

Working conditions in call-centers, the impact on employee health: a transversal study. Part II

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Abstract

Purpose The present study sought to assess the impact of telephone call center employees' working conditions on health by identifying at-risk employment situations.

Methods A transversal study was performed in companies followed by 47 occupational physicians taking part (working conditions have been previously described). A self-administered medical questionnaire was used to collect data on absence due to sick leave, hearing and visual problems,

musculoskeletal disorders, psychotropic drug use, etc. An analog-scale self-assessment of health status and a general health questionnaire (GHQ-12) were used. Personal or familial events that might underlie health problems and affect GHQ-12 results were quantified and taken into account in a logistic regression.

Results A total of 2,130 call-handlers were included. Workers who had availed sick leave during the previous 12 months were 60%. The most frequent musculoskeletal complaints over the previous 12-month period concerned the cervical region (59%). During the same period, 77.3% of subjects experienced visual fatigue, 50% reported auditory fatigue signs and 47% vocal disturbance or fatigue. According to the Likert scale, 39.4% of workers had showed psychological distress. Almost 24% of the workers had used psychoactive medication during the previous 12 months. A significant association was found between psychological distress and the frequency of musculoskeletal disorders. Psychological distress and musculoskeletal disorders were significantly greater in workers with Job Strain and Iso Strain.

After taking non-occupational factors into account, some occupational factors were found to increase the risk of psychological distress (Likert >12): imposed full-time schedule, being unable to simultaneously meet both quality and quantity requirements, situations of tension with clients, negative comments from superiors, and lack of recognition from superiors.

Conclusions This survey of over 2,000 call center employees highlighted the high frequency of psychological distress in this population and the health impact of working conditions.

Keywords Working conditions · Health · Call center · GHQ-12 · Likert

Legal agreements Approval by the French Ministry of Research (*Comité consultatif pour le traitement de l'information en matière de recherche dans le domaine de la santé*) and the French data protection authority (*Commission Nationale de l'Informatique et des Libertés*) was obtained before starting the study.

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Introduction

Over the last few years, the spread of new information and communication technologies has been exponential, including the setting up of call centers, a new type of business offering remote services via the Internet and/or telephone.

These new companies implement often complex work-time systems, covering most of the day or indeed all of the night as well, to meet the ever more urgent and continuous public demand for information or to adapt to the times during which their target end-users are available to be contacted.

Occupational physicians monitoring populations working in these structures, noting the changes in work organization and the many demands entailed by this kind of business, feel concerned as to the possible impact on employee health.

The psychosocial demands of call center work have been studied in the English-speaking world (Most 1999), spotlighting, for example, the mismatch between individual needs and corporate expectations, leading to frustration and conflict exacerbated by competition. Some authors have suggested a link between these psychosocial demands and an increased frequency of musculoskeletal disorders found in call centers (Most 1999; Ferreira and Saldiva 2002).

The present study sought to describe telephone call center employees' working conditions and subjective experience of work, and to assess the impact on health status by identifying at-risk employment situations.

Materials and methods

Study population

The study population and recruitment procedure were defined in a publication on working conditions and employees' subjective experience of work (Croidieu et al. 2008). This study confirmed the high rate of psychosocial constraints for call-handlers and identified at-risk work situations. A Karasek questionnaire revealed less decision latitude (mean = 57.2 ± 12.6) and higher psychological demand (mean = 23.3 ± 4.0) than that found in other French working populations. Social support, on the other hand, was similar to that reported in other French studies, indicating a good level of call-center teamwork.

Medical data were collected using a self-administered questionnaire: absence due to sick leave and visual and hearing problems (for auditory fatigue, indications of symptoms were given: "humming, whistling ear, feeling of hearing impairment, etc."). The frequency of musculoskeletal disorders was estimated using part of a Nordic Questionnaire (Charbotel et al. 2003) to assess presence of

symptoms during the past 12 months, and frequency of medical consultation and treatment for these symptoms. Several anatomic regions were studied. Psychotropic drug use in the previous months was quantified.

An analog-scale self-assessment of health status (from 1 "very poor" to 8 "very good") was used to assess general health and physical and nervous fatigue. These scales had been previously used in the French GAZEL study with a cohort of employees of the state-owned Electricité de France, Gaz de France company (Goldberg et al. 2001).

