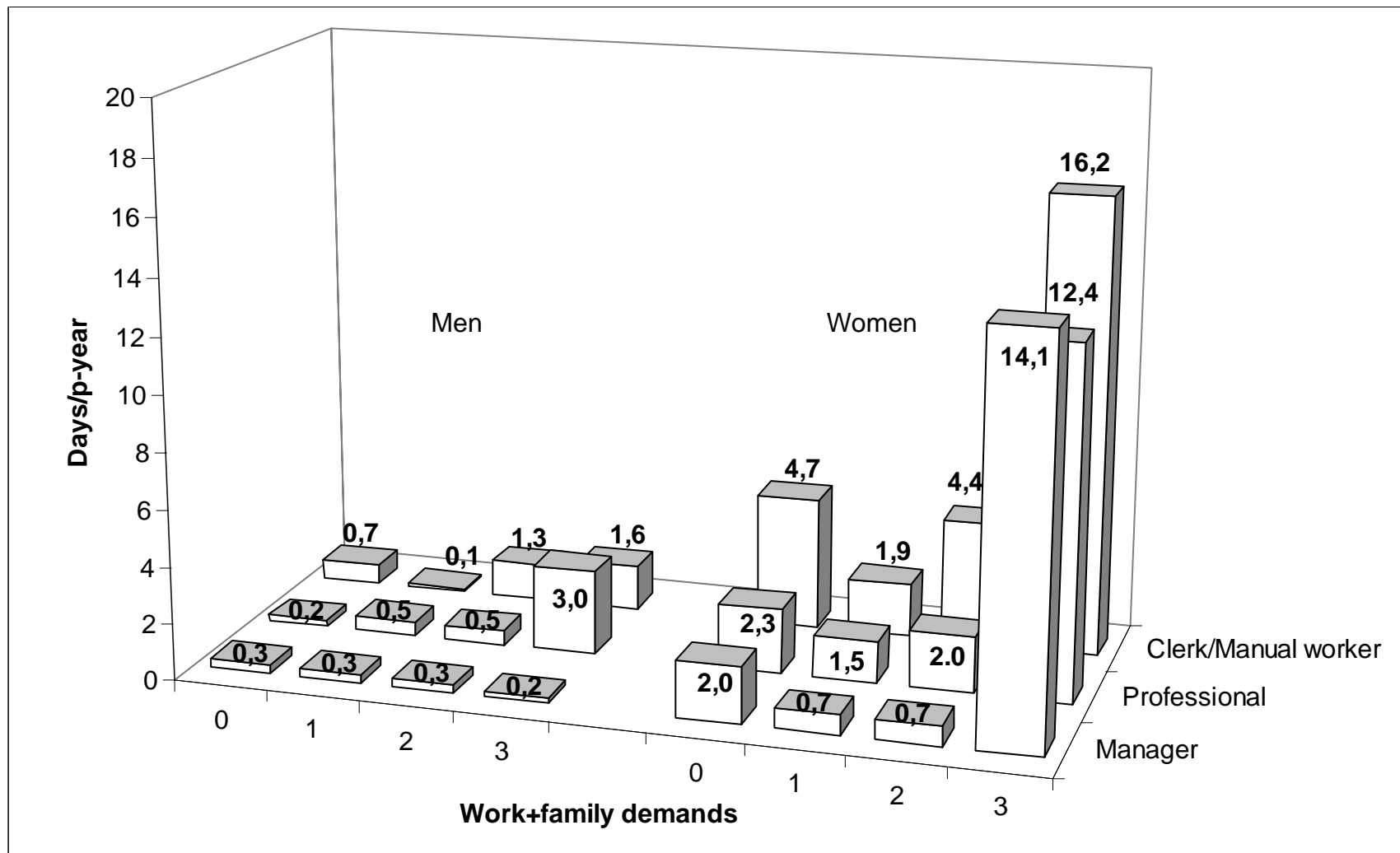
Figure 1 Multiple work and family demands and non-psychotic psychiatric sickness absence in the GAZEL cohort study (days/p-year of follow-up; 1995-2003).



Level of work-family demands : 0 : 0-3 work stress factors + 0 dependents ; 1 : 0-1 work stress factors + 1-3 dependents; 2: 0-1 work stress factors+>=4 dependents or 2-3 work stress factors + 1-3 dependents; 3: 2-3 work stress factors + >=4 dependents

Work and family demands and psychiatric sickness absence in the GAZEL cohort.

Figure 2 Multiple work and family demands and sickness absence due to depression in the GAZEL cohort study (days/p-year of follow-up; 1995-2003).



Level of work-family demands : 0 : 0-3 work stress factors + 0 dependents ; 1 : 0-1 work stress factors + 1-3 dependents; 2: 0-1 work stress factors+>=4 dependents or 2-3 work stress factors + 1-3 dependents; 3: 2-3 work stress factors + >=4 dependents.