Threats of dismissal and symptoms of major depression: a study using repeat measures in the Swedish working population

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ABSTRACT

Background Job insecurity is considered a profound work stressor. While previous research has indicated that job insecurity represents a substantial mental health burden, few studies have examined its relationship with symptoms of major depression. The aim of this study was to assess whether episodic and repeated self-reported threats of dismissal increase the risk of subsequent symptoms of major depression and whether symptoms of major depression are related to subsequent experience of threats of dismissal.

Methods The study is based on the Swedish Longitudinal Occupational Survey of Health (SLOSH) study, a cohort study with multiple repeated measurements. The sample consisted of 6275 participants who were in regular paid employment and who provided data in 2008, 2010 and 2012. Severity of depression was assessed with a brief Symptom Checklist scale and categorised according to symptoms of major depression or not.

Results Results based on generalised estimating equations logit models showed that prior threats of dismissal predicted symptoms of major depression OR 1.37; 95% CI 1.04 to 1.81) after adjustment for prior depression and major confounders. Especially related threats increased the risk of major depression symptoms (OR 1.74 CI 1.09 to 2.78). Major depression symptoms also increased the odds of subsequent threats of dismissal (OR 1.52, CI 1.17 to 1.98).

Conclusions These findings support a prospective association between threats of dismissal and symptoms of major depression, in particular repeated exposure to threats of dismissal. The results also indicate that threats of dismissal are more likely to be reported by workers with symptoms of major depression.

INTRODUCTION

Job insecurity is a common feature of today's labour market. A study from 2005 showed that around 14–16% of the European workforce risked losing their job within the next 6 months.[1] Job insecurity has been associated with several indicators of poor mental and physical health, although self-reported mental ill health and physical indicators are the outcomes most commonly investigated.[2–4] Data on associations with clinical outcomes and mortality have until recently been sparse.[2]

Mental health in particular may be affected by job insecurity.[3] In Europe, the fraction of mental disorders attributable to job insecurity has been estimated to be 4.5%, indicating a substantial disease burden.[5] Accumulating evidence also links job insecurity to depressive disorders based on clinical criteria.[6–9] The majority of the studies have, however, used cross-sectional methodology. This means that evidence remains limited with respect to the role of pre-existing health problems, the long-term health effects of job insecurity and the effects of prolonged or repeated exposure.[3] The few studies that have addressed changes in job insecurity, or repeated exposure to threats of losing one's job have shown long-term changes in job insecurity to generally be accompanied by changes in strain variables including depressive symptoms, psychosomatic complaints, irritation and worrying.[10] Other studies have suggested that repeated or prolonged exposure to job insecurity is a risk factor for subsequent deterioration in health and/or depressive symptoms.[11–13] However, none of these studies have focused on the more severe mental health problems, such as depression, that can give rise to substantial individual suffering and disability, with obvious consequences for work ability, labour force participation and workplace productivity and, thereby, considerable societal costs.[14]

The main aim of the present study was to assess if episodic and especially repeated job insecurity is a risk factor for subsequent clinically meaningful symptoms of major depression. To increase the understanding of causality and the interrelationship between threats of dismissal and symptoms of depression over time, we also assessed if symptoms of major depression increased subsequent experience of threats of dismissal.

METHODS

Study sample

The study sample was derived from the Swedish Longitudinal Occupational Survey of Health (SLOSH) study, a nationally representative longitudinal cohort survey started in 2006. People recruited into SLOSH were originally contacted by telephone by Statistics Sweden through the Labor Force Survey (LFS), which is conducted biennially, and drawn from the entire Swedish population after stratification for county, citizenship and inferred employment status. A subsample from the LFS is then sent supplementary questionnaires, as part of the Swedish Work Environment Survey (SWES), if they were gainfully employed and 16–64 years of age. In 2006, all eligible SWES participants from 2003 (n=9214) were asked to respond to more detailed self-completion questionnaires, one addressed to those in gainful employment (at

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least 30% of full time) and one to people working less or who had temporarily or permanently left the labour force.[15 16] The number of respondents to the 2006 questionnaire was 5985 (65%). The second, third and fourth follow-ups, which also included participants from SWES 2005 (n=9703), were conducted in 2008 (11 441), 2010 (10 078) and 2012 (9880), respectively, with total response proportions ranging from 57% to 61%. This study is based on the 7398 participants who were originally recruited from SWES 2003 or 2005 and who participated in 2008, 2010 and 2012, see figure 1. To maximise the number of study participants, 2008 was used as the baseline, and to ensure that data on threats of dismissal were available from this time point, only people in gainful employment in 2008 were included. The self-employed and farmers in 2008, or subsequent waves, were also excluded, resulting in a study sample of 6275 individuals. The majority of these individuals worked 30% or more at all waves, but a group of 1939 individuals worked less than 30% or not at all in 2010 or 2012. Compared to non-responders and those excluded, the study sample included a higher proportion of women (57% vs 43%) and university educated (46% vs 39%) and had a slightly higher mean age in 2008 (50 compared to 48 years).

