

# Assessment of work intensification by managers and psychological distressed and non-distressed employees: a multilevel comparison

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**Abstract:** Work intensification is a popular management strategy to increase productivity, but at the possible expense of employee mental stress. This study examines associations between ratings of work intensification and psychological distress, and the level of agreement between compared employee-rated and manager-rated work intensification. Multi-source survey data were collected from 3,064 employees and 573 company managers from the private sector in 2010. Multilevel regression models were used to compare different work intensification ratings across psychological distress strata. Distressed employees rated higher degree of total work intensification compared to non-distressed employees, and on three out of five sub ratings there were an increased prevalence of work intensification in the case group. In general, there was poor agreement between employee and company work intensification rating. Neither manager-rated work intensification nor employee/manager discrepancy in work intensification ratings was associated with psychological distress. Distressed employees had a higher total score of employee/manager agreed work intensification, and a higher prevalence of increased demands of labour productivity. This study demonstrates higher ratings of employee/manager agreed work intensification in distressed employees compared to non-distressed employees, challenging previous findings of reporting bias in distressed employees' assessment of work environment.

**Key words:** Stress, Workload, Multilevel study, Psychosocial work environment

## Introduction

Work intensification has been cited as an emergent risk factor for job strain<sup>1–4</sup>). Globalization in the form of increasing competition, the global financial crisis, and developments in technology is the cause of increasing

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work intensification. Numerous organizational factors can contribute to work intensification: changes in the organization of production<sup>5, 6</sup>; changes in work organization, particularly in regards to increased authority<sup>6</sup>; the introduction of new technology<sup>7</sup>; downsizing that reduces the number of hands without reducing the overall workloads<sup>3</sup>; the introduction of working time reductions without any compensatory increases in new hires<sup>3, 8</sup>. Work intensification is inherently a limited process since human physical and mental capacities do not allow an endless extension of efforts<sup>3</sup>, however few studies have investigated this important matter.

The potential detrimental effect of work intensification is suggested to occur due to increased demands of work effort. Work effort is defined by Green<sup>9</sup> as the rate of physical/and or mental input to work tasks performed during the working day. Self-reported effort levels have been shown to correlate with measures of work stress and measures of productivity<sup>11</sup>. More effort within a limited time frame equals greater energy spent and less time to recuperate, which may ultimately increase the risk of psychological distress<sup>10</sup>. Psychological distress covers a broader range of conditions than mental illness and describes a situation that is psychologically more detrimental than that of ‘simple’ stress. Psychological distress is widely accepted as “*a state of emotional suffering characterized by symptoms of depression and anxiety*”<sup>11, 12</sup>.

According to Green changes in work intensity can manifest itself in two ways; more work hours (extensive work intensification), or greater work effort during the time spent (intensive work intensification)<sup>9</sup>. It is possible to measure extensive work intensification through hours spent at work, however intensive work intensification is less tangible, and often rely on self-reports. Previous studies, however, have found that reporting bias can inflate associations between job strain and psychological distress, if studies rely on self-reports<sup>13, 14</sup>. These types of bias are specially pronounced in cross-sectional studies, where exposure and outcome often are self-reported<sup>15, 16</sup>. To avoid this type of bias multi-source studies have been recommended; i.e. management level evaluation of work content versus employee level evaluation of work content<sup>8, 17, 18</sup>. This takes into account the individual’s perception of the working environment as well as offers an alternative, but still relevant evaluation of the work content. Company management has a clear picture of strategy matters and formal work organization, whereas workers can be asked about what they really do, how they adapt to the context of their work and their general level of psychological

distress<sup>19</sup>. The assessment of both company management and employees allows going one step further in the understanding and description of the linkages between work intensification and psychological distress.

The present study embraces this type of multilevel study design, and offers the potential to expand the epidemiological knowledge on associations between work intensification and distress. By using retrospective, cross-sectional survey data obtained from both company managers and their employee, our aim is; first, to examine associations between employee/manager ratings of work intensification and psychological distress, and second, to compare employees’ assessment of work intensification with the manager’s assessment in order to identify agreement or lack thereof.

