Risk Factors for Long-Term Absence Due To Psychiatric Sickness: A Register-Based 5-Year Follow-Up From the Oslo Health Study

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Objective: To identify individual and work-related predictors of long-term (≥8 weeks) sickness absence with psychiatric diagnoses (LSP). Methods: Data from the Oslo Health Study (response rate 46%) were linked to public registers. A total of 8333 subjects were followed from 2001 through 2005. Cox regression was used to compute hazard ratios for LSP. Results: At least one LSP was present in 7.8% of women and 3.9% of men. Poor support from superior had an independent and moderate effect. Path and linear regression analyses indicated that the effect of support from superior was mediated through mental distress and not the other way around. Self-reported mental distress had a strong independent effect. Conclusions: Women had a higher risk of LSP than men. Low education and poor support from superior and mental distress were found to be determinants of LSP.

Long-term sickness absence represents a major health and economic problem in Norway and many other Western countries. In these countries, psychiatric disorders are the second most frequent diagnoses for sickness absence and disability pensions after musculoskeletal disorders. Furthermore, mental disorders have become the most prominent cause of sickness absence in the United Kingdom. Return to work after a sickness absence with a psychiatric diagnosis generally takes more time than absences following physical problems; today, many young people with psychiatric diagnoses receive an early disability pension. Mild depression seems to matter most in relation to sickness absence. Because many of these disorders occur at an early age, there is selection into the labor market. There is also an increased health-related selection out of working life, particularly for people of low socioeconomic position (SEP), which seems to be connected to working conditions in Western societies. The development of interventions to address the growing challenge of mental illness, especially its impact on permanent work disability among younger people, is a major public health issue. Thus, there is a need for more studies investigating the causes of sickness absences associated with mental disorders.

Potential risk factors for psychiatric sickness absence include both individual and workplace conditions. Mechanisms that may explain associations between working conditions, mental health, and sickness absence are still poorly understood. Poor mental health might lead to selection into jobs with poor work environment. Mental distress may also be associated with negative perceptions of workplace characteristics. Thus, mental health might act as a confounder in the relationship between working conditions and sickness absence, and there is a possibility of reverse causality.

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METHODS

The Oslo Health Study (HUBRO) was conducted during 2000 to 2001 as a collaboration between the Norwegian Institute of Public Health, the University of Oslo, and the Municipality of Oslo. The survey included 40,888 inhabitants in Oslo aged 30, 40, 45, 60, and 75 years. The response rate was 46%, yielding a study sample of 18,770. The HUBRO survey included several questionnaires; a main questionnaire was presented to all, and supplementary questionnaires were given to different age groups. The participants answered questions on personal, social, health, and work-related topics. HUBRO participants were linked to the Historical Event Database in Statistics Norway (FD-Trygd), which is a historical event database for the national insurance that covers the whole population, by linking several official registers based on each individual’s unique 11-digit identification number. Data on working conditions, lifestyle, and health were self-reported survey data from HUBRO. Data on sickness absence and education were from FD-Trygd. Diagnostic information was based on the International Classification of Primary Care (ICPC-2). In Norway, economic compensation to employees is given from the first day of sickness absence to persons with pensionable income above the limit that permits a sickness allowance (5700 USD, January 1, 2001). A physician’s diagnosis is necessary for all long-term absences. We collected data on the first spell of LSP (ICPC-2, chapter P) sickness absence for 8333 participants (4411 women and 3922 men) who were considered to be at risk for sickness absence on January 1, 2001. Those who were not considered to be at risk were excluded.
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from the analyses. This group comprised, in categories that were not mutually exclusive, people who had died, emigrated, or received disability pension before the start of the follow-up as well as persons with pensionable income in 2001 that was below the limit entitling them to sickness allowance. The analyses were restricted to the 30-, 40- and 45-year age groups because questions on working conditions and work-related health were not given to the 60- and 75-year age groups. The Regional Committee for Medical Research Ethics (Department Southern Norway, Oslo) approved the study.

Study Outcome

The dichotomous study outcome was having at least one spell of long-term (>8 weeks) continuous sickness absence with a psychiatric diagnosis during the 5-year period of 2001–2005.

Variables

The classification of SEP was based on education level according to the standards of Statistics Norway, which was collapsed into five ordered categories: 1) primary education/lower secondary, 2) upper secondary education, basic, upper secondary, 3) final year/postsecondary, nontertiary education, 4) first stage of tertiary education, undergraduate level, and 5) first stage of tertiary education, graduate level/postgraduate education.