The study was approved by the Regional Research Ethics Board in Stockholm and all procedures were in accordance with the 1964 Helsinki declaration and its later amendments.

Main measures

Participants at each wave were asked to rate if they felt under threat of temporary or permanent dismissal (yes or no). The participants were also divided into four groups indicating whether participants felt threatened at two consecutive time points or not (2008 and 2010 or 2010 and 2012): (1) those with no threats of dismissal at either of the time points (reference group), (2) those with threats of dismissal only at the former of the two time points (distal episodic threat); (3) those with threats of dismissal only at the latter of the two time points (proximal episodic threat) and (4) those with threats of dismissal at both time points (repeated threat). Symptoms of major depression were measured with a brief subscale from the (Hopkins) Symptom Checklist (SCL-90), the SCL-CD_6. The SCL-CD_6 assesses 1-week prevalence, quantified on a five-category scale from 0=Not at all to 4=Extremely, of being troubled by: Feeling blue; Feeling no interest in things; Feeling lethargic or low in energy; Worrying too much about things; Blaming yourself for things; and Feeling everything is an effort. The six items were primarily selected based on clinical validity.[17] The items were first added to give a total score indicating depression severity. A validation study has shown the SCL-CD_6 scale to have better psychometric properties than the entire SCL depression scale and the centre for Epidemiological Studies Depression Scale as a measure of depression severity. A score of ≥17 on the 0–24 scale was used to indicate major depression as this has been found to be the best cut-off point for epidemiological research when high specificity is more important than high sensitivity.[17]

Data analyses

We first analysed the prevalence of threats of dismissal at different measurement occasions. Next, the data were analysed using generalised estimating equations (GEE), a method for longitudinal data that simultaneously analyses variables at different time points. Dependency between multiple observations from the same participant is adjusted for efficiently by assuming a certain correlation structure. However, since the resulting regression coefficient cannot directly be interpreted as an estimate of the longitudinal relationship between different variables, we fitted standard as well as alternative models. While the standard GEE can be considered as a pooled analysis of cross-sectional (between-participant) and longitudinal (within participant) relationship, *autoregressive* GEE analysis was chosen to specifically assess the longitudinal relationship.[18] The autoregressive GEE alternatively regress the dependent variable on the independent variable at the previous time point as well as the dependent variable at the previous time point and were thus based on a fewer number of observations. We first analysed all threats. Episodic and repeated threats were additionally studied separately taking into account threats during two consecutive time points. In the autoregressive GEE models of episodic/repeated threats, the analyses were then ultimately restricted to data on threats of dismissal from 2008 to 2010. The corresponding dependent variable was restricted to symptoms of major depression from 2012 although the models adjusted for prior symptoms. More details regarding the data structure and the models are presented in online supplementary figure S1. For the standard models, the autoregressive correlation structure was found to fit the data best. The independent correlation structure was, on the other hand, used to correct for within-subject correlations in the autoregressive models.[18] In another set of analyses, we investigated if there was an indication of reverse causality by fitting models with major depression as the independent variable and threats of dismissal at a later follow-up as the dependent variable. Factors such as age, sex, family responsibility, partner support, socioeconomic status and labour market attachment have been found to be antecedents of job insecurity[3 19] and may be associated with depression.[20] We thus considered age, sex, marital status, children at home, education, income and full-time or part-time work as potential confounders (table 1). Of these, age, sex, marital status and having children at home were used in the adjusted models as they were associated with both threats of dismissal and major depressive symptoms. We further explored if lifestyle factors such as smoking (yes, no/previously), exercise (never, very little, now and then, regularly) and excessive alcohol consumption (measured with alcohol use disorders identification test[21] 2006–2008 and Cut-Annoyed-Guilty-Eye Questionnaire 2010–2012)[22] influenced the relationship. These behaviours may be associated with job stressors and depression.[23 24] All variables, except sex and age, were used as time-varying covariates. The analyses were conducted in STATA V.12[25] using robust variance-covariance estimates.