The French version of the general health questionnaire [GHQ-12 © D. Goldberg (Goldberg 1978)] was used to estimate the frequency of mental disorder and allow comparison with other populations.

As some personal or familial events may underlie health problems and affect GHQ-12 results, a list of events developed for the GAZEL cohort was used to collect data for the previous 12 months (birth or adoption, separation or divorce, death or health problems within the family, and job loss).

Two types of score were calculated from the GHQ-12 (Table 1):

- (1) The 0–12 GHQ score (Goldberg 1972; Goldberg and Williams 1988; Goldberg et al. 1997; HSE 2003):
 - 0–2: low level of psychological distress;
 - 3–5: moderate level of psychological distress;
 - 6 or more: high level of psychological distress.
- (2) The 12-to-36 Likert score (Pevalin 2000; Lasfargues et al. 2003):
 - Greater than 12: psychological distress;
 - Greater than 20: severe psychological distress.

Statistical analysis

A descriptive stage characterized this working population and their health status.

Associations between psychosocial constraint and musculoskeletal disorder or psychological distress were studied as well as the relationship between psychological distress and frequency of musculoskeletal symptoms.

Selected working conditions data were crossed with health data so as to identify at-risk situations. The items concerned were (1) those used to identify specific working conditions impacting Karasek scores and (2) a list of items describing perception of work.

Correlations between these criteria and GHQ-12 scores were assessed by χ^2 test. Single regressions were performed to calculate Odds Ratios.

The significance threshold was set at 0.05.

Table 1 General health questionnaire (GHQ-12), example of questions and scores used

1. Have you recently been able to concentrate on whatever you are doing?	Better than usual	Same as usual	Less than usual	Much less than usual
GHQ-12 score	0	0	1	1
Likert	0	1	2	3
2. Have you recently lost much sleep over worry?	Not at all	No more than usual	Rather more than usual	Much more than usual
GHQ-12 score	0	0	1	1
Likert	0	1	2	3

We would like to know how your health has been in general, over the past few weeks. Please answer all of the following questions by circling the answer that best applies to you

GHQ-12 © D. P. Goldberg (Goldberg 1978), NFER Publishing

A logistic regression was performed including GHQ-12 mental health data as dependent variables, with job and individual factors attaining significance on the univariate analysis as independent variables. Two models were run to select the significant factors from the two working conditions and perception of work series to be included in a final model that also included significant personal factors.

Statistical analysis used SAS[®] software.

Results

General characteristics

Forty-seven occupational physicians took part in the study, recruiting employees from a hundred different companies. Two physicians following call-center employees refused to take part. Two banking sector companies refused to have their employees included. Employee agreement, on the other hand, was good, with only 18 refusals.

The sample comprised 2,130 employees, mainly female (71.9%), with a mean age of 32.4 years. This relatively young sample comprised a large percentage (41.7%) of single persons; 51.2% were married or living in couples; 5.4% were separated, divorced or widowed and 62.0% were childless.

The educational level was generally high, with 68.2% having at least 2 years of higher education.

General health status

On a scale of 1–8, most subjects (60.6%) self-assessed their health status at between 6 and 7. Only 10.1% rated their health as very good. 15.2% rated it at 5, and 14.1% at 4 or less (poor or very poor). Both the mean and median values were 6.

Self-assessments of physical and nervous fatigue were more severe, with a mean of 4.8 for physical fatigue and 4.9 for nervous fatigue; in both cases, the median value was 5.

Those who had availed at least one period of sick leave during the previous 12 months were 59.3%: 26.7% had availed once only, 15.3% twice, 7.1% three times, and 10.2% four times or more. The mean number of days of sick leave per subject with at least one period of sick leave was 13.1.

Musculoskeletal disorders

The most frequent complaints over the previous 12-month period concerned the cervical region (59%). Dorsal and lumbar regions also featured frequently (Table 2), followed by upper limb problems: nearly one-third of respondents had shoulder and more than one in six, wrist complaints.

Some 50% of subjects with hip and knee problems consulted a physician, compared to nearly 40% of those with back or shoulder complaints.

Whatever the complaint, 71–83% received medical treatment as a result of their consultation.

The frequency of musculoskeletal disorders was found to be significantly higher among workers with Job Strain or Iso Strain, except for those reporting knee symptoms.

