The experience of demanding work environments in younger workers

T. N. Winding¹, M. Labriola¹,², E. A. Nohr³,⁴ and J. H. Andersen¹

¹Danish Ramazzini Centre, Department of Occupational Medicine, Regional Hospital Herning, 7400 Herning, Denmark, ²Department of Clinical Social Medicine, Public Health and Quality Management, Central Denmark Region and Section of Clinical Social Med, and Rehabilitation, School of Public Health, Aarhus University, 8000 Aarhus, Denmark, ³Research Unit of Gynaecology and Obstetrics, Institute of Clinical Research, University of Southern Denmark, 5230 Odense, Denmark, ⁴Department of Public Health, Section for Epidemiology, Aarhus University, 8000 Aarhus, Denmark.

Correspondence to: T. N. Winding, Danish Ramazzini Centre, Department of Occupational Medicine, Regional Hospital Herning, Gl. Landevej 61, 7400 Herning, Denmark. Tel: +45 7843 3500; fax: +45 7843 3518; e-mail: trwind@rm.dk

Background
Investigating whether certain individual or background characteristics are associated with an increased risk of experiencing an excessively demanding work environment in younger workers may help to reduce future inequality in health and maximize their labour market participation.

Aims
To describe the work environment of Danish 20- to 21-year olds and to investigate the influence of family socioeconomic background and individual characteristics at age 14–15 on later experience of physical and psychosocial work environments.

Methods
We obtained information on subjects’ school performance, vulnerability, health and parental socioeconomic status from registers and a questionnaire completed in 2004. A questionnaire concerning eight measures of subjects’ psychosocial and physical work environment in 2010 was used to determine the outcomes of interest.

Results
The study population consisted of 679 younger workers aged 20–21. The psychosocial work environment was in general good but younger workers experienced more demanding physical work than the general working population. Overall, individual as well as family factors had a limited impact on their assessment of the work environment. Low self-esteem at age 14–15 was associated with experiencing high demands and lack of trust and fairness at work, whereas low parental socioeconomic status was associated with a demanding physical work environment.

Conclusions
This study showed a social gradient in experiencing a demanding physical work environment at age 20–21. The psychosocial work environment experienced by younger workers was generally good, but vulnerable young people may need special attention to protect them from or prepare them for psychosocially demanding jobs later in life.

Key words
Childhood exposure; cohort study; risk factors; work environment; younger workers.

Introduction
The successful integration of younger workers in the labour market is necessary if we want to reduce future inequalities in health and social status [1,2]. The psychosocial work environment experienced in young adulthood is an important determinant of lifetime health inequality [3,4]. Low socioeconomic status has been associated with a demanding work environment in adult populations [5,6] but little is known about how younger workers’ work environments are influenced by their family socioeconomic status [7] or individual factors such as school performance [8] or mental health [9]. Female gender, low family socioeconomic status and poor academic achievement at age 16 have been associated with low job control and high job strain at age 31 [7] and social and emotional competence in high school seems to be related to reporting a demanding work environment 5 years later [8]. Self-esteem has been found to be positively related to job satisfaction [10], whereas the association between a sense of coherence and the psychosocial work environment is less convincing [11]. In order to reduce future inequality in health and maximize labour
market participation, it is important to investigate whether certain individual or background characteristics are associated with an increased risk of younger workers experiencing a demanding work environment, when the effects of other family and individual risk factors are taken into account.

The object of this study was therefore to explore some of the individual and family characteristics affecting younger workers’ perception of their work environment, which could eventually lead to poor health outcomes. The study aims were to describe the work environment of working Danish 20- to 21-year olds and compare them to the Danish general working population and to investigate if family socio-economic background and individual characteristics at age 14–15 influenced subjects’ assessment of their physical and psychosocial work environment at age 20–21.

Methods

The study sample was derived from the prospective cohort ‘Vestliv’, a youth cohort of all individuals born in 1989 and living in the county of Ringkøbing, Denmark in early April 2004 [12,13]. The baseline questionnaire was completed during school hours at the respondents’ schools, when they were aged 14–15 and those not at school on the day of collection received the questionnaire by mail. A follow-up conducted in 2007, when the participants were aged 17–18, used both e-mailed and postal questionnaires. A second follow-up in 2010, when the participants were 20–21, used only e-mailed questionnaires.

The analyses were based on register information and questionnaire information from 2004 to 2010. The study sample was defined as those who answered a questionnaire at baseline and at follow-up in 2010, including information on at least one of the outcomes and who were working or undergoing vocational education with an apprenticeship at age 20–21. Those receiving other education were excluded (Figure 1).