The standard GEE models assume that missing observations are missing completely at random (MCAR).[26] However, if missingness is either missing at random (MAR) or missing not at random, that is, non-response in the outcome at a particular time point depends on the observed value at the previous time point, or an unobserved value at the same time point, the estimates from the GEE models may be biased. In a sensitivity analysis, we thus considered if dropout in depressive symptoms was related to symptoms of major depression at earlier time points, by testing whether the GEE models were more plausible under MAR assumptions using a weighting technique developed by Robins *et al*.[27]

RESULTS

Threats of dismissal was reported by around 12–14% of the population. This varied somewhat at the different time points, as presented in figure 2. A higher percentage of the study population reported that they faced threats of dismissal in 2010.

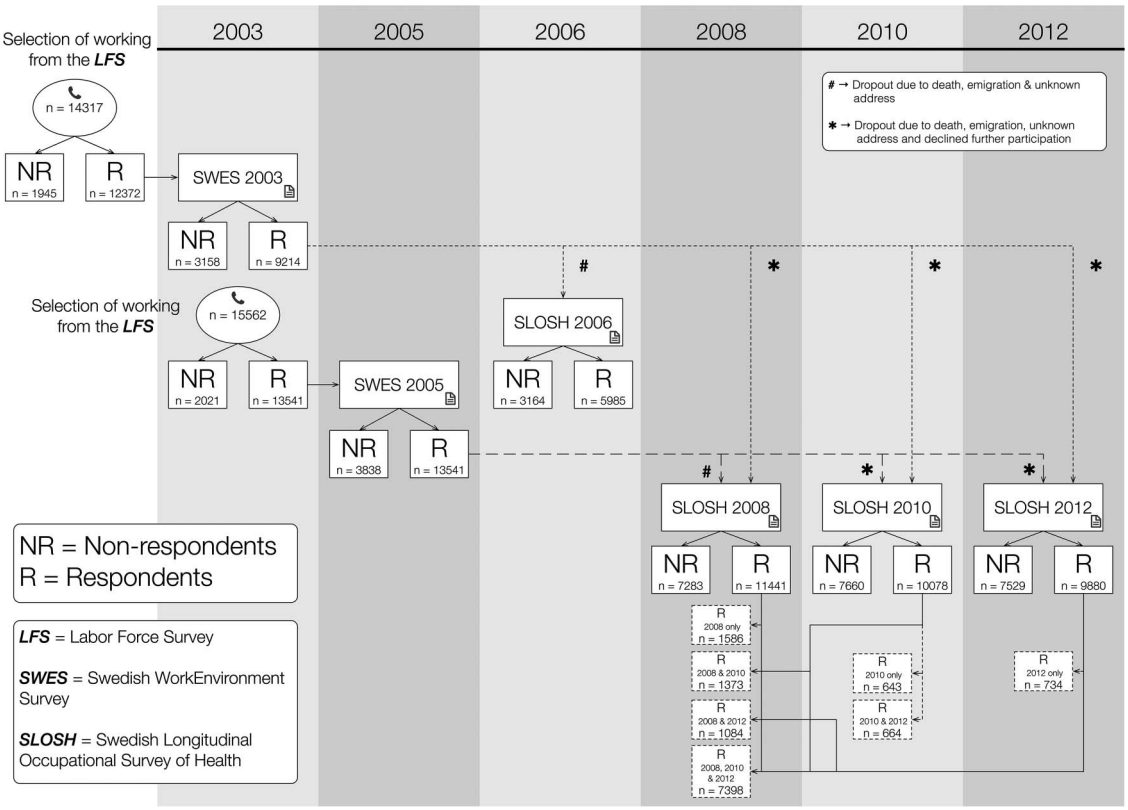

Figure 1 Illustration of the Swedish Longitudinal Occupational Survey of Health data collection concerning people originating from the Swedish Work Environment Surveys of 2003 and 2005, and how many of these responded to the 2008, 2010 and 2012 surveys.

In 2010, 55% of those facing a threats of dismissal and with available data from the previous data collection reported an episodic threat, whereas 37% reported repeated a threat. In 2012, these figures were 50% and 42%, respectively.

The frequency of threats of dismissal according to certain demographic characteristics and other potential confounders, derived from the 2008 questionnaire, is presented in table 1.