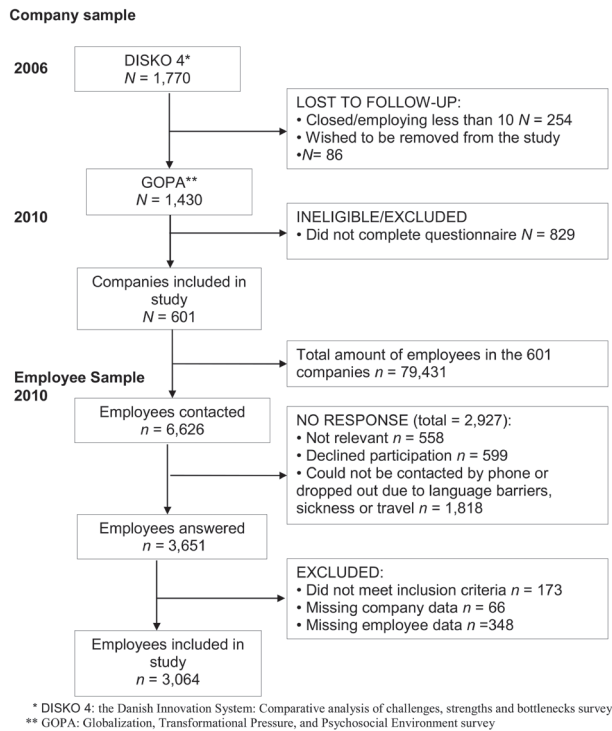
## Subjects and Methods

### *Study population and data collection*

The present multilevel study was performed within the *Globalization, Transformational Pressure, and Psychosocial Work Environment (GOPA)* study, which is aimed at examining the effects of external and internal company level exposures on the psychosocial work environment and employee mental health.

### *Company sample*

The GOPA study is the successor of a series of studies on the Danish Innovation System (the DISKO surveys)<sup>20</sup>. In 2006, the fourth and last DISKO 4 was completed with 1,770 questionnaire responses at company level<sup>21, 22</sup>. In 2010, the same companies were assessed for GOPA study (Fig. 1). Data collection was performed by the Danish governmental organization Statistics Denmark which previously had collected the data for the DISKO surveys. According to Danish law there was no requirement for IRB approval/informed consent in the present study, however both the local Ethics Committee and the Danish Data Protection Agency received the research protocol for orientation. Prior to data collection, the company questionnaire was piloted in a sample of ten companies (not part of the potential respondent group) to verify that the questions were understood correctly. Unique login information for the GOPA web-questionnaire was emailed to 1,430 companies (if email information was unavailable, they were contacted by letter). The companies were reminded twice by email or letter to respond, and once by phone. Company respondents were managers, human resource managers, or someone holding a similar position within



**Fig. 1. Flow-chart over companies and employee respondents.**

each company.

A total of 601 companies (managers) answered the survey (response rate 42%).

### Employee sample

All potential salary earners ( $n=79,431$ ) from the final sample of companies were extracted from Statistics Denmark's registry data (a collection of information supplied by administrative registers of governmental agencies). The study aimed to include approximately 2,000 respondents in the final sample. According to estimates from Statistics Denmark, a total of 6,626 individuals had to be included to provide the desired number of responses. However, approximately 85% of the employees were employed in approximately 35% of the companies, thus simple random sampling of employees would under-represent employee responses from smaller companies. Therefore, a weighted sampling strategy was used, so that smaller companies had a larger percentage of their employees selected. Depending on the size of the company, up to 12 persons were selected for participation. The company responses spanned five different industries. Companies were divided into three size groups (10–49, 50–99 and >100 employees). This yielded a total of 15 categories across industry type and size. If more than 50% of the employees within one of

the 15 categories were non-responders, more participants would be sampled from responding companies within that category.

A total of 6,626 employees were contacted by letter and invited to answer a web survey. The employee response rate was 55%, corresponding to 3,651 men and women aged 16 to 81 yr. The number of non-respondents did not differ substantially across industry types or company sizes. A total of 173 employees were excluded since they were no longer employed in the company where they worked during the entire time period of 2007–2009 (which was the only employee inclusion criterion in the study). Another 66 employees (and 8 companies) were excluded due to incomplete company data on key variables, and 348 employees were excluded due to missing or incomplete employee data (resulting in a further loss of 20 companies with no valid employee responses). The final sample consisted of 573 companies and 3,064 employees. Anonymised demographic registry data delivered by Statistics Denmark were made available for the entire sample (both respondents and non-respondents) (Fig. 1).