Visual and hearing disorders

During the 12 previous months, 77.3% of subjects experienced visual fatigue, 13.9% of them reporting their symptoms as permanent and 86.1% as occurring at the end of the working day. Some 60% wore corrective lenses of one sort or another, and 0.7% had had surgery for their vision. Those with correction who were short-sighted were 55.8%, 17.4% long-sighted, and 26.8% had both deficits. Glasses were the most common form of correction (86.5%), the other 13.5% being contact-lenses. Only 11.1% of those with correction found their correction faulty.

The auditory fatigue signs surveyed, buzzing or whistling in the ear and the impression of hearing less well, were reported by half of the call center workers. Auditory fatigue, when reported, was experienced mainly (71.3%) at the end of the day, or permanently in 28.7% of such cases.

Table 2 Musculoskeletal complaints during the past 12 months

	During the previous 12 months have you had problems (pain, aches, discomfort, etc.) in ...? <i>N</i> (%)	If yes, did you see a doctor for this problem? <i>N</i> (% of those reporting disorder)	If yes, did you receive a medical treatment for this problem? <i>N</i> (% of those consulting)
Neck	1,228 (59.2)	381 (31.5)	283 (76.3)
Shoulder	639 (31.6)	234 (38.4)	179 (82.5)
Elbow	108 (5.3)	36 (34.6)	27 (77.1)
Wrist	363 (17.9)	95 (27.4)	67 (71.3)
Back	1,116 (54.2)	418 (38.7)	308 (77.8)
Lumbar region	883 (43.1)	369 (43.3)	274 (78.5)
Hip	182 (9.1)	85 (48.6)	61 (78.2)
Knee	286 (14.2)	96 (34.0)	69 (75.0)
Ankle	208 (10.3)	100 (49.8)	81 (83.5)

Vocal disturbance or fatigue over the previous 12 months was reported by 47.0% of subjects, despite 84.6% of call center workers having no particular otorhinolaryngological history (such as auditory trauma, otitis, eardrum graft, tympanostomy, etc.)

One in four (26.1%) had the impression of still hearing the phone ring after work, and this symptom correlated with the frequency of auditory fatigue ($P < 0.0001$). Likewise, 60.3% reported work-place automatism persisting when they used their own phone.

GHQ-12 data analysis

Call center employees who fully completed the GHQ questionnaire, 746 (36.0%) of the 2,074, showed a moderate (classic GHQ score 3–5) or high (equal to or greater than 6) level of psychological distress. The median GHQ score was 1; the mean was 2.47.

On the Likert method, 818 (39.4%) of employees had scores greater than 12, corresponding to possible psychological distress, and 172 (8.3%) scores greater than 20, corresponding to severe psychological distress. The median Likert score was 11, and the mean 12.3. For women, the mean score was 12.7 with a standard deviation of 5.6, compared to 11.3 (SD 4.8) for men ($P < 0.001$). The frequency of psychological distress was found to be significantly higher in workers with Job Strain or Iso Strain. A higher frequency of each of the musculoskeletal disorders studied was also found in those with Likert scores above 12.

Psychotropic medication

The questionnaire concerned use of sleeping pills, medication for anxiety or depression and stimulants taken over the previous 12 months. Call center workers who had taken sleeping pills at least several times per month were 12.1%, and 20.0% had taken medication for anxiety or depression.

Taking all psychotropic drugs together, consumption reached 23.6%, with a sex-difference of 27.7% in women versus 14.2% in men ($P < 0.001$).

Analytical step

Likert scores greater than 12 were crossed with the predefined variables as presented in Table 3.

Significantly more women than men showed initial signs of psychological distress. Age as such did not seem to play an important role, but the percentage of employees showing initial signs of psychological distress did increase with seniority. It varied very little according to company size. In contrast, it was higher among those who had not chosen to work in a call center and in those who had not chosen to work full time.

Where call-time length was set by the company, significantly more employees had Likert scores greater than 12 ($P < 0.0001$). The type of call (incoming vs outgoing), on the other hand, did not significantly affect the Likert score. Management controls increased the likelihood of psychological distress, especially when employees were advised of such controls in advance.