Prevalence of symptoms of major depression also varied slightly between the measurement occasions: 4.4% in 2008, 4.3% in 2010 and 3.2% in 2012. The group experiencing a threats of dismissal contained a much higher proportion of individuals with symptoms of major depression than the group reporting no threats of dismissal (figure 3).

Table 2 presents the results of the GEE models. The standard GEE model provided evidence of an association between risk of dismissal and symptoms of major depression, unadjusted OR 1.86 (CI 1.50 to 2.33). Adjustment for confounders (sex, age, marital status and children at home) gave a corresponding OR of 1.90 (CI 1.53 to 2.38).

The autoregressive GEE models, which were fitted to examine if a threats of dismissal (whether repeated or episodic) increased the risk of subsequent symptoms of major depression, provided an OR of 1.40 (CI 1.07 to 1.83), adjusted only for previous symptoms of major depression and time. Additional adjustments for sex, age, marital status and children at home had little effect on the risk estimate; 1.37 (CI 1.04 to 1.81). Adding lifestyle factors, exercise and smoking, attenuated the risk estimate to 1.30 (CI 0.98 to 1.74).

Results from the analyses focusing on episodic or repeated threats are also presented in table 2. The standard GEE model indicated no clear risk of major depression attributable to a distal repeated threats of dismissal, whereas a proximal episodic threat as well as repeated threats appeared to increase the risk. The autoregressive models, however, showed that the odds of subsequent symptoms of major depression for people who had experienced a proximal episodic threats of dismissal, that is, reported being under threat only at the latter of the two prior time points, were not significantly higher than those for people not under threats of dismissal at any of the two previous time points. The results, on the other hand, pointed towards a slightly higher, and statistically significant, increased risk for people who had experienced repeated threats, that is, threats of dismissal on two consecutive occasions in previous waves (OR 1.67, CI 1.05 to 2.64). In the adjusted model, the corresponding OR was 1.74 (CI 1.09 to 2.78), which was reduced to 1.67 (CI 1.04 to 2.68) when adding lifestyle factors.

The autoregressive models were alternatively adjusted for prior level of depression symptoms (instead of major depression symptoms only). These analyses also showed a tendency to increased risk estimates, especially for repeated threats (OR 1.41; CI 0.88 to 2.26).

Sensitivity analyses to check the plausibility of assumptions of MCAR in the GEE models indicated that dropout at one time point was not dependent on prior symptoms of major depression ($p=0.388$). This indicates that dropout is ignorable and the estimates can be regarded as unbiased by this type of dropout. However, we also fitted some weighted GEE models where the weights were the inverse of the probability of dropout. The adjusted weighted models showed slightly higher risk estimates (see online supplementary table S1).

Results of the analyses conducted to examine reverse causation provided evidence supportive of an association between

Table 1 Frequency and percentage reporting threats of dismissal, by demographic characteristics and potential confounders measured 2008

	No threats of dismissal		Episodic or repeated threats of dismissal		
	n/mean	%/SD	n/mean	%/SD	Test of difference (p value)
Age group					
20–29	161	77.0	48	23.0	
30–39	726	85.4	124	14.6	
40–49	1384	87.8	193	12.2	
50–59	1656	85.3	286	14.7	
60–69	1073	93.5	75	6.5	<0.001
Sex					
Men	2147	85.5	363	14.4	
Women	1222	88.7	363	11.3	<0.001
Civil status					
Single	990	84.5	182	15.5	
Married/cohabiting	3970	88.1	535	11.9	<0.01
Children at home					
No	2258	86.5	352	13.5	
Yes	2692	87.8	373	12.2	0.14
Education					
<10 years	453	87.4	65	12.6	
Upper secondary school	2193	87.1	324	12.9	
University	2352	87.5	337	12.5	0.93
Yearly income (Swedish Crowns)	315 000	2.1	313 000	5.3	0.37
Contractual work hours					
Full time	3816	86.8	579	13.2	
Part time	1097	88.8	138	11.2	0.06

symptoms of major depression and subsequent threats of dismissal in the standard GEE analysis (OR 1.50, CI 1.13 to 1.99) adjusted for sex, age, marital status and children at home (data not shown). Results from the autoregressive GEE analysis were almost identical (OR 1.52, CI 1.17 to 1.98).