Three occupational factors were included in the analyses: job control, support from superior, and job security. The question on job control was “Can you yourself decide how your work should be organized?” The four response categories were dichotomized into Good or Poor. Support from superior was measured by merging the two following questions: “Can you get support and positive feedback from your immediate superior?” and “Are your work achievements appreciated by your immediate superior?” The response categories were as follows: Very seldom or never (score 1), Rather seldom (score 2), Sometimes (score 3), Rather often (score 4), and Very often or always (score 5). The scores from the two questions were summed. Thus, the participants were given a total score from 2 to 10, dichotomized into Poor support (score 2–5) and Good support (score 6–10). Job security was measured by merging the two following questions: “Are there rumors concerning changes at your workplace?” [Response categories: Very often or always (score 1), Rather often (score 2), Sometimes (score 3), Rather seldom (score 4), and Very seldom or never (score 5)] and “Are you confident that 2 years from now you will have a job that you consider as attractive as your present job?” [Response categories: Very little or not at all (score 1), Rather little (score 2), Somewhat (score 3), Rather much (score 4), and Very much (score 5)]. Thus, the participants were given a total score from 2 to 10, dichotomized into Poor job security (score 2–5) or Good job security (score 6–10).

Mental distress was measured by the 10-item Hopkins Symptom Checklist. The test asks about psychiatric symptoms, such as depression and anxiety, on a four-point scale ranging from 1 = “not at all” to 4 = “extremely.” The average item score was calculated by dividing the total score by the 10 items, resulting in a continuous scale ranging from 1 to 4. Each item was rated on a scale of 0 (Yes) to 1 (No) during the past week. The scale was used as a categorical variable with a cutoff point of 1.85.

Self-reported general health was measured by the question: “How would you describe your present state of health?” The three response categories were Poor, Good, and Very Good.

Social affiliation was measured by the two following questions: “Do you feel you have enough good friends?” (Response categories: Yes or No) and “How often do you take part in some kind of club/social activity?” The four response categories were dichotomized into Never, A few times per year, and 1–2 times per month or more.

Work-related health was measured by the question: “Have you experienced any of the following common health problems during the last month and are they totally or partially caused by working conditions in your present or previous jobs?” This was followed by a list of 11 common work-related health problems (eye problems, nose problems, chest tightness, heavy breathing, eczema, impaired hearing, pain in neck, shoulders and/or arms, low back pain, fatigue, and sleep disturbance). The response categories were dichotomized into Yes, if there was a positive answer to any of these symptoms, or No.

Smoking and alcohol use were used as measures on lifestyle. Smoking was measured by the question: “Have you smoked/do you smoke daily?” The response categories were Never, Yes before, and Yes now. Alcohol use was measured by the question: “Have you, during one or more periods in the last 5 years, drunk so much alcohol as to hamper you socially or at work?” The four response categories were dichotomized into Yes, socially and/or at work, or No.

Statistical Analysis

Stata/SE 10.1 was used in the analysis. Cox proportional hazards models were used for computing LSP hazard ratios and the corresponding 95% confidence intervals. All analyses were stratified by gender. Follow-up lasted until the end of 2005. Censoring occurred when people died, emigrated, or received a disability pension. This was the case for 212 people. Sickness absences with other diagnoses were ignored.

We applied a targeted, sequential analytical strategy of a priori formulated models, distinguishing between potential mediators and confounders. One goal was to estimate associations between working conditions and LSP after controlling for potential confounders. Furthermore, we wanted to estimate the degree to which these associations were mediated through other factors.

Five models were applied. Model A was the crude analysis. Model B included age and education. Model C included model B, working conditions, and work-related health. Model D included model C and general and mental health. Model E, the full model, included model D, lifestyle and social affiliations.

We considered the causal pathways leading to LSP as illustrated in Figure 1. Coefficients for pathways were computed with the “pathreg” command in Stata. Multiplying the individual coefficients by mental distress, for example, and comparing them with the direct pathway coefficients made it possible to make rough assessments of the degree of mediation. The corresponding mediation values were estimated with regression models as well, comparing crude and adjusted assessments.

RESULTS

During follow-up, 344 (7.8%) women and 153 men (3.9%) experienced at least one LSP. For the total population, the LSP risk
was 6.0%. The distribution of psychiatric diagnoses, distinguishing between symptomatic and clinical diagnoses, is presented in Table 1. Diagnoses related to depression (P03, P76) were very common, accounting for 63% of the diagnoses in both genders. Table 2 shows the 5-year risk of LSP according to age, education, work-related factors, general and mental health, lifestyle and social affiliations across genders.

Mental distress was associated with a more than 3-fold increased risk of LSP in women and a 4-fold increased risk of LSP in men. Poor general health was more than doubled the risk of LSP in women and was associated with a 4-fold risk of LSP in men. Poor support from superior doubled the risk of LSP for both genders. Subjects aged 40 and 45 years showed a higher risk of LSP than the youngest subjects (30 years). For both genders, the lowest education category (primary education/lower secondary) was associated with the highest risk of LSP. Women in education category 5 (first stage of tertiary education and graduate level/postgraduate education) had less than half the LSP risk compared with women in the lower education categories. In men, the effect of education on LSP risk was somewhat weaker. Women and men who reported current smoking had an almost doubled LSP risk compared with those who never smoked. Alcohol problems were associated with a ~3-fold increase in LSP risk in men.

