

Work demands are related to mental health problems for older engine room officers

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ABSTRACT

The aim of the present study was to analyse the main and interaction effects of age and psychosocial work demands on mental wellbeing in a sample ($N = 685$; age $M = 47$ years) of engine room officers in the Swedish merchant fleet. As expected, work demands were highly related to general mental health as well as to perceived stress, while the main effect of age only related significantly to perceived stress. The interaction effects between high work demands and high age significantly explained the variance of general mental health as well as perceived stress. The results can be understood as a consequence of the rapid technological and organisational development in the shipping industry and suggest that it ought be of high priority to provide older employees with work-related resources to support their long-term work performance as well as their health and wellbeing.

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Key words: older workforce, work demands, interactions, mental health

INTRODUCTION

The ageing population is a phenomenon common for all industrialised countries, which in turn is reflected in an ageing workforce and an increasing proportion of older workers [1–4]. Increasing age is associated with normative physiological change as well as with increased risks for various pathological changes which may make older workers more susceptible to physical and psychosocial environmental hazards. On the other hand, cognitive and coping skills developed by long experience may give older workers certain advantages.

An extensive review study on the needs of the older workers [1] claimed that research on the consequences of the ageing workforce and the conditions for the older workers up till now is inconclusive. Recent studies on the relationships between working conditions and wellbeing among older workers have presented somewhat

contradictory results. A large study performed in Sweden with a representative sample [5] analysing the relationship between working conditions and demographic characteristics on the one hand and sleep disturbances/fatigue on the other hand found that while higher age (above 49 years) was a predictor of disturbed sleep, fatigue was more common among younger workers (below 49 years). Among the factors found to interfere with sleep was work stress (disturbed sleep and fatigue) and shift work (disturbed sleep). Similarly, a study among seafarers serving in the Royal fleet auxiliary [6] found that while there was a relatively high level of work-related fatigue among the participants the older seafarers had no higher need for recovery from work compared to their younger colleagues. The authors suggested that this may be due to a “survival effect” — that is, individuals capable of coping with the work demands tend to remain in the workforce.

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However, other studies have found increased health problems and fatigue among older workers. A cross-sectional study on a sample of Belgian public sector employees found significantly increased need for recovery for older employees [7]. Among the other risk factors for increased need for recovery from work in the Belgian study was work stress. A longitudinal study on a sample of more than 2000 British wage earners [2] in a wide range of occupations showed that demanding psychological (e.g. long work hours, high job demands/efforts) and physical (e.g. heavy lifting, driving vehicles for prolonged periods) working conditions predicted significantly higher need for recovery from work for older – compared to younger – workers, in particular for persons in the age category 50–69 years. In a study on health among more than 6000 seafarers from 11 different countries older participants perceived their health significantly worse compared to their younger colleagues [8].

One type of particular risk factor for elderly workers may be strenuous psychosocial working conditions [2, 4, 7]. During recent decades the Demand-Control (DC) model [8] has been the most prominent generic model to analyse the relationships between psychosocial working conditions and work-related health outcomes. The initial version of the model comprised two independent dimensions of the work content, namely: Demands, which relates to how hard and intense the jobholder has to work and refer to e.g. time pressure and quantitative work load. The second dimension, Control, comprises two distinct but closely related components: task authority reflects the scope of the jobholder's authority to make decisions at work, and skill discretion relates to the level and variety of the skill required for the work tasks and the long-term possibilities to acquire new skills in the work role [8]. The DC model predicts that the combination of high job demands and low control (high strain jobs) interactively predicts the worst work-related health outcomes. Later a third dimension, work-related social support, was added to the model [9]. An extensive review of the model, exclusively based on longitudinal studies, found firm support for the main effects of the dimensions of the model on a wide range of health outcomes [10]. Another review study has further confirmed the impact of the model on mental health [11].

When the DC model was applied to the maritime sector significantly more strenuous psychosocial working conditions was found for a sample of French seafarers compared to those of a group of non-seafarers (engineers and technicians) employed by the same company and also participating in sea voyages [12]. A Swedish study found that work demands had a high impact on mental well-being among engine officers [13].