To retrieve register information on background risk factors respondents were linked to their parents or guardians by using their personal identification number from the Central Person Register (CPR number),

Figure 1. Flow chart of participants eligible for this study.
allocated to every inhabitant in Denmark at birth or at immigration [14]. The study and the data linkage procedures were approved by the Danish Data Protection Agency. According to Danish law, questionnaire and register-based studies need neither approval by ethical and scientific committees nor informed consent.

Information on subjects’ psychosocial work environment came from the 2010 questionnaire and was based on selected items from the short edition of the ‘Copenhagen Psychosocial Questionnaire’ (COPSQII) [15,16]. Mean scores on six aspects of the psychosocial work environment were calculated and compared with the mean scores of a representative sample of Danish wage earners [17]. Each aspect was generated from two items and transformed to scales measuring: quantitative demands, work pace, emotional demands, influence, trust and fairness at the workplace, with scores in the range 0–8. Low scores on the three scales measuring quantitative demands, work pace and emotional demands and high scores on the three scales measuring influence, trust and fairness indicated a good work environment.

Information about the physical work environment was originally derived from the Dutch Musculoskeletal Questionnaire (DMQ) [18]. The four items were transformed to scales measuring monotonous repetitive work and physical hard work, with scores in the range from 2 to 8 and with low scores indicating a good work environment. The mean values of the two scales were compared with the mean values of a large Danish sample of working adults [19]. The mean values of the eight work environment scales for the samples of working adults were based on exactly the same questions as the scales for the study sample.

Risk factors were divided into four domains; vulnerability, health, school performance and family socioeconomic status, which are described in detail below. Information on vulnerability and health came from the baseline questionnaire while information about school performance and family socioeconomic status was based on available Statistics Denmark registers [20,21].

Self-esteem was measured by using six items from Rosenberg’s 10 item self-esteem scale [22]. Data was dichotomized into low and normal/high self-esteem by applying a cut-off point at the 25% percentile, corresponding to a self-esteem score greater than 17. From the ‘Sense of coherence revised short version for children’ scale, four items about sense of meaningfulness were used [23]. The answers were categorized with a cut-off point at the 25% percentile corresponding to a ‘sense of meaningfulness’ score >12.

Self-rated health was used as a general indicator of health, using a single item from SF-36 with five response alternatives [24]. Due to the limited numbers of younger workers reporting ‘not so good’ and ‘bad’ general health status, the variable was dichotomized into ‘high’ (excellent, very good) and ‘low’ (good, not so good, bad) general health status. Depressive symptoms were measured using the four-item validated version of ‘The Center for Epidemiologic Studies Depression Scale for Children’. The responses were dichotomized into ‘depressive symptoms’ and ‘no depressive symptoms’ with the recommended cut-off at 3 and above indicating increasing levels of depressive symptoms [25].

The exam grades for oral Danish and written maths after compulsory school (9th grade) were used. Before September 2007, grades were given according to the so-called 13-point scale (00, 03, 5, 6, 7, 8, 9, 10, 11, 13). A dichotomous variable indicating high grades (8–13 equivalent to B+ and above) and low grades (00–7) was generated. Information about highest attained education in the household and household income was obtained in year 2003. Highest attained education in the household was divided into three categories: <10, 10–12 and >12 years [20]. Yearly household income was divided into tertiles corresponding to lowest (<64 540 Euros), middle (64 540–82 402 Euros) and highest tertile (>82 402 Euros) [21].

Across all risk factors, the mean values of the work environment outcomes were calculated. Q-Q plots were used to check for normal distribution, which was confirmed for all the included outcomes. A test of co-linearity was performed revealing only minor correlation between risk factors with a maximum correlation of 0.3.

The mean differences of the work environment outcomes were calculated according to each risk factor using linear regression models and presented with 95% confidence limits. Adjustments were performed in two steps. Initially, the individual risk factors were adjusted for family risk factors and vice versa. Secondly, every single risk factor was adjusted for all other risk factors. In addition, the statistical models were adjusted for whether the younger workers were in an apprenticeship or employees. Initially, risk factors were included in the models as continuous or category variables but since changes in scales or cut-off points did not affect the main results, six of the eight risk factors were dichotomized to improve comprehensibility of the results. Results from a crude analysis including only the participants with complete information on all exposures and outcomes were only slightly different from the partly adjusted and fully adjusted estimates and did not change the overall conclusions. To gain as much statistical power as possible, the analyses were therefore carried out on the originally defined study population. When gender was included in the analyses, some indication of effect modification was seen and we did not adjust for gender, instead performing a stratified analysis.

**Results**

A total of 3681 potential participants were identified using information from The Central Office of Civil Registration [14] and from public schools. Of these, 3054 (83%) chose to participate at baseline in 2004. Of
the baseline responders, 2181 (71%) responded in 2007 and 1945 (64%) in 2010. Of these, 695 were working and 679 had information available for at least one of the eight outcome variables (see Figure 1), leaving 679 younger workers in the final study sample.