DISCUSSION

This study, using data from multiple repeated measurements of threats of dismissal and symptoms of major depression over a 6-year period, provides strong evidence in support of an association between job insecurity and depression. Specifically, the results suggest that threats of dismissal is a risk factor for symptoms of major depression about 2 years later, and that repeated exposure may further increase the risk.

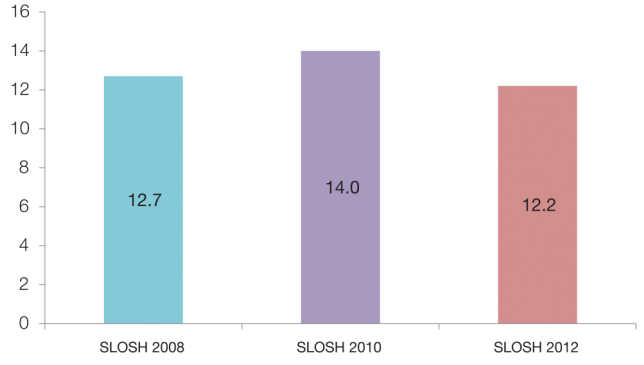

Figure 2 Percentage of the study sample reporting a threats of dismissal.

This study adds to the literature on the consequences of job insecurity by focusing on symptom levels that can be anticipated to have clinical relevance. While some previous results supported a link between job insecurity and clinical depression, most of these studies have been cross-sectional. One recent cross-sectional study showed an association between job insecurity and major depression disorder, categorised according to a standard diagnostic interview, especially among women.[9] Studies by Blackmore *et al*[6] and Wang *et al*[7] also support a cross-sectional association with depressive disorders among men. Wang *et al*[8] found evidence of a prospective association between job insecurity and major depressive disorder 1-year later, which was similar to the findings in this study. However, the results of this study extend those of Wang *et al* by showing that the association is stronger among individuals who have experienced repeated exposure to the threats of dismissal. Although the outcome variable in our study was not derived from a standard diagnostic instrument, our findings suggest an increased risk of clinically relevant depressive symptoms among workers exposed to threats of dismissal.

According to Twisk, it is advisable to base conclusions on the results from several models as exemplified in this study.[28] However, since temporal precedence is an important criterion for causality, we were mainly interested in results from the autoregressive GEE models rather than the standard GEE models. The autoregressive GEE models allowed us to examine if the preceding exposure to threats of dismissal predicted symptoms of major depression while taking account of prior symptoms of major depression and thus reduced the likelihood that our findings can be explained by health selection. These results provide evidence of an increased future risk of symptoms of major depression, especially for those who reported repeated threats

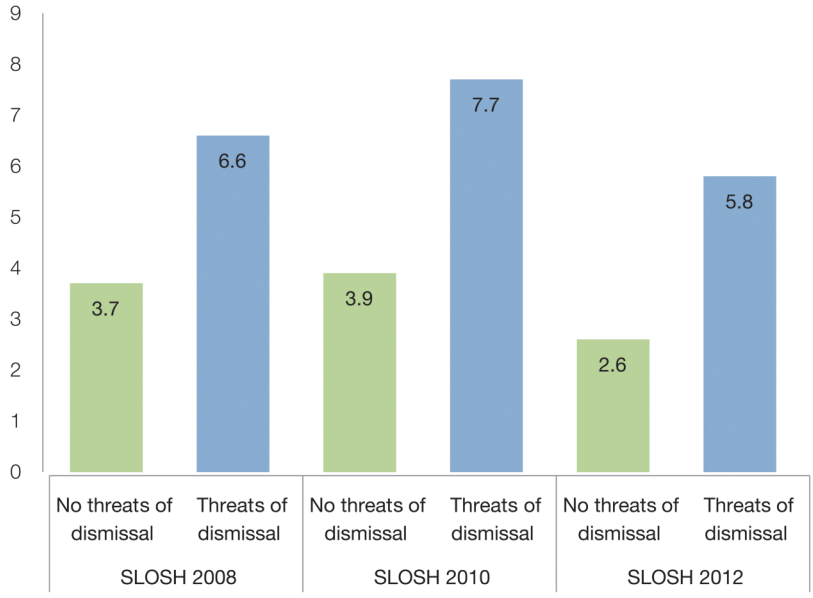

Figure 3 Percentage of the study sample reporting symptoms of major depression by threats of dismissal.

of dismissal. Adjustment for depression score as a continuous variable attenuated the association; however, this adjustment may result in underestimation of the association as previous depressive symptoms may lie on the pathway from job insecurity to major depression.