All the factors, inherent to the perception of working conditions tended to affect the risk of psychological distress: insufficient means available to do the job, tension with interlocutors at work, difficulty in performing the job and lack of help, negative comments and lack of recognition, verbal aggression, and disturbance due to management controls (Table 4). An initial multivariate analysis disclosed certain predominant factors with only five of the variables under study reaching the 0.05 significance threshold: being unable to simultaneously meet both the quality and speed/time goals (OR = 1.61 [1.29–2.01]), being disturbed by management controls (OR = 3.30 [2.05–5.30]), tense situations with clients (OR = 1.84 [1.42–2.39]), negative comments from superiors (OR = 1.79 [1.06–3.05]), and

Table 3 Analysis of GHQ-12 by age, sex and working conditions

	<i>N</i>	Psychological distress, Likert >12 (%)	OR	CI 95%	<i>P</i>
Age					
<30 years	944	39.2	1.11	0.87–1.43	0.41
30–39 years	760	40.7	1.18	0.91–1.53	0.21
40 years or above	357	36.7	1		
Sex					
Female	1,480	42.1	1.54	1.26–1.89	<0.0001
Male	583	31.1	1		
Work schedule					
Full-time imposed	536	43.3	1.29	1.05–1.59	0.02
Part-time imposed	44	43.2	1.29	0.70–2.36	0.42
Part-time chosen	337	40.7	1.16	0.90–1.48	0.25
Full-time chosen	1,146	37.2	1		
Company size					
>200 persons	1,069	39.5	1.69	0.92–3.11	0.09
50–199 persons	698	41.1	1.81	0.98–3.35	0.06
20–49 persons	250	37.6	1.57	0.82–2.99	0.17
<20 persons	54	27.8	1		
Seniority					
Above 5 years	535	41.9	1.28	1.02–1.60	0.03
2–5 years	731	40.6	1.21	0.99–1.49	0.07
Below 2 years	790	37.7	1		
Job choice					
No	611	47.1	1.58	1.30–1.92	<0.0001
Yes	1,449	36.1	1		
Specific job training					
Yes	1,735	39.5	1.05	0.83–1.34	NS
No	331	38.4	1		
Call type					
Incoming/inbound only	748	41.2	1.10	0.90–1.34	0.35
Outgoing/outbound only	86	37.2	0.93	0.59–1.47	0.76
Both	925	38.9	1		
Call duration					
Imposed	929	45.4	1.57	1.31–1.89	<0.0001
Free	1,110	34.6	1		
Controls					
Yes	1,941	40.4	2.48	1.52–4.06	<0.001
No	98	21.4	1		
Notice of controls					
At least once with notice	1,384	44.1	2.90	1.77–4.75	<0.0001
No notice	557	31.1	1.65	0.99–2.76	0.06
No controls	98	21.4	1		

lack of signs of recognition from superiors (OR = 1.52 [1.18–1.97]).

Among life events tested as independent variables, divorce or separation during the previous 12 months significantly increased the rate of initial signs of psychological distress (OR = 2.66 [1.82–3.88]); a hospital

admission within the family increased the risk by a factor of 1.38 [1.13–1.68]; job-loss during the previous 12 months was associated with a risk of 2.47 [1.19–5.11]; and a change in partner's job, with a risk of 2.20 [1.05–4.63]. The other personal factors examined had no significant impact.