Tables 3 and 4 show the results from the Cox regression analyses according to models A–E for women and men, respectively. The risk of sickness absence increased with increasing age in men, whereas the age gradient was weaker in women. In the fully adjusted model, statistically significant risk factors for LSP were poor support from superior and self-reported poor general health, which seemed to have an independent and moderately adverse effect on LSP. Mental distress had a strong independent effect on LSP, somewhat stronger in men than in women. In women, education categories 1–4 were associated with considerably higher risk than the reference category, graduate tertiary, whereas in men, there were no statistically significant effects of education on LSP. Alcohol problems for men and present smoking for women were also independently associated with LSP. The effects of social affiliations and work-related health problems on LSP risk were modest, as were the effects of job insecurity and low job control (data not shown).

Figure 2 shows the results from the path analysis. This is a simplified model, where only the variables with a substantial contribution to the total LSP burden estimates are included. Support from superior and educational level was both negatively associated with LSP. The effect of support from superior on the risk of LSP was mediated through mental distress. The path analysis showed that ~54% (women) [(−0.222 × 0.184)−0.035 + −0.222 × 0.184] = 0.54 or 54%] and 42% (men) of the effect of support from superior on LSP was mediated through mental distress, whereas 24% (women) and 47% (men) of the effect of education was mediated through mental distress. We also estimated mediation through mental distress in regression models, and the results were 52% (women) and 33% (men) for support from superior and 44% (women) and 48% (men) for education.

There was less evidence for mediation through the other opposite pathways (figure not shown) i.e., via support from superior. Only ~2% of the effect of education on LSP was mediated through support from superior and 3% of the effect of mental distress was mediated through support from superior. The results from regression models showed 5% and 8%, respectively.

### DISCUSSION

Approximately 8% of women and 4% of men had an LSP during the 5 years following the health survey. Poor support from superior had an independent, modestly adverse effect on LSP. For both genders, self-reported mental distress had a strong and independent effect on LSP, whereas self-reported poor general health had an independent and moderate effect on LSP. In addition, the presence of alcohol problems was an independent determinant for LSP in men, and present smoking was an independent determinant in women. The results indicate that the effect of support from superior on LSP was mediated through mental distress. An effect of mental health on LSP mediated through poor support from superior was less likely. Similarly, the effect of education on LSP was mediated through mental distress to a considerable degree.

The strengths of this study are a relatively large population-based sample, register-based data on sickness absence, and a longitudinal study design. Studies of psychosocial work characteristics and health that suggest a causal role of working conditions on mental health have been criticized on methodological grounds for an undue reliance on self-reported outcome measures and for not addressing the possibility of information bias. The basic source of dependent error is usually normal variation in certain personality traits, but it may also lie in more transitional moods in the study population or inadequate measurement tools. Register-based rates of physician-certified sickness absence can serve as an objective and even better measure of health status than self-reports, which are often biased. The major precaution that should be taken to eliminate bias from dependent error is the elimination of the bond between exposure and outcome information via gathering of data from two separate sources, as we have done in this study. Data on education level were also objective, as they were from public registers.

An important shortcoming of our outcome variable is that the sickness absence diagnoses do not take undetected mental disorders into account. Thus, our estimates of the occurrence of LSP must be considered possible underestimates. Another important challenge in this follow-up study is that information about working conditions, lifestyle, and health is registered at the same time. It is thus difficult to determine the position of these factors in the causal chain, and it is possible that a reverse causality exists. More than one analytical approach should be used, and this can be facilitated through the use of causal diagrams and structural equation models.

### TABLE 1. The Distribution of Psychiatric Diagnoses (ICPC) in Long-Term Sickness Absence (>8 wk) Among Participants in the Oslo Health Study With Follow-Up in the Period 2001–2005, According to Gender

| Diagnoses (ICPC)                      | Women | %   | Men | %   |
|--------------------------------------|-------|-----|-----|-----|
| Symptom diagnoses                    |       |     |     |     |
| Feeling anxious/nervous/tense (P01)  | 7     | 2.0 | 1   | 0.7 |
| Acute stress reaction (P02)          | 61    | 17.7| 21  | 13.7|
| Feeling depressed (P03)              | 52    | 15.1| 21  | 13.7|
| Other symptom diagnoses             | 22    | 6.4 | 16  | 10.5|
| Total symptom diagnoses             | 142   | 41.3| 59  | 38.6|
| Disease diagnoses                   |       |     |     |     |
| Affective disorders (P73)            | 6     | 1.7 | 1   | 1   |
| Anxiety disorder (P74)              | 12    | 3.5 | 6   | 3.9 |
| Depressive disorder (P76)           | 165   | 48.0| 76  | 49.7|
| Neurasthenia (P78)                  | 8     | 2.3 | 5   | 3.3 |
| Psychosis/obsessive disorders (P72, P79, P98) | 4 | 1.2 | 2 | 1.3 |
| Other disease diagnoses             | 7     | 2.0 | 4   | 2.6 |
| Total disease diagnoses             | 202   | 58.7| 94  | 61.4|
| Total                               | 344   | 100 | 153 | 100 |
### TABLE 2. Five-Year Risk of Long-Term (>8 wk) Sickness Absence Due To Psychiatric Diagnosis (LSP) Among Participants in the Oslo Health Study With Follow-Up in the Period 2001–2005, According to Potential Determinants