### Variables

#### Work intensification

Two aspects of work intensification were of interest in this study; the degree of work intensification and the agreement between manager and employee ratings of work intensification. There is no overarching theory or construct used to measure work intensification in the literature<sup>23</sup>, so questions based on the recommendation of OECD Oslo Manual<sup>24</sup> (previously used in the DISKO 4 survey) was used.

“The degree of work intensification was measured separately at *employee level* and *company level* by five dichotomous items: Did work content change in the period 2007–2009 in the direction of: 1) increased autonomy and responsibility, 2) increased technical/professional demands, 3) increased knowledge content, 4) increased interdisciplinary collaboration, 5) increased demand for labour productivity. The managers answered separately for the three occupational positions, because we assumed that work intensification could vary greatly depending on whether you worked down on the factory floor, or you were in the office above. The dichotomous items were afterwards summed for a work intensification score. The agreement measures were created by combining the employee level and company level ratings to examine *discrepancy in work intensification*, and *agreed work intensification*. Table 1 presents an overview of the different

**Table 1. Overview of the single item ratings of work intensification and the sum scores**

	Employee rating	Manager rating	Discrepancy rating	Agreement rating
Single item ratings	0/1	0/1	0 if employee rating=manager rating; 1 otherwise	1 if both employee and manager rating = 1; 0 otherwise
Sum score	Sum (0–5)	Sum (0–5)	Sum (0–5)	Sum (0–5)
Cronbach's $\alpha$	0.78	0.84	0.58	0.75

ratings and scores used in this study, and the Cronbach's  $\alpha$  value of the sum scores. Principal component analysis (PCA) was performed on the dichotomous items of each of the four measures. The tendencies of the five items were all in the same direction, and followed the direction of the Cronbach's  $\alpha$  reported in Table 1. The discrepancy measure showed the least unidirection, but it still only loaded on a single PCA factor.

#### *Psychological distress*

Psychological distress was estimated using the Symptoms Checklist 90 revised (SCL-90-R)<sup>25)</sup>, which measures psychological complaints and symptom intensity on nine subscales; somatization, interpersonal sensitivity, depression, anxiety, phobic anxiety, obsession-compulsion, hostility, paranoid ideation and psychoticism, as well as a global severity index (GSI)<sup>26)</sup>. The GSI scale was calculated by the sum of the scores (0–4) of 90 questions regarding mental distress symptoms divided by items answered. The raw scores were converted into standardised scores (t-standard; mean=50, sd=10). As recommended by Derogatis a t-score of 63 or higher on GSI, or 2 subscales with t-scores of 63 or higher were used to determine psychological distress caseness<sup>25, 27)</sup>.

#### *Demographics and covariates*

Covariates included in the study were gender, age (four categories: 15–34, 35–44, 45–54, 55+), and occupational status (white-collar, blue-collar, unskilled) on the employee level. On the organisational level, two covariates were included: industry type, and company size. All information was obtained from registry data provided by Statistics Denmark.

#### *Statistical analysis*

We examined the distribution of covariates according to psychological distress caseness (reported as frequencies/percentages), the employee/company work intensification measurements, and the two agreement measurements (reported by mean/associated 95% confidence intervals (95% CI)).

We used linear regression models to assess the association between the sum scores of work intensification/agreement and psychological distress caseness. Due to the multilevel structure of the data, the regression models were based on generalized estimating equations (GEE), which allowed for correlated measurement errors within companies (exchangeable correlation structure; i.e. all observations within each company are equally correlated). For the multilevel analyses companies were identified by company ID number and employees by personal ID number. The results were reported by mean scores and 95% confidence intervals (95% CI). A priori, it was decided to adjust for the potentially confounding effect of age, company size, and occupational position. Multivariate regression analyses were performed to adjust the mean scores and 95% CI for age, occupational position and company size.

The association between the single item ratings of work intensification/agreement and psychological distress was assessed using simple prevalence ratios (PRs) and 95% CI using Poisson regression models based on GEE (accounting for within-company correlations; exchangeable correlation structure). Subsequently, multivariate regression analyses were performed on the single item ratings to adjust the PR and 95% CI for age, occupational position and company size.

All statistical analyses were conducted in Stata 11.1 (StataCorp LP, 2008). A *p*-value less than 0.05 was considered statistically significant.