Table 4 Likert score and perceived working conditions, univariate analysis

		<i>N</i>	Psychological distress, Likert >12 (%)	OR	CI 95%	<i>P</i>
Do you usually have for your job						
Clear and sufficient information?	Yes	1,408	35.2	0.58	0.48–0.69	<0.0001
	No	664	48.5	1		
The possibility of teamwork?	Yes	1,894	37.7	0.44	0.32–0.61	<0.0001
	No	175	57.7	1		
Enough co-workers?	Yes	1,495	35.3	0.54	0.44–0.65	<0.0001
	No	572	50.4	1		
Suitable software?	Yes	1,516	36.2	0.60	0.49–0.73	<0.0001
	No	553	48.5	1		
Sufficient and suitable equipment?	Yes	1,586	36.3	0.57	0.46–0.70	<0.001
	No	484	50.0	1		
Sufficient and suitable training?	Yes	1,406	34.3	0.52	0.43–0.62	<0.0001
	No	663	50.2	1		
Are you ever unable simultaneously to meet quality and time goals?						
	Yes	693	56.3	2.87	2.38–3.47	<0.0001
	No	1,376	31.0	1		
Do you ever have to deal with a difficult situation alone?						
	Yes	797	48.1	1.79	1.49–2.14	<0.0001
	No	1,272	34.1	1		
Do you experience tense situations (to the point where it disturbs your work)?						
With clients	Yes	532	60.5	3.24	2.64–3.97	<0.0001
	No	1,541	32.1	1		
With superiors	Yes	219	70.8	4.36	3.21–5.92	<0.0001
	No	1,854	35.7	1		
With colleagues	Yes	62	69.4	3.61	2.09–6.24	<0.0001
	No	2,008	38.6	1		
With subordinates	Yes	45	73.3	3.99	2.04–7.79	<0.0001
	No	817	35.5	0.80	0.66–0.96	<0.0001
	SO ^a	1,183	40.8	1		
Do you face verbal aggression during work?						
	Yes	413	57.6	2.54	2.04–3.16	<0.0001
	No	1,659	34.9	1		
In the last 3 months, have you had						
Negative comments by superiors?	Yes	110	76.4	5.41	3.45–8.47	<0.0001
	No	1,957	37.4			
Negative comments by clients?	Yes	415	53.7	2.09	1.68–2.60	<0.0001
	No	1,644	35.7			
Recognition by superiors?	Yes	434	27.7	0.51	0.41–0.65	<0.0001
	No	1,635	42.6			
Are you disturbed by management controls?						
	Yes	593	62.9	5.25	3.39–8.14	<0.0001
	No	1,349	30.3	1.35	0.88–2.05	<0.0001
	NA ^a	127	24.4			

^a Not applicable

After taking the other factors into account, the conditions associated with a significantly increased rate of psychological distress were: female gender, imposed full-time schedule and, as regards the perception of working condi-

tions, being unable to simultaneously to meet both quality and quantity requirements, situations of tension with clients, negative comments from superiors, and lack of recognition from superiors (Table 5). Management controls had a

Table 5 Multivariate model taking account of all risk factors for signs of psychological distress (Likert >12), work- and subject-linked factors

Factor studied	Categories	OR	CI 95%
Sex	Female versus male	1.60	1.26–2.03
Work schedule	Part-time chosen versus full-time chosen	0.84	0.62–1.13
	Full-time imposed versus full-time chosen	1.42	1.11–1.81
	Part-time imposed versus full-time chosen	1.15	0.57–2.30
	Seniority	More than 5 versus less than 2 years	1.07
	Between 2 and 5 versus less than 2 years	1.19	0.93–1.51
Call time	Imposed versus free	1.16	0.94–1.44
Controls	At least one control with notice versus no controls	1.29	0.71–2.35
	No notice versus no controls	0.99	0.54–1.83
Disturbed by controls	No versus not applicable	1.01	0.61–1.69
	Yes versus not applicable	2.51	1.46–4.32
Job choice	No versus yes	1.23	0.99–1.54
	Unable simultaneously to meet quality and time goals	1.82	1.46–2.28
Tension with clients	Yes versus no	2.08	1.64–2.64
Negative comments by superiors	Yes versus no	2.71	1.63–4.51
Recognition by superiors	No versus yes	1.61	1.23–2.09
Separation	Yes versus no	2.68	1.75–4.11
Hospital admission in the family	Yes versus no	1.26	1.00–1.58
Job-loss	Yes versus no	2.71	1.20–6.15
Partner's change of job	Yes versus no	2.41	1.01–5.74

negative impact when experienced as disturbing. Finally, most of the personal factors identified above as being risk factors were significant on multivariate analysis.

Discussion

The present study described call center employee health status in a sample that was mainly female (over 70%) and relatively young (mean age, 32 years). Similar features were reported for British call centers in a 2003 Health and Safety Executive (HSE) study, two-thirds of employees being between 20 and 39 years of age, and 74% female (HSE 2003).

The size of our sample probably makes it representative for the sector: over 2,000 took part, and the refusal rate was very low, whether for occupational physicians, companies or employees. Recruitment was helped by the method used (inquiry during a normal occupational medicine visit), although this did exclude persons absent at that time, and notably, for health reasons, meaning that problems may have been underestimated.

In our sample, 14.1% of employees reported poor general health. The French GAZEL study of a cohort of EDF-GDF electricity and gas employees, using the same self-assessment scale, found 19.7% of employees reporting poor general health in 1997, and 12.5% in 1998. Call center

employees might be expected to be in poorer general health, but our data fail to support this hypothesis. This indicator was shown to correlate significantly with the rate of illness in the GAZEL cohort (Goldberg et al. 2001).