A number of previous studies have described the rapid technological development and the increased requirements

for economic profitability in the shipping industry, in particular for mid-level managers, e.g. engine officers [14–16]. The technological development has e.g. implied changes in task performance and added new tasks to the daily duties of the engine officers [15]. An epidemiological study [17] also confirmed greater health risks for officers, compared to ratings in the US shipping industry. The conclusion from these studies is that the new technical and organisational requirements in the shipping industry have led to work intensification – due to reduced manning on board and the introduction of new work tasks for which seafarers have not always been properly trained, in particular not older seafarers. There is thus reason to assume that the new types of work demands in the shipping industry may have a stronger impact on the health and wellbeing for older seafarers. The main aim of the present study was to analyse if the psychosocial work demands particularly affected the mental wellbeing of older marine engineer officers.

MATERIALS AND METHODS

PROCEDURE

A questionnaire comprising 129 items was distributed to all engine officers affiliated to the Swedish Merchant Marine Officers' Association, which held the only reliable address register of the target group for this study, and also administrated the dispatch of the questionnaire, which was followed by two reminders – mainly to the home addresses of the participants. A requirement of the Merchant Marine Officers Association for their assistance in the study was that participation should be anonymous, which rendered any dropout analysis or longitudinal follow-up study impossible.

PARTICIPANTS

The sample consisted of 1383 engine officers. A total of 731 (54%) of the engine officers returned the completed questionnaire. The mean age of the participants was about 47 ± 11.6 years and the median age was 49 years. In all, 43 participants declined to report their age and were therefore excluded from the present study. The relatively high average age for engine room officers participating in this study was representative for the population of Swedish engine room officers in the merchant fleet [18].

The participants were almost exclusively men (99%) with Scandinavian citizenship (99%). Three out of 4 (76%) of the participants were in a relationship while 24% were living alone; 41% had children living at home. The mean time in their current position was about 13 ± 10.5 years and their total experience at sea was, on average, about 24 ± 12.8 years. The occupational positions of the participants were; Chief engineer (44.5%), Second engineer (29.5%), Third engineer (14.0%), Electrical engineer (11.5%), and Other (0.6%).

INDEPENDENT VARIABLES

Demands were measured by 4 items by a slightly modified version of the Job Content Questionnaire [19] with Cronbach’s alpha coefficient (α) of 0.69. The items of the demand scale had 4 response alternatives and were all coded so that a higher value indicated higher work demands. The Demand scale was calculated by the mean procedure (SPSS version 20) and dichotomised at the median (Md = 2.25). Also the other independent variable age was dichotomised at the median (–48 years; 49+ years).

CONTROL VARIABLE

Several authors [20–23] claim that negative affectivity (NA) is a dispositional trait, independent of actual situational or environmental conditions, to perceive and report ones health as bad and environmental/situational conditions as unfavourable, regardless of actual health status or “objective” quality of e.g. the working conditions. In accordance with the dispositional trait view of NA these authors suggest that NA may contribute to artificially high stressor-strain relationships in cross-sectional studies based exclusively on self-reported data, since high-NA individuals tend to report more distress and more health problems regardless of the objective environmental/situational conditions or actual health status. For this measure the 10 items related to NA in the well-established PANAS scale [24] were used. The scale consists of 20 adjectives, with 5 Likert-type response alternatives ($\alpha = 0.85$).

OUTCOME VARIABLE

The short version of the General Health Questionnaire (GHQ12) was used as an indicator of mental strain [25]. This scale is developed to measure mental health in the general adult population. It consists of 12 items with 4 response alternatives, where a higher alternative always indicates greater mental health problems ($\alpha = 0.85$). As a second indicator of mental strain the 10 item version of the Perceived Stress Scale – PSS10 ($\alpha = 0.84$) was used [26]. The time frame referred to was “the last month”, and each item had 5 response alternatives (0 never – 4 very often).

STATISTICAL ANALYSES

For the statistical analyses factorial covariance analysis (SPSS version 20) was used, with dichotomised work demands and dichotomised age as independent variables; NA was used exclusively as a covariate.

RESULTS

In Table 1 the inter-correlations between all variables in the study, in full range, are presented. As revealed, age in

Table 1. Inter-correlations (Pearson r_{xy}) between the variables in the study; * $p < 0.01$

	1	2	3	4
1. Age	–			
2. Demands	–0.023	–		
3. Perceived stress	–0.011	0.41*	–	
4. GHQ	–0.013	0.34*	0.66*	–
5. Negative affectivity	–0.11*	0.28*	0.55*	0.49*

Table 2. Analysis of variance for General Mental Health (GHQ12) and Perceived Stress Scale (PSS10) by work demands, age, and their interaction. Negative affectivity (NA) as covariate

	GHQ12		PSS10	
	Df	F	Df	F
NA (covariate)	1	165.7**	1	242.2**
Work demands (A)	1	30.8**	1	55.2**
Age (B)	1	1.15	1	5.45*
Interaction A × B	1	4.28*	1	4.37*
Error	684	(0.096)	681	(0.229)

Values enclosed in parentheses represent mean squared errors; * $p < 0.05$; ** $p < 0.001$

itself was unrelated to mental wellbeing as well as to perceived work demands, and was negatively related to NA – thus older EROs tended to report lower NA.