## **Results**

The characteristics of the participants stratified by caseness status, employee mean intensification rating, manager mean intensification rating, mean discrepancy rating and mean agreed increased rating are presented in Table 2. Of the 3,064 employees who participated in the survey 478 (16%) fulfilled the psychological distress caseness criteria. Two third (68%) of our sample were men, and 15% of these were classified as distressed and among the women 18% fulfilled the psychological distress caseness

criteria. Employees in the age group 16–34 yr were the least represented in the study, and they also had the highest psychological distress prevalence (19%) among the age groups. Unskilled workers had the highest psychological distress prevalence (20%), followed by blue-collar (16%), then white-collar (10%).

Most of the participants came either from the industry sector (36%) or the commerce sector (31%), with three other industry types representing the remaining third of the companies. Employees in the industry sector had the highest prevalence of psychological distress (19%) compared to the other sectors. The prevalence of psychological distress was similar across company sizes, though employees in the large companies had a slightly higher prevalence of psychological distress.

Three overall tendencies stood out from the employee self-rated work intensification; age was inversely associated with increased work intensification rating, a higher occupational position was associated with increased work intensification rating, and employees in smaller companies reported less intensification than employees in larger companies. A higher occupational position was associated with increased manager-rated work intensification. The discrepancy rating did not appear to be associated with any of the covariates, whereas the agreed work intensification ratings followed the general direction of the employee self-rated work intensification.

#### *Intensification ratings measures*

The distressed employee group had a higher mean of self-rated (employee) rated work intensification compared to the non-distressed employees (the reference group) as presented in Table 3. The difference between the groups was statistically significant. A closer examination of the intensification levels indicated that the non-distressed group reported a higher rate of minimum of intensification, while the distressed group reported a higher rate of maximum of intensification (data not shown). Table 3 also shows the crude and adjusted PRs of increased work intensification for the distressed group with the non-distressed group as reference group. There was a general tendency towards increased reported work intensification in the distressed group. The most pronounced difference in prevalence was found in the item demand for labour productivity. Confounder adjustment did not alter the associations.

For manager-rated work intensification, we found no evidence of a difference between the distressed group and the non-distressed group. We also did not find any difference in prevalence of work intensification present in the

analysis of the single item ratings as presented in Table 3. Confounder adjustment did not alter the associations.

#### *Agreement measures*

In general, the discrepancy between employees and managers in their rating of work intensification was close to what would be expected by chance (i.e. if employees and managers selected their ratings independently at random). There was no difference between the distressed group and the non-distressed group in mean number of discrepant items. Likewise, there was no evidence of a difference in prevalence of discrepancy in the single item analyses between the distressed group and non-distressed group (Table 4).

The distressed group had a significantly higher agreed rating of work intensification than the non-distressed group. In both the unadjusted and adjusted single item analysis, no clear tendencies in the direction of association were observed, and only the PR of demands for labour productivity was significantly different from 1.0.

## **Discussion**

This multilevel study on Danish companies and employees examined associations between psychological distress and self-rated work intensification, manager-rated work intensification, discrepancy in manager-employee ratings of work intensification, and manager-employee agreed work intensification. Distressed employees had a higher prevalence of self-reported work intensification compared to the non-distressed employees, but there was no difference in manager rated work intensification between the two groups. Neither was there any difference between the two groups in the discrepancy in manager-employee ratings of work intensification. The employee/company agreed work intensification was slightly increased in the distressed employee group compared to the non-distressed group.

The results of this study suggested that self-rated increased autonomy and responsibility was associated with psychological distress. This is somewhat surprising, because *increased autonomy* could be interpreted as “increased control” which is typically regarded as a protective aspect against work strain in the popular demand/control model. However, Delbridge<sup>6)</sup> argues that the important production decisions are often dictated by management-decreed goals and regulations, which could explain our findings. Increased responsibility, on the other hand, can also be interpreted as increased accountability which trans-

**Table 2. Frequency of covariates by psychological distress caseness, and mean sum intensification ratings, and mean sum agreement ratings (N=3,064)**