Information was available for all risk factors and outcome variables in 578 younger workers.

In their psychosocial work environment, the younger workers in our study experienced fewer quantitative and emotional demands, and higher trust and fairness at work compared with a population of working adults in Denmark (Supplementary Table 1, available as Supplementary data at Occupational Medicine Online). Quantitative demands showed the most positive results with a mean score of 2.2 compared with an overall mean of 3.3 among working adults. Physical work environment measures showed increased physical demands with more repetitive movements and especially more hard physical work among younger workers with a mean score of 4.3 compared with an overall mean of 3.4 in the working adult population.

Supplementary Table 2 (available as Supplementary data at Occupational Medicine Online) shows mean differences across the eight risk factors in relation to the six psychosocial work environment outcomes. Younger workers with low self-esteem reported higher mean values of quantitative demands and work pace compared with those with normal/high self-esteem. Low general health status was associated with high quantitative demands.

Younger workers from low/middle socioeconomic status families experienced fewer emotional demands at work than those from high socioeconomic status families. In particular, low/middle parental education was associated with lower emotional demands compared with higher levels of parental education. A low sense of meaningfulness was associated with experiencing low influence at work compared with those with normal/high sense of meaningfulness. The largest differences in experiencing trust and fairness were found between those with low self-esteem compared with those with normal/high self-esteem. Low parental socio-economic status showed the strongest associations with low influence at work at age 20–21. Low parental socioeconomic status was associated with lower emotional demands compared with normal/high socioeconomic status families. Low self-esteem at age 14–15 was associated with experiencing high quantitative demands and work pace and low trust and fairness at work, and among females low self-esteem was associated with the experience of low influence at work at age 20–21. Low parental socioeconomic status showed the strongest associations with experiencing a demanding physical work environment.

This study benefits from its prospective design with follow-up after 3 and 6 years and a high response rate at baseline (83%). Additional strengths are the use of both register- and questionnaire-based data, which minimizes the risk of common method variance [26], as well as almost complete information from the registers.

A limitation of the study is the use of abbreviated scales when measuring self-esteem and sense of meaningfulness, which reduces the ability to compare our results with others. Despite the relatively high response rates, especially at baseline, people with a demanding work environment may be under-represented in

![Figure 2](image)

**Figure 2.** Mean differences with 95% confidence limits of psychosocial work environment among those with low self-esteem and normal/high self-esteem (fully adjusted). High mean values of quantitative demands, work pace and emotional demands and low mean values of influence, trust and fairness indicating a demanding work environment.

**Discussion**

Overall, the psychosocial work environment of these younger workers, compared with that of the Danish general working population, was good but they experienced more demanding physical work than adults. None of the risk factors showed any strong association with experienced work environment and all the mean differences were below the recommended minimal important difference of 0.5 SD [15]. Moreover, because of the large number of comparisons, there is a possibility that some of the findings could be due to chance.

Low self-esteem at age 14–15 was associated with experiencing high quantitative demands and work pace and low trust and fairness at work, and among females low self-esteem was associated with the experience of low influence at work at age 20–21. Low parental socioeconomic status showed the strongest associations with experiencing a demanding physical work environment.

Among those with low general health status, higher mean values of repetitive movements were seen compared with those with normal/high status. Conversely, those with low general health status reported less exposure to hard physical work compared with those with high status.

Analysis by gender showed some differences in experienced work environment. Among females, low self-esteem was more strongly associated with high quantitative demands, low influence and repetitive movements at work than among males. Also, the association between low sense of meaningfulness and low influence at work and the association between low parental education and repetitive movements were stronger among females than among males (results not shown).
One explanation could be that younger workers with the most demanding work environment experiences have already left the labour market, which could possibly underestimate the associations in the study. Another explanation could be that for some reason those with the most demanding work environment chose not to participate and therefore are not represented in the study population.

In a recent study, it was shown that although certain characteristics in the Vestliv Cohort were related to initial participation and especially to follow-up participation, this did not have any large impact on the relative risk estimates of interest. These findings are reassuring with regard to obtaining valid risk estimates in other analyses of this cohort [13]. In order to assess potential selection problems, the distribution of four register variables (grades in maths and Danish, household income and highest parental education) were compared between the participants (n = 679) and the potential participants, that is participants with information on work environment but no questionnaire information from baseline in 2004 (n = 746). The results only showed minor variations and did not change the overall conclusions.

Caution is needed in applying the results of this study to all Danish young people. The cohort comprises younger workers in the labour market or attending vocational education with an apprenticeship at age 20–21. This means that young people attending tertiary education were not represented. Therefore, it is likely to consist of fewer people who will complete tertiary education than in general adult working cohorts.