|         | Women (N = 4,411) |         | Men (N = 3,922) |
|---------|-------------------|---------|-----------------|
|         | N     | %    | LSP  | %    | N     | %    | LSP  | %    |
| Age (yr)|       |      |      |      |       |      |      |      |
| 30      | 1,768 | 40.1 | 122  | 6.9  | 1,606 | 40.9 | 42   | 2.6  |
| 40      | 1,373 | 31.1 | 118  | 8.6  | 1,212 | 30.9 | 58   | 4.8  |
| 45      | 1,270 | 28.8 | 104  | 8.2  | 1,104 | 28.1 | 53   | 4.8  |
| Education*|       |      |      |      |       |      |      |      |
| 1       | 232   | 5.3  | 22   | 9.5  | 244   | 6.2  | 14   | 5.7  |
| 2       | 762   | 17.3 | 72   | 9.4  | 509   | 13.0 | 26   | 5.1  |
| 3       | 872   | 19.8 | 72   | 8.3  | 961   | 24.5 | 43   | 4.5  |
| 4       | 1,685 | 38.2 | 140  | 8.3  | 1,280 | 32.6 | 37   | 2.9  |
| 5       | 728   | 16.5 | 29   | 4.0  | 805   | 20.5 | 27   | 3.4  |
| Missing | 132   | 3.0  | 9    | 6.8  | 123   | 3.1  | 6    | 4.9  |
| Work-related health problems|       |      |      |      |       |      |      |      |
| No      | 1,323 | 30.0 | 82   | 6.2  | 1,410 | 36.0 | 44   | 3.1  |
| Yes     | 2,483 | 56.3 | 208  | 8.4  | 1,842 | 47.0 | 74   | 4.0  |
| Missing | 605   | 13.7 | 54   | 8.9  | 670   | 17.1 | 35   | 5.2  |
| Support from superior|       |      |      |      |       |      |      |      |
| Good    | 3,222 | 73.0 | 219  | 6.8  | 2,641 | 67.3 | 85   | 3.2  |
| Poor    | 478   | 10.8 | 59   | 12.3 | 516   | 13.2 | 31   | 6.0  |
| Missing | 711   | 16.1 | 66   | 9.3  | 765   | 19.5 | 37   | 4.8  |
| Job security|       |      |      |      |       |      |      |      |
| Good    | 3,171 | 71.9 | 229  | 7.2  | 2,724 | 69.5 | 97   | 3.6  |
| Poor    | 498   | 11.3 | 50   | 10.0 | 420   | 10.7 | 18   | 4.3  |
| Missing | 742   | 16.8 | 65   | 8.8  | 778   | 19.8 | 38   | 4.9  |
| Job control|       |      |      |      |       |      |      |      |
| Good    | 2,621 | 59.4 | 190  | 7.2  | 2,525 | 64.4 | 85   | 3.4  |
| Poor    | 1,142 | 25.9 | 98   | 8.6  | 693   | 17.7 | 32   | 4.6  |
| Missing | 648   | 14.7 | 56   | 8.6  | 704   | 18.0 | 36   | 5.1  |
| General health|       |      |      |      |       |      |      |      |
| Very good| 1,318 | 29.9 | 72   | 5.5  | 1,016 | 25.9 | 24   | 2.4  |
| Good    | 2,483 | 56.3 | 196  | 7.9  | 2,427 | 61.9 | 88   | 3.6  |
| Poor    | 563   | 12.8 | 69   | 12.3 | 450   | 11.5 | 37   | 8.2  |
| Missing | 47    | 1.1  | 7    | 14.9 | 29    | 0.7  | 4    | 13.8 |
| Mental distress|       |      |      |      |       |      |      |      |
| No      | 3,852 | 87.3 | 259  | 6.7  | 3,520 | 89.8 | 111  | 3.2  |
| Yes     | 398   | 9.0  | 73   | 18.3 | 238   | 6.1  | 29   | 12.2 |
| Missing | 161   | 3.6  | 12   | 7.5  | 164   | 4.2  | 13   | 7.9  |
| Smoking cigarettes|       |      |      |      |       |      |      |      |
| Never   | 2,009 | 45.5 | 118  | 5.9  | 1,967 | 50.2 | 65   | 3.3  |
| Yes, before | 1,079 | 24.5 | 83   | 7.7  | 898   | 22.9 | 26   | 2.9  |
| Yes, now | 1,276 | 28.9 | 138  | 10.8 | 1,027 | 26.2 | 60   | 5.8  |
| Missing | 47    | 1.1  | 5    | 10.6 | 30    | 0.8  | 2    | 6.7  |
| Alcohol problem|       |      |      |      |       |      |      |      |
| No      | 3,698 | 83.8 | 278  | 7.5  | 2,952 | 75.3 | 92   | 3.1  |
| Yes     | 117   | 2.7  | 11   | 9.4  | 281   | 7.2  | 24   | 8.5  |
| Missing | 596   | 13.5 | 55   | 9.2  | 689   | 17.6 | 37   | 5.4  |
| Good friends|       |      |      |      |       |      |      |      |
| Yes     | 3,161 | 71.7 | 233  | 7.4  | 2,570 | 65.5 | 80   | 3.1  |
| No      | 597   | 13.5 | 55   | 9.2  | 661   | 16.9 | 36   | 5.4  |
| Missing | 653   | 14.8 | 56   | 8.6  | 691   | 17.6 | 37   | 5.4  |
| Social activities|       |      |      |      |       |      |      |      |
| ≥1–2 times/month | 1,890 | 42.8 | 137  | 7.2  | 1,497 | 38.2 | 47   | 3.1  |
| More seldom | 1,878 | 42.6 | 151  | 8.0  | 1,737 | 44.3 | 70   | 4.0  |
| Missing | 643   | 14.6 | 56   | 8.7  | 688   | 17.5 | 36   | 5.2  |