	Distress frequency		Intensification ratings				Agreement ratings			
			Employee rating		Manager rating		Discrepancy rating		Agreed rating	
	N	% <sup>a</sup>	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
Total	478	15.60	2.40	(2.33–2.46)	2.52	(2.45–2.59)	2.37	(2.32–2.43)	1.27	(1.22–1.33)
Gender										
Male	308	14.58	2.40	(2.31–2.48)	2.44	(2.29–2.58)	2.38	(2.31–2.46)	1.25	(1.15–1.34)
Female	170	17.77	2.36	(2.24–2.48)	2.39	(2.23–2.54)	2.33	(2.23–2.44)	1.20	(1.08–1.31)
Age groups										
16–34	55	19.37	3.05	(2.91–3.20)	2.46	(2.30–2.63)	2.40	(2.28–2.52)	1.56	(1.43–1.69)
35–44	134	16.13	2.69	(2.60–2.78)	2.44	(2.30–2.59)	2.38	(2.31–2.46)	1.38	(1.28–1.47)
45–54	178	16.12	2.32	(2.25–2.39)	2.42	(2.28–2.56)	2.37	(2.30–2.43)	1.20	(1.11–1.28)
55+	11	13.14	1.95	(1.85–2.06)	2.39	(2.24–2.54)	2.35	(2.26–2.44)	1.02	(0.91–1.12)
Occupational position										
White-collar	62	10.10	2.54	(2.41–2.66)	2.81	(2.66–2.97)	2.36	(2.25–2.47)	1.50	(1.38–1.62)
Blue-collar	280	15.97	2.39	(2.32–2.47)	2.44	(2.30–2.58)	2.37	(2.31–2.43)	1.24	(1.16–1.33)
Unskilled	136	19.51	2.24	(2.12–2.37)	2.07	(1.92–2.23)	2.38	(2.28–2.48)	0.99	(0.88–1.10)
Sector										
Industry	197	18.27	2.32	(2.21–2.44)	2.43	(2.22–2.65)	2.35	(2.26–2.44)	1.22	(1.09–1.35)
Construction	40	15.44	2.36	(2.28–2.44)	2.43	(2.27–2.58)	2.36	(2.29–2.43)	1.23	(1.13–1.32)
Commerce	138	14.41	2.40	(2.32–2.48)	2.42	(2.27–2.57)	2.37	(2.31–2.44)	1.23	(1.14–1.32)
Information	45	14.02	2.44	(2.33–2.55)	2.41	(2.21–2.61)	2.39	(2.30–2.47)	1.24	(1.12–1.36)
Real estate	58	12.95	2.48	(2.33–2.63)	2.41	(2.12–2.69)	2.40	(2.28–2.52)	1.24	(1.07–1.42)
Size										
10–49	150	14.52	2.18	(2.06–2.30)	2.33	(2.11–2.54)	2.35	(2.25–2.45)	1.10	(0.97–1.23)
50–99	134	15.71	2.38	(2.31–2.45)	2.42	(2.28–2.56)	2.37	(2.31–2.43)	1.23	(1.14–1.32)
100+	194	16.57	2.58	(2.47–2.69)	2.52	(2.30–2.74)	2.39	(2.29–2.48)	1.36	(1.23–1.49)

<sup>a</sup> Percent of subgroup

**Table 3. Prevalence ratio (PR) of increased work intensification for distressed group compared to non-distressed by employee ratings and manager ratings, and mean sum scores (n=3,064)**

	Employee rating				Manager rating			
	Crude		Adjusted <sup>a</sup>		Crude		Adjusted <sup>a</sup>	
	PR	95% CI	PR	95% CI	PR	95% CI	PR	95% CI
Autonomy and responsibility	1.16**	(1.05–1.28)	1.12*	(1.02–1.24)	1.01	(0.95–1.07)	1.03	(0.97–1.09)
Technical/professional demands	1.15**	(1.04–1.26)	1.13*	(1.03–1.24)	0.97	(0.90–1.04)	0.98	(0.92–1.05)
Knowledge content	1.07	(0.98–1.17)	1.07	(0.99–1.17)	0.93	(0.87–1.00)	0.96	(0.89–1.03)
Interdisciplinary collaboration	1.07	(0.95–1.20)	1.06	(0.95–1.19)	0.99	(0.93–1.06)	1.01	(0.95–1.07)
Demand for labour productivity	1.30***	(1.21–1.40)	1.27***	(1.18–1.36)	0.99	(0.93–1.06)	0.99	(0.92–1.06)
Sum score	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
Non-distressed	2.33	(2.25–2.41)	2.34	(2.26–2.41)	2.43	(2.29–2.57)	2.45	(2.31–2.59)
Distressed	2.68*** <sup>b</sup>	(2.52–2.85)	2.69*** <sup>b</sup>	(2.53–2.85)	2.38	(2.21–2.55)	2.39	(2.22–2.55)