The reason younger workers perform more physically demanding work than their older colleagues could be that they do not yet have the same experience and social position as their older colleagues and are therefore selected to perform the hardest job functions [27].

### Table 1. Mean differences in physical work environment according to individual and family risk factors

<table>
<thead>
<tr>
<th>Physical work environment</th>
<th>Repetitive movement</th>
<th>Hard physical work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crude</td>
<td>Adj1</td>
</tr>
<tr>
<td>β 95% CI</td>
<td>β 95% CI</td>
<td>β 95% CI</td>
</tr>
<tr>
<td>Individual risk factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grades – oral Danish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 or below</td>
<td>0.24</td>
<td>−0.09, 0.56</td>
</tr>
<tr>
<td>Grades – written maths</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 or below</td>
<td>0.15</td>
<td>−0.18, 0.49</td>
</tr>
<tr>
<td>Self-esteem</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>0.38</td>
<td><strong>0.03, 0.73</strong></td>
</tr>
<tr>
<td>Sense of meaningfulness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>0.39</td>
<td>−0.01, 0.79</td>
</tr>
<tr>
<td>General health status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>0.63</td>
<td>−0.18, 1.44</td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td><strong>0.33</strong></td>
<td><strong>0.00, 0.65</strong></td>
</tr>
<tr>
<td>Family risk factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle</td>
<td>0.34</td>
<td>−0.01, 0.69</td>
</tr>
<tr>
<td>Lowest</td>
<td><strong>0.48</strong></td>
<td><strong>0.11, 0.86</strong></td>
</tr>
<tr>
<td>Highest household education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10–12 years</td>
<td>0.58</td>
<td><strong>0.26, 0.91</strong></td>
</tr>
<tr>
<td>&lt;10 years</td>
<td>0.46</td>
<td>−0.03, 0.96</td>
</tr>
</tbody>
</table>

Bold denotes significance. Job type is included in all adjusted models. 95% CI, 95% confidence interval.

Adj1: individual risk factors are adjusted for all family risk factors and family risk factors are adjusted for all individual risk factors.

Adj2: all risk factors are mutually adjusted.

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Although the results of this study indicate a more positive psychosocial work environment experience among younger workers compared with older ones, the importance of vulnerability, especially low self-esteem in late childhood, should be noted. Previous studies on adults have shown an association between self-esteem and job satisfaction [10] but we were not able to identify studies that investigated the association between childhood self-esteem and psychosocial work environment later in life. Two previous studies have investigated the association between sense of coherence and psychosocial work environment but the results were not conclusive [11,28]. Although Modin et al. found that high sense of coherence at school may modify the association between adverse psychosocial work environment and health, this finding was from a cross sectional design which precludes any causal interpretation [28]. Togari et al. did not find an association between sense of coherence and experienced psychosocial work environment 1 year later in a population of workers aged 20–40 [11].

The finding of low self-esteem as an important risk factor for experiencing a demanding psychosocial work environment could be explained in several ways. Firstly, those with low self-esteem could be selected into jobs with a demanding work environment because of their low self-esteem. Secondly, negative affectivity [29], where low self-esteem could influence the way the individual perceives the work environment, may result in those with low self-esteem automatically reporting negatively on all aspects of work environment. The truth most likely involves a combination of these two explanations.

Previous studies on adult populations have shown low socioeconomic status to be strongly related to demanding physical [6] and psychosocial work environments [5,6]. In this study, the strongest associations were seen between low socioeconomic status and a demanding physical work environment. In contrast, a reverse tendency was seen with low socioeconomic status being associated with experiencing low emotional demands at work. That high emotional work demands are frequent in high social positions has been confirmed previously [5,6] and does not necessarily have negative health implications unless combined with low job control [30]. It is important to emphasize that a demanding work environment is not always negative but will depend on the resources of the individual worker. Demands that are too high for one person might well be suitable or too low for another.

It is reassuring that younger Danish workers in general experience a good psychosocial work environment at the beginning of their career and that individual as well as family factors in late childhood only have limited impact on how they report their work environment at age 20–21. Nevertheless the results call for attention to vulnerable young people in the transition from the educational system to working life. Student advisors, teachers and parents should try to improve the self-esteem of young people as well as help prepare them for the challenges of work life and prevent those with low self-esteem from being selected into psychosocially demanding job functions.

Key points

- The psychosocial work environment in this cohort of younger workers in Denmark was on average good, but they experienced more demanding physical work tasks than the general working population.
- It seems that young people with low self-esteem need special attention in order to protect them from or prepare them for experiencing psychosocially demanding job functions later in life.
- This study showed a social gradient in experiencing a demanding physical work environment at age 20–21.

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Conflicts of interest

None declared.

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