*Level of education was collapsed into five categories: 1) primary education/lower secondary, 2) upper secondary education, basic, upper secondary, 3) final year/postsecondary, nontertiary education, 4) first stage of tertiary education, undergraduate level, and 5) first stage of tertiary education, graduate level/postgraduate education.*
We made use of path analysis, which permits the determination of the main directions of the arrows. Path analysis introduces the ideas of direct, indirect, and total effects, and a linear additive model yields a simple calculus for these effects. Although there are many methodological studies on the estimation of the effects of mediators, many ignore the technical challenges raised by measurement errors in the proposed mediators and by potential hidden confounders of mediators and outcomes. Statements about mediation are usually not definitive, but they do move us a step closer to better understanding.29

It has been discussed whether there is evidence of reciprocal associations between working conditions and mental health or vice versa. Four hypotheses have been proposed to explain some of the reverse associations: tendencies that could be related to changes in perception (the “gloomy perception” and the “rosy perception”) and changes in the workplace that may differentially affect healthy and unhealthy people (the “drift mechanisms” and the “upward selection mechanisms”).14 The “gloomy perception” refers to situations where individuals with poor mental health reinterpret their work environment negatively and hence perceive their work as less favorable across time. The “rosy perception” refers to healthy workers who feel positive about their work, which makes them reinterpret their jobs in the opposite way, ie, as more favorable and less demanding, over time. According to the environmental hypotheses, ie, the “drift mechanisms” and the “upward selection mechanisms,” unhealthy workers are inclined to end up in less attractive jobs with more unfavorable work characteristics, and healthy workers are likely to be selected for jobs with more challenge and control.14

A spurious association could also arise between work characteristics and current mental disorders. It is possible that negative

| TABLE 3. Hazard Ratios (HR) of Long-Term (>8 wk) Sickness Absence Due To Psychiatric Diagnosis Among Participants in the Oslo Health Study With Follow-Up 2001–2005, According to Potential Determinants (Women) |
|---|---|---|---|---|---|
| Age (yr) | Model A* | Model B† | Model C‡ | Model D§ | Model E∥ |
| | HR | 95% CI | HR | 95% CI | HR | 95% CI | HR | 95% CI | HR | 95% CI |
| 30 | 1.1 Reference | 1.0–1.1 | 1.1 Reference | 1.0–1.1 | 1.1 Reference | 1.0–1.1 | 1.1 Reference | 1.0–1.1 | 1.1 Reference | 1.0–1.1 |
| 40 | 1.1 0.9–1.3 | 1.1 0.9–1.3 | 1.1 0.9–1.3 | 1.1 0.9–1.3 | 1.1 0.9–1.3 |
| 45 | 1.1 0.9–1.3 | 1.1 0.9–1.3 | 1.1 0.9–1.3 | 1.1 0.9–1.3 | 1.1 0.9–1.3 |
| Education¶ | | | | | |
| 1 | 1.4 0.9–2.0 | 1.4 0.9–2.0 | 1.4 0.9–2.0 | 1.4 0.9–2.0 | 1.4 0.9–2.0 |
| 2 | 2.4 1.8–3.2 | 2.4 1.8–3.2 | 2.4 1.8–3.2 | 2.4 1.8–3.2 | 2.4 1.8–3.2 |
| 3 | 2.2 1.6–3.0 | 2.2 1.6–3.0 | 2.2 1.6–3.0 | 2.2 1.6–3.0 | 2.2 1.6–3.0 |
| 4 | 2.1 1.6–3.0 | 2.1 1.6–3.0 | 2.1 1.6–3.0 | 2.1 1.6–3.0 | 2.1 1.6–3.0 |
| 5 | 1 Reference | 1 Reference | 1 Reference | 1 Reference | 1 Reference |
| Support from superior | | | | | |
| Good | 1 Reference | 1 Reference | 1 Reference | 1 Reference | 1 Reference |
| Poor | 1.4 1.1–2.7 | 1.4 1.1–2.7 | 1.4 1.1–2.7 | 1.4 1.1–2.7 | 1.4 1.1–2.7 |
| General health | | | | | |
| Very good | 1 Reference | 1 Reference | 1 Reference | 1 Reference | 1 Reference |
| Good | 1.5 1.1–2.1 | 1.5 1.1–2.1 | 1.5 1.1–2.1 | 1.5 1.1–2.1 | 1.5 1.1–2.1 |
| Poor | 2.3 1.8–3.0 | 2.3 1.8–3.0 | 2.3 1.8–3.0 | 2.3 1.8–3.0 | 2.3 1.8–3.0 |
| Mental distress | | | | | |
| No | 1 Reference | 1 Reference | 1 Reference | 1 Reference | 1 Reference |
| Yes | 2.5 1.9–3.2 | 2.5 1.9–3.2 | 2.5 1.9–3.2 | 2.5 1.9–3.2 | 2.5 1.9–3.2 |
| Smoke cigarettes | | | | | |
| Never | 1 Reference | 1 Reference | 1 Reference | 1 Reference | 1 Reference |
| Yes, before | 1.3 1.0–1.7 | 1.3 1.0–1.7 | 1.3 1.0–1.7 | 1.3 1.0–1.7 | 1.3 1.0–1.7 |
| Yes, now | 1.7 1.3–2.3 | 1.7 1.3–2.3 | 1.7 1.3–2.3 | 1.7 1.3–2.3 | 1.7 1.3–2.3 |
| Alcohol problem | | | | | |
| No | 1 Reference | 1 Reference | 1 Reference | 1 Reference | 1 Reference |
| Yes | 1.3 0.9–1.9 | 1.3 0.9–1.9 | 1.3 0.9–1.9 | 1.3 0.9–1.9 | 1.3 0.9–1.9 |
| Missing | 1.2 0.8–1.9 | 1.2 0.8–1.9 | 1.2 0.8–1.9 | 1.2 0.8–1.9 | 1.2 0.8–1.9 |