\* $p < 0.05$  \*\* $p < 0.01$  \*\*\* $p < 0.001$ . <sup>a</sup>Adjusted for age, occupational position and company size. <sup>b</sup> $p$ -value for comparison of the non-distressed group mean to the distressed group mean

lates into increased demands. Interpretation of the results is difficult, as autonomy and responsibility are two different concepts, a distinction which was not taking into ac-

count in the original question from the DISKO 4 survey. It is also important to be aware that these are cross-sectional results. Given the symptoms of psychological distress

**Table 4. Prevalence ratio (PR) of increased work intensification for distressed compared to non-distressed by discrepancy and agreed intensification ratings and mean sum score (n=3,064)**

	Discrepancy rating				Agreed rating			
	Crude		Adjusted <sup>a</sup>		Crude		Adjusted <sup>a</sup>	
	PR	95% CI	PR	95% CI	PR	95% CI	PR	95% CI
Autonomy and responsibility	0.99	(0.90–1.10)	0.99	(0.90–1.10)	1.16	(1.00–1.34)	1.15	(0.99–1.33)
Technical/professional demands	1.02	(0.91–1.13)	1.02	(0.91–1.13)	1.08	(0.92–1.26)	1.09	(0.94–1.26)
Knowledge content	1.10	(1.00–1.21)	1.09	(0.99–1.20)	0.91	(0.76–1.08)	0.95	(0.80–1.12)
Interdisciplinary collaboration	0.96	(0.86–1.07)	0.96	(0.86–1.07)	1.11	(0.93–1.33)	1.13	(0.95–1.34)
Demand for labour productivity	0.92	(0.83–1.03)	0.92	(0.83–1.03)	1.33***	(1.17–1.50)	1.29***	(1.14–1.45)
Sum score	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
Non-distressed	2.37	(2.30–2.43)	2.37	(2.30–2.43)	1.21	(1.20–1.30)	1.22	(1.13–1.31)
Distressed	2.37	(2.23–2.51)	2.37	(2.23–2.51)	1.35 <sup>b</sup>	(1.21–1.49)	1.36 <sup>b</sup>	(1.22–1.50)

\* $p < 0.05$  \*\* $p < 0.01$  \*\*\* $p < 0.001$ . <sup>a</sup>Adjusted for age, employee occupational position and company size. <sup>b</sup> $p$ -value for comparison of the non-distressed group mean to the distressed group mean.

such as reduced energy and cognitive ability, it is likely distressed employees will feel the responsibility of work has increased as they no longer have the same resources to cope with the demands at work. It is also worth noting that the type of increased autonomy and responsibility that the managers report, may not necessarily translate into more autonomy and responsibility for the individual employee. It is likely that at least some of it stems from a more collective increase in autonomy and responsibility through teams or employee representatives.

*Self-rated increase in technical and professional demands* was associated with psychological caseness in this study. The introduction of computerized technologies into everyday work routines creates a continuous need for acquiring new knowledge and skills<sup>1)</sup>, but at the same time innovations and development in technology makes skills obsolete faster than ever<sup>28, 29)</sup>. Computerisation, mechanisation, and automatisisation often replace repetitive, routine (manual and mental) operations, thus increasing the ratio of non-routine to routine tasks. Work becomes more mentally demanding as non-routine tasks involve greater mental resources (demands) than do routine ones<sup>30)</sup>. However, no association between psychological caseness and increase in knowledge content was found.

*Increased interdisciplinary collaboration* did not show any associations with psychological caseness. Previous sharp industry professional boundaries are reduced and interdisciplinary collaboration has blurred the distinctions between different trades<sup>31)</sup>. Although these changes may still be the source of conflict and confusion we find no link to psychological caseness.

*Increased demand for labour productivity* was most

clearly associated to psychological distress in both the self-rated and agreed work intensification measurements. This exposure variable is probably the most traditional or “raw” measurement of work intensification among the five variables<sup>9, 32)</sup>. Cowan<sup>30)</sup> suggests that during stress productivity increases at first, and then decrease if stress continues to increase. If work intensification is associated with psychological distress, it could prove counterproductive as a management strategy in the long run.