While our results support an effect of job insecurity on subsequent depression, findings from additional analyses indicated that reverse causality could be an issue in that symptoms of major depression were associated with subsequent self-reports of threats of dismissal. This suggests that depressive symptoms may indeed influence how a person perceives his/her threats of dismissal. Few previous studies have examined reverse causality between job insecurity and mental health outcomes. Hellgren and Sverke[29] found a relatively strong path from job insecurity to mental health complaints 1 year later but not the reverse. Ibrahim *et al*,[30] on the other hand, found a reverse relationship between distress and job insecurity 2 years later, but not specifically between depression and job insecurity. Further research is needed before definite conclusions about reverse causality or reciprocal relationships can be drawn, but caution is warranted when interpreting findings, particularly from cross-sectional studies.

This study has a number of advantages including the longitudinal nature of the data, which allowed us to focus on temporality and repeated threats of dismissal. We controlled not only for prior levels of depression but also for demographic and lifestyle factors in our study. Despite this, we cannot rule out that other unmeasured confounding factors, such as personality characteristics, may have contributed to the associations observed in this study as the data are derived solely from self-reports. However, given that previous research has found that the effects of job insecurity on outcomes tend to remain relatively unaffected by dispositional variables,[31] we believe that personality characteristics are not likely to have affected our estimates greatly. A number of potential explanatory factors, such as socioeconomic status, income and health behaviors,[32 33] were also tested and did not completely explain the relationship. However, it is possible that changes in psychosocial working conditions during a period of insecurity at the workplace could influence the risk of major depression.[32] Future studies specifically designed to examine if other psychosocial work characteristics fully or partially explain the association between job insecurity and depression are warranted.

Another advantage of the study is that the sample is drawn from the entire Swedish working population. This provided us with a relatively large sample covering a wide range of occupations and sectors, in contrast to many other studies in the field.[2] However, those remaining in the study were found to differ

Table 2 Results of the generalised estimating equations (GEE) analyses of the association between threats of dismissal and major depression, presented as OR with 95% CI

	Episodic or repeated threats of dismissal		Distal episodic threat of dismissal		Proximal episodic threats of dismissal		Repeated threats of dismissal	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Standard GEE								
Model 1*	1.87	1.50 to 2.33	1.30	0.92 to 1.84	2.02	1.47 to 2.76	2.23	1.53 to 3.24
Model 2†	1.91	1.53 to 2.38	1.28	0.89 to 1.83	2.05	1.49 to 2.83	2.30	1.58 to 3.37
Autoregressive GEE								
Model 1‡	1.40	1.07 to 1.83	1.10	0.67 to 1.80	1.51	0.96 to 2.36	1.67	1.05 to 2.64
Model 2§	1.37	1.04 to 1.81	1.08	0.66 to 1.78	1.48	0.95 to 2.32	1.74	1.09 to 2.78

*Adjusting for time.
†Adjusting for time, as well as sex, age, civil status and children at home.
‡Adjusting for prior major depression category and time.
§Adjusting for prior major depression category and time, as well as sex, age, civil status and children at home.

from non-responders at earlier stages of the data collection, for instance at the educational level. There may have been differential dropout among those exposed to job insecurity. Similarly, there may have been differential dropout among those with severe mental health problems. While this may have contributed to a self-selection and somewhat biased estimates of association, any such selection is likely to have contributed to an underestimation rather than overestimation of the job insecurity–depression relationship. Our sensitivity analysis of dropout also indicated that the main results slightly underestimated the relationship.

We thus conclude that the findings not only support a prospective association between threats of dismissal and symptoms of major depression but also that depression relates to subsequent experience of threats of dismissal.

What is already known on this subject

- Job insecurity has been associated with poorer mental health.
- Repeated exposure may further increase the risk.
- However, it is not established whether episodic or repeated job insecurity is causally related to clinically significant depression.

What this study adds

- This study supports a causal relationship between job insecurity and depression.
- The results show that job insecurity is associated with high subsequent depressive symptoms (evidence of temporality), and suggests that repeated job insecurity increases the risk further (evidence of a "dose-response" relationship).
- More attention should be devoted to identifying factors that can alleviate or prevent negative health effects of job insecurity.

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Contributors LLMH, HSC and MS designed the study. LLMH and HSC analysed the data. LLMH wrote the first version. All authors revised it critically and interpreted the data and they have also seen and approved the final version.

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