In France in 2005, 22.6% of all employees below 40 years of age had availed at least one sick leave during the year, for an total average of 33 days (Kusnik-Joinville et al. 2006). In comparison, 59.3% of our call center employees reported at least one sick leave during the previous 12 months, for a total average of 13.1 days, i.e., sick leave would seem to be more frequent but shorter among call center employees. However, our data should be taken with caution as the number of sick leaves and days of sick leave were not measured objectively but assessed by the workers themselves.

The rate of musculoskeletal disorder in call center employees has been examined in several studies. In an American study of 100 call center employees (Hoekstra et al. 1995), 68% reported musculoskeletal disorder during the previous 12 months; 37% reported this as being on a daily basis, one half had consulted a physician, and 38% had availed sick leave. In a Brazilian study of 108 banking sector call center employees, 43% of the women employees complained of neck or shoulder pain and 39% of wrist or hand pain (Rocha et al. 2005). Other studies reported increased neck and hand disorders (Ferreira and Saldiva 2002; Norman et al. 2004). In a study of working conditions

in a Swedish call center, after adjustment for age, the rate of neck, back or upper limb disorder was 1.18-fold higher in call center employees than in controls, and 1.38-fold higher in males (Norman et al. 2004). In our sample, the most frequent disorders likewise concerned the neck (59%) and back (54%), although there were few complaints of wrist disorder.

On the borderline between physical and psychological hardship, auditory and visual fatigue were often reported by call center employees. Some 65% complained of end-of-the-day visual fatigue. Alcouffe et al. found similar rates of 67 and 73%, respectively, for those working exclusively on-screen or on-screen and by phone (Alcouffe et al. 1994). Companies try to reduce this visual fatigue, notably by migrating to LCD screens, used by 56% of employees (Croidieu et al. 2008). Two-thirds of employees were troubled by noise, although more than 50% claimed never to experience auditory fatigue.

Nearly 60% of call center employees had corrected vision. In the 2000 CREDES (*Centre de Recherche d'Etude et de Documentation en Economie de la Santé*) study of a permanent sample of 14,795 beneficiaries of the EPAS public health insurance scheme, 51% of respondents wore glasses or contact lenses (Auvray et al. 2001). Predictably, glasses were worn more frequently with advancing age: 19% of under 16s, 40% for the 16–39 age-group, and 71% for the 40–64 age-group. Sex differences emerged, especially in the 16–39 age-group, where 46% of women, but only 32% of men wore glasses. It seemed that the glasses were worn a little more frequently in our present sample, although our figures are probably in line with those for service sector workers as a whole.

Employees' mental health was assessed from the GHQ-12, which is a good tool for screening for minor psychiatric disorder occurring over the preceding weeks (MaGPIe Research Group 2003). GHQ-12 is commonly used in the literature, and has been translated into several languages, with little fall in validity coefficients with respect to the original version and no bias attached to sex, age, educational level or the level of development of the country (Goldberg 1972; Goldberg et al. 1997).

In the present study, 35.9% of respondents had GHQ scores equal to or greater than 3, and 16.9% equal to or greater than 6. A New Zealand study of 3,414 GP patients above 19 years of age reported similar findings: 35.7% of scores were equal to or greater than 3 and 16.7% were equal to or greater than 6. Likewise, in a British general population panel of 4,167 persons aged between 16 and 65 years, repeatedly assessed between 1991 and 1997, the mean Likert score varied, depending on the year, from 10.0 to 10.5 for men and from 11.1 to 12.0 for women (Pevalin 2000). In the present study, the mean Likert score was a little higher, at 12.3 overall.

GHQ-12 has often been used in occupational medicine to assess mental health status.

In France, a study of the mental health status of 1,002 mass retail workers found 25% with Likert scores greater than 12 and 6.2% greater than 20; the mean score was 10.6 and the median 9 (Lasfargues et al. 2003). In the present study, the percentage of subjects presenting initial signs of psychological distress (Likert >12) was significantly higher (39.4%; $P < 10^{-5}$); on the other hand, the percentages for "severe" psychological distress do not significantly differ between the two sectors (8.3%, in our sample).