*Crude analysis.
†Adjusted for age and education.
‡Adjusted for age, education, work-related health, and work-related factors.
§Adjusted for age, education, work-related factors, and self-reported general and mental health.
∥Adjusted for all including lifestyle and social affiliation.

Level of education was collapsed into five categories: 1) primary education/lower secondary, 2) upper secondary education, basic, upper secondary, 3) final year/postsecondary, nontertiary education, 4) first stage of tertiary education, undergraduate level, and 5) first stage of tertiary education, graduate level/postgraduate education.
selective factors related to mental distress operate on working conditions over the life course. Poor mental health during childhood may compromise educational achievement and lead to jobs associated with unfavorable work characteristics.16 Incomplete adjustment for these influences may explain some of the variability in the estimated associations between work characteristics and common mental disorders.13

TABLE 4. Hazard Ratios (HR) of Long-Term (>8 wk) Sickness Absence Due To Psychiatric Diagnosis Among Participants in the Oslo Health Study With Follow-Up 2001–2005, According to Potential Determinants (Men)

| Potential Determinant | Model A* | Model B† | Model C‡ | Model D§ | Model E‖ |
|-----------------------|----------|----------|----------|----------|----------|
| Age (yr)              | HR 95% CI| HR 95% CI| HR 95% CI| HR 95% CI| HR 95% CI|
| 30                    | 1 Reference | 1 Reference | 1 Reference | 1 Reference | 1 Reference |
| 40                    | 1.8 1.2–2.7 | 1.7 1.2–2.6 | 1.7 1.2–2.6 | 1.6 1.1–2.4 | 1.7 1.1–2.5 |
| 45                    | 1.9 1.2–2.8 | 1.7 1.2–2.6 | 1.8 1.2–2.7 | 1.6 1.1–2.5 | 1.7 1.1–2.6 |
| Education¶            | 1.7 0.9–3.3 | 1.5 0.8–2.9 | 1.3 0.7–2.6 | 1.1 0.6–2.2 | 1.0 0.5–2.0 |
| 2                     | 1.5 0.9–2.6 | 1.4 0.8–2.3 | 1.2 0.7–2.1 | 1.0 0.6–1.7 | 0.9 0.5–1.6 |
| 3                     | 1.3 0.8–2.2 | 1.3 0.8–2.1 | 1.2 0.7–1.9 | 1.0 0.6–1.7 | 1.0 0.6–1.6 |
| 4                     | 0.9 0.5–1.4 | 0.9 0.5–1.4 | 0.8 0.5–1.4 | 0.8 0.5–1.2 | 0.7 0.4–1.2 |
| 5                     | 1 Reference | 1 Reference | 1 Reference | 1 Reference | 1 Reference |
| Missing               | 1.6 0.6–3.8 | 1.6 0.7–3.8 | 1.4 0.6–3.4 | 1.1 0.4–2.6 | 1.0 0.4–2.4 |
| Support from superior | 1 Reference | 1 Reference | 1 Reference | 1 Reference | 1 Reference |
| Good                  | 1.9 1.3–2.9 | 1.8 1.2–2.7 | 1.7 1.1–2.6 | 1.6 1.0–2.4 | 1.6 1.0–2.4 |
| Poor                  | 1.5 1.0–2.2 | 1.4 1.0–2.1 | 0.6 0.1–3.0 | 0.5 0.1–2.5 | 0.5 0.1–2.5 |
| Missing               | 1.6 0.6–3.8 | 1.6 0.7–3.8 | 1.4 0.6–3.4 | 1.1 0.4–2.6 | 1.0 0.4–2.4 |
| General health        | 1 Reference | 1 Reference | 1 Reference | 1 Reference | 1 Reference |
| Very good             | 1.5 1.0–2.4 | 1.5 0.9–2.3 | 1.4 0.9–2.3 | 1.4 0.9–2.1 | 1.2 0.8–2.0 |
| Good                  | 3.6 2.2–6.1 | 3.1 1.8–5.3 | 2.9 1.7–5.0 | 2.1 1.2–3.7 | 1.8 1.0–3.2 |
| Poor                  | 6.2 2.2–17.9 | 5.4 1.9–15.6 | 5.3 1.8–15.3 | 3.9 1.3–11.8 | 3.9 1.3–11.9 |
| Mental distress       | 1 Reference | 1 Reference | 1 Reference | 1 Reference | 1 Reference |
| No                    | 4.1 2.7–6.2 | 3.9 2.6–5.9 | 3.6 2.4–5.6 | 3.0 1.9–4.7 | 2.7 1.7–4.3 |
| Yes                   | 2.5 1.4–4.5 | 2.2 1.2–4.0 | 2.1 1.2–3.8 | 1.7 0.9–3.2 | 1.7 0.9–3.3 |
| Smoke cigarettes      | 1 Reference | 1 Reference | 1 Reference | 1 Reference | 1 Reference |