Examining both the manager and employee mean work intensification ratings, it seems that a very large proportion of employees have experienced at least some work intensification which connotes with previous findings<sup>3, 32)</sup>. Managers and employees may not agree on which aspects of work that has intensified, but they agree that work in general is intensified. Work intensification is not likely to diminish in the nearest future with globalisation increasing competition and technology developments<sup>32)</sup>, making the topic all the more relevant.

The finding; that *self-rated work intensification* is associated with psychological distress connotes with the previous findings of Green<sup>9)</sup>. However, this previous measurement is in risk of reporting bias as both exposure and outcome are self-reported<sup>15, 16)</sup>. Reporting bias in psychosocial research has been studied and discussed extensively<sup>14–16, 33–35)</sup>. The pivotal point is that of circular reasoning; distressed employees may rate work content as more stressful than their non-stressed colleagues leading to overestimation of risk factors. However, the results of the agreement analyses challenge the previous findings on reporting bias of distressed employees since no difference in manager/employee discrepancy in assessment of

work intensification was found across caseness status, and secondly that distressed employees had a higher mean of manager/employee agreed intensification than non distressed.

The main methodological challenge of this paper is that change in work intensification is not measured at two or more time points, but only once (retrospectively). Therefore we cannot infer whether a causal connection exists between work intensification and psychological distress. Furthermore, a longitudinal study design would have allowed us to see whether the general direction of the employees and managers assessment of work intensification was the same over time.

Response rates were 42% at the company level and 55% at the individual level. This could be considered to be rather low. However, it is in line with response rates reported in meta-analysis at both executive and employee levels<sup>36, 37</sup>). We have no reason to believe that managers would be less likely to answer a survey due to work intensification of the employees. Employees who have experienced a lot of work intensification could be under greater time pressure making it harder to find time to answer the survey. This could lead to a possible underestimation of work intensification in the sample.

Due to our weighted sampling strategy, replies from smaller firms are over-represented. The results might therefore not mirror correctly associations in the general population of companies and employees in Denmark. This validity and reliability of manager assessments of increased job intensification may be highly dependent on the closeness of manager and employee<sup>8, 16, 38, 39</sup>). Managers may refer to the average increase in demands for a particular employee group, which does not necessarily hold true for all employees within that particular group. On the other hand, we found no evidence of an association between discrepancy and company size, suggesting that the extent of such bias was small.

In a study of similar size and magnitude Hårenstam<sup>40</sup>) examined correspondence between researchers', managers' and employees' assessments of whether organisational change had occurred or not. The results showed that the correspondence between the employees', managers and the researchers' assessments were lower than 50%. Though our variables were more detailed we had approximately the same degree (or lack of) correspondence between employee ratings and manager ratings. Both employee and company questionnaires were piloted to check for cohesion and understanding prior to launching the main survey and no problems were found regarding the questions.

Identical questions for the management and employees were used, but according to Greenan<sup>19</sup>) most workers do not understand the vocabulary of business surveys. Greenan<sup>19</sup>) suggests that questions directed at employees should be factual and simple, and perhaps the question on knowledge content was too intangible. However, similar low correspondence was found in all of the items, making it less likely that the reason for the discrepancy was found in the immediate understanding of some of the questions. Nevertheless, management may still answer the questions from a strategic understanding, while the employees understand them from a practical everyday viewpoint<sup>19</sup>).

Our sum scores were created by simple summing up the single item ratings, in effect letting each item "weigh" the same. However, it is not known whether for example increase in interdisciplinary collaboration intensify work as much as increase in demand of labour productivity. Furthermore, work intensification was measured dichotomously; and we neglected to measure decrease in work intensification, an outcome that might be associated with psychological distress caseness. A gradient in exposure assessment is suggested to improve the analysis of associations to health outcome. Longitudinal, multi-source studies are needed to more fully understand the causal connection between work intensification and psychological distress with focus on more nuanced work intensification measures assessed on individual, co-worker and manager level<sup>41</sup>).

In conclusion, this study demonstrates two things; first, that there are large discrepancies between employee and employers evaluation of work intensification; and second, that distressed employees and their managers both rated a higher degree of work intensification, compared to non-distressed employees challenging previous findings of reporting bias in distressed employees' assessment of work environment.

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