Among mass retail workers, psychological disorder was also more frequent in women, 30.3% had Likert scores >12 compared to only 18.2% for men; a similar sex difference emerged in our data, the sex factor having an OR of 1.56 [1.23–1.98] after adjustment on the other factors.

In the HSE survey of 36 British call centers, 39% of the sample of 880 had GHQ scores greater than 3. This rate is slightly but non-significantly higher than in our population (35.9%; $P = 0.12$); the difference, such as it is, may be due to selection bias, the participation rate in the British study being lower than that in ours (38 vs. nearly 100%, respectively) due to the use of postal contact.

The HSE survey found the frequency of management controls to impact GHQ score, job satisfaction, anxiety and depression (HSE 2003): the more frequent the "taps" the poorer the indices. Electronic controls, on the other hand, gave a curvilinear relation: the indices for employees whose work was checked "rarely or never" were no better than that of those monitored "very often" or "constantly". Appropriate use of electronic control thus seems better adapted to employee well-being. The same conclusion can be drawn from a study of two British banking sector call centers (Holman et al. 2002): if the control criteria are sufficiently clear and employees receive positive feedback, controls may improve well-being. This study further showed that it was the employees' perception of control intensity that negatively impacted well-being. Our findings concur: after taking other risk factors into account, the existence of controls did not in itself significantly increase the risk of psychological distress, whereas the fact of being disturbed by controls was associated with an OR of 2.50 [1.46–4.29]. Our study highlighted other risk factors for psychological distress at work: mainly, imposed full time schedules, inability to simultaneously meet quality and quantity goals, tension with clients, negative comments from superiors, and lack of recognition by superiors. The Karasek scores indicated a higher risk of psychological distress in workers with Job Strain or Iso Strain, although the transversal design of the study prevents any causal relation being established.

The same reserve applies to the significantly higher frequency of musculoskeletal disorders found in workers with

Job Strain or Iso Strain and in those with psychological distress, even if other authors have suggested associations between psychosocial factors and increased frequency of musculoskeletal disorders in call centers (Most 1999; Ferreira and Saldiva 2002).

In response to questions about psychotropic drug use, 12.1% of call center employees reported taking sleeping pills several times per month or more, and 20% taking anxiolytics or antidepressants during the previous 12 months. According to the *Observatoire Français des Drogues et des Toxicomanies* (OFDT), 6% of French men and 12% of women in the 18–75 years age bracket had used antidepressants during the previous year, and, respectively, 12 and 20% had used drugs of the tranquilizer and sleeping-pill type (Beck et al. 2006). Consumption of psychotropic drugs as a whole in the OFDT report was 14% in men and 25% in women. Our data for call center employees were comparable: 14.2% of men and 27.7% of women reporting consumption over the previous 12 months, and this in a relatively young, working population.

Psychosocial workplace stress has been previously described as associated with increased psychotropic drug intake. In a study conducted in Quebec, in which Siegrist's approach was used to quantify conditions at work, a positive association was found between an imbalanced extrinsic effort-reward ratio and psychotropic drug use (Chartrand, 2003). Assessing Siegrist's extrinsic effort is like assessing psychological demand on Karasek's demand-latitude model: there are questions on time limits, interruptions, responsibilities, overtime work, physical workload and growth in demand. Mismatch between effort and recognition, according to Siegrist, creates a situation in which the employee is at risk of workplace tension, with consequent health impact. In the present study, a high frequency of psychosocial constraint was identified (Croidieu et al. 2008).

Conclusions

This transversal survey of over 2,000 call center employees highlighted the health impact of working conditions. Call center employees sometimes reported physical suffering (musculoskeletal disorders, auditory or visual fatigue), but frequently reported psychological distress. Those who presented a moderate-to-severe level of psychological distress (GHQ score equal to or greater than 3) were 36%. These findings are comparable to those from other call centers, notably in the UK. They are also to be compared to the sick-leave rate, which was higher than that in the general population of state health insurance beneficiaries, although the durations were shorter. Consumption of sleeping pills, anxiolytics and antidepressants also seemed considerable.

The psychosocial environment of these telephone workplaces is thus of importance. It may not be possible to change certain intrinsic features of call center jobs, but some "organizational" aspects could be modified. The question of job-choice appears to be important, as do certain intrinsic factors of working relations with clients and superiors, and the question of work-loads.

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