| Never                 | 0.9 0.6–1.4 | 0.8 0.5–1.2 | 0.8 0.5–1.3 | 0.7 0.5–1.2 | 0.7 0.4–1.1 |
| Yes, before           | 1.8 1.3–2.5 | 1.5 1.1–2.2 | 1.5 1.0–2.2 | 1.4 0.9–2.0 | 1.3 0.9–1.9 |
| Yes, now              | 2.0 0.5–8.3 | 1.7 0.4–7.0 | 1.6 0.4–6.5 | 1.1 0.2–4.6 | 1.1 0.3–4.8 |
| Alcohol problem       | 1 Reference | 1 Reference | 1 Reference | 1 Reference | 1 Reference |
| No                    | 2.8 1.8–4.4 | 2.8 1.8–4.4 | 2.8 1.8–4.4 | 2.4 1.5–3.8 | 2.3 1.4–3.7 |
| Yes                   | 1.8 1.2–2.6 | 1.7 1.1–2.5 | 2.6 0.8–9.0 | 2.6 0.7–9.1 | 2.2 0.6–8.5 |

*Crude analysis.
†Adjusted for age and education.
‡Adjusted for age, education, work-related health, and work-related factors.
§Adjusted for age, education, work-related factors, and self-reported general and mental health.
‖Adjusted for all including lifestyle and social affiliation.
¶Level of education was collapsed into five categories: 1) primary education/lower secondary, 2) upper secondary education, basic, upper secondary, 3) final year/postsecondary, nontertiary education, 4) first stage of tertiary education, undergraduate level, and 5) first stage of tertiary education, graduate level/postgraduate education.

FIGURE 2. Causal diagram showing possible determinants leading to long-term (>8 weeks) sickness absence due to psychiatric diagnosis (LSP).
Most studies on sickness absence with mental illness have shown a higher incidence of anxiety and depressive disorders in women than in men, which is in line with our findings. Abuse disorders are more than twice as common in men compared with women,35 which is also in agreement with our findings on self-reported alcohol problems. Epidemiological studies and studies of treatment-seeking patients indicate gender differences, with women more likely to meet criteria for anxiety, depression, eating disorders, and borderline personality disorder; on the other hand, men are more likely to meet criteria for antisocial personality disorder.39 Heavy drinkers have also been found to have substantially higher rates of sickness absence,39 and this is in accordance with our findings. Current smoking in women was also independently associated with LSP. Others have found associations between smoking and depression.40 As smoking is known to be more prevalent in individuals with lower SEP, it is likely that smoking mediates the inverse associations of SEP with LSP to some extent.41

Overall, the effect of education on LSP was somewhat weaker than expected. The reasons for this are not clear. A contributing factor may be that ~20% of the study population was born abroad, and a substantial proportion of these subjects might have been educated in foreign countries. The Education Register in Statistics Norway is less reliable for education undertaken abroad. Thus, some of the people classified as having a low level of education may in reality have a somewhat higher level of education.

Our study shows that the age cohorts of 40 and 45 years had the highest LSP risk. A recent Norwegian study42 using comprehensive register data (covering 1.78 million individuals) found that, with all other variables being equal, 30-year-old employees have a 10% higher entry rate to sickness absence due to mental diseases than 45-year-old employees. However, this was not restricted to long-term absence, which might explain why the age profile differed from ours. Diagnostic misclassification should also be considered in the interpretation of psychiatric sickness absence.