As could be assumed, all other variables were positively related, in particular the two outcome indicator’s GHQ-Perceived Stress (0.66, $p < 0.01$).

The results of the analysis are presented in Table 2. As expected, the covariate NA explained a very high proportion of the variance in both outcome variables. Also, work demands had a highly significant impact on general mental health ($F = 30.8$, $p < 0.001$) as well as on perceived stress ($F = 55.2$, $p < 0.001$).

The analysis gave mixed findings in regard to the independent contribution of age on mental strain. While age failed to significantly affect general mental health it had a significant impact on perceived stress ($F = 5.45$, $p < 0.05$). However, the interaction between work demands and age significantly affected general mental health ($F = 4.28$, $p < 0.05$) as well as perceived stress ($F = 4.37$, $p < 0.05$).

As shown in Table 3, where the mean values of the outcome variables are presented for each combination of the independent variables, it was the elevated values for general mental health ($M = 2.01$) as well as perceived stress ($M = 2.00$) in combination with high work demands and high age that brought about the significant interactions.

Table 3. Mean values for General Mental Health (GHQ12) and Perceived Stress Scale (PSS10) under the different combinations of the independent variables; grand mean

Work demands	Age	General Mental Health		Perceived Stress Scale	
		Mean	Std. Err	Mean	Std. Err
Low	Low	1.84	0.026	1.63	0.040
Low	High	1.81	0.024	1.64	0.037
High	Low	1.93	0.023	1.84	0.036
High	High	2.01	0.023	2.00	0.035
Grand mean		1.90	0.013	1.78	0.022

DISCUSSION

The relationship between work demands and mental strain is well established in the scientific literature, so the highly significant impact on both the outcome variables in this study was expected. The finding in regard to age was mixed. While older engine officers did not report elevated levels of general mental health problems compared to their younger colleagues, they perceived significantly higher degrees of stress. The most noteworthy finding was that the interactions between age and work demands significantly affected mental wellbeing among the engine officers so that older engine officers with higher psychosocial work demands tended to report inflated levels of mental distress.

A previous study based on the same data [27] showed that compared to a sample of shore-based British professional engineers the engine room officers did not perceive higher work demands. In the present study it was also shown that the older participants did perceive higher work demands than their younger colleagues. The findings from these studies thus do not indicate that engine room officers in general or the older participants in particular suffer from comparatively elevated work demands. But since the average age among this group of qualified professionals is fairly high it should be of particular importance for the shipping industry to adjust the working conditions for the older workforce. While it is beyond the scope of the present study to give a full explanation of these findings it seems likely that the last decades of rapid technological and organisational change in the shipping industry may in particular affect the older employees – whose education most often is of older date and who may not have been able to acquire the same “computer literacy” as their younger colleagues. Further studies are needed to identify which work demands are perceived as strenuous and suggest strategies to help older workers to efficiently handle them.

The cross-sectional design of this study prevents any conclusions on causality. A further limitation of the study may be the generic work demand measure used in this study, which may have led to an underestimation of the true level

of psychosocial work demands as well as an underestimation of the health effects caused by high work demands for this professional group. The DC model was initially developed to assess psychosocial strain for blue-collar workers in relatively unqualified professions, and its instigators have stated that it better explains the stressor → strain for these types of professions [9]. A longitudinal study [28] comparing the explanatory power of the DC(-S) model on mental wellbeing showed that while professionals reported higher levels of mental strain than blue-collar workers the dimensions of the model accounted for less explained variance in the outcome variables for the former group. In line with recent findings in occupational stress theory it may thus be recommended to future studies on the working conditions in the shipping industry to develop more occupation-specific inventories on work demands [29].

CONCLUSIONS

The findings from the present study indicate that rapid technological and organisational development in the shipping industry may be associated with increased mental strain for the older engine room officers. Since engine room officers in the Swedish merchant fleet is an occupational category with a relatively high average age, it is important for the shipping industry to provide their older employees with work-related resources to support their long-term work performance as well as their health and wellbeing.

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