CONCLUSIONS

This study aimed at increasing our understanding of the underlying causes of LSP. Our data indicate that work environment can make people mentally distressed rather than that poor mental health leads to selection into jobs with poor work environment. Sickness absence due to psychiatric diagnoses is a public health problem with serious consequences for the individual. Improving working conditions, such as social support, may be an important step toward reducing the burden of sickness absence due to mental conditions. There is a need for more and better research on the mediating pathways between working conditions and mental illness. A broad approach that focuses on individuals as well as work-related factors is necessary for preventing sickness absence and disability pensioning and reducing the large social inequalities in health. We propose that future research should include the development of measures designed for studying workplace exposure according to the traditional axes of demand-control across different countries. This could provide a more systematic overview of knowledge that can be applied to prevention.

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The results from the path analysis indicate that the model shown in Figure 2 fits our data best. It is more likely that the effect of support from superior on LSP is mediated through mental distress than that the effect of mental health on LSP is mediated through support from superior. In other words, our results indicate that work environment can make people mentally distressed rather than that poor mental health may lead to selection into jobs with poor work environment (unhealthy worker effect or the drift mechanisms). Mental distress may also be associated with more negative perceptions of the social environment in the workplace (the gloomy perception).14,16 Our model does not support such mechanisms.

It must be stressed that the results are model-dependent and hence sensitive to the factors being analyzed.30 The questions in the HUBRO do not allow analyses according to the traditional axes of demand-control and effort-reward imbalance.31,32 A meta-analysis of longitudinal studies between 1994 and 200513 found strong associations between job strain and mental distress. However, mental distress was modestly linked to low social support at work, high psychological job demands, low decision authority, and low decision latitude. In our study, job insecurity and low job control had a modest effect in the crude analysis, and this influence was extensively diminished in the adjusted model. However, because people change jobs, particularly individuals who are not satisfied with their work, the study participants’ work environment might have changed during the 5 years of follow-up and thus diluted the effects. Finding new employment can result in higher levels of job control for both healthy and unhealthy workers. Working life might also be more dynamic than most work-stress models convey.14 The inconsistencies in findings of studies using the demand-control model may be partly due to differences in definitions and measuring of demand-control and mental health, which often differs from the original structure outlined by Karasek.14,33

There may be several other mediators, confounders, and effect modifiers in addition to those outlined in Figure 1. Some mediators, including other personal characteristics such as coping behavior, may exist on the pathway from mental health to LSP. Cole et al14 found that the impact of a composite work stressor measure for psychological distress could be almost entirely explained by mediation through self-esteem and mastery. A previous study investigated mastering in relation to disability pensions using HUBRO data. The study found that subjects with poor mastering had an age, gender, and health-adjusted odds ratio of 2.4 compared with those with the highest level of mastering.35

The low attendance rate (46%) in HUBRO may have led to self-selection of healthy subjects into the study. Predictors of attendance and the magnitude and direction of the nonresponse bias in prevalence estimates and association measures have been investigated based on information from all 40,888 invitees to the Oslo Health Study.26 Potential attribution bias was studied by linking register-based Statistics Norway data of demographics, lifestyle, and social security benefits to the whole study population. Unhealthy people were found to have lower attendance than healthy individuals, but social inequalities in health defined by different sociodemographic variables seemed unbiased.36 In addition, the response rate to the supplementary questionnaires with questions on working conditions was lower in subgroups with poorer health.37 Because poor health is often associated with poor work environment, this finding may imply lower responses among subjects with poor work environment. The estimation of the effect of working conditions on LSP may thus be conservative.

LSP risk was predicted by self-reported poor general and mental health. Self-reported health was previously found to be a strong predictor of sickness absence,26 and this was also the case in our study.

Most studies on sickness absence with mental illness have shown a higher incidence of anxiety and depressive disorders in women than in men, which is in line with our findings. Abuse disorders are more than twice as common in men compared with women,35 which is also in agreement with our findings on self-reported alcohol problems. Epidemiological studies and studies of treatment-seeking patients indicate gender differences, with women more likely to meet criteria for anxiety, depression, eating disorders, and borderline personality disorder; on the other hand, men are more likely to meet criteria for antisocial personality disorder.39 Heavy drinkers have also been found to have substantially higher rates of sickness absence,39 and this is in accordance with our findings. Current smoking in women was also independently associated with LSP. Others have found associations between smoking and depression.40 As smoking is known to be more prevalent in individuals with lower SEP, it is likely that smoking mediates the inverse associations of SEP with LSP to some extent.41

Overall, the effect of education on LSP was somewhat weaker than expected. The reasons for this are not clear. A contributing factor may be that ~20% of the study population was born abroad, and a substantial proportion of these subjects might have been educated in foreign countries. The Education Register in Statistics Norway is less reliable for education undertaken abroad. Thus, some of the people classified as having a low level of education may in reality have a somewhat higher level of education.

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