Negative socioeconomic changes and mental disorders: a longitudinal study

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ABSTRACT

Background There is increasing interest on whether the current global economic uncertainties have an influence on the population's mental health. In this paper, we examined the association of negative socioeconomic changes, job loss and household income reductions with incident mental disorders. The moderating effect of gender was assessed.

Methods Data come from the Netherlands Mental Health Survey and Incidence Study-2 (NEMESIS-2), a representative population-based, longitudinal study. Individuals with a paid job and without a 12-month mental disorder at baseline were selected and reassessed 3 years later (2007–2009/2010–2012). Substantial household income reductions and not being at a paid job anymore were self-reported at follow-up. Multivariate logistic models were utilised to investigate the association between these negative socioeconomic changes and the incidence of mood, anxiety and substance use Diagnostic and Statistical Manual-IV disorders assessed by the Composite International Diagnostic Interview 3.0.

Results After 3 years, 6% had lost their job, 11% had a substantial household income reduction and 12.2% had developed a mental disorder. Household income reductions increased the risk of any mental disorder (aOR=1.77), particularly the risk of mood (aOR=2.24). Job loss increased the risk of mood disorders (aOR=2.02). Gender modified the relationship: job loss increased the risk of any mental disorder among men (aOR=3.04) and household income reductions did so among women (aOR=2.32).

Conclusions Negative socioeconomic changes occurring within a short time period significantly increased the risk of incident mental disorders, particularly of mood disorders. Effective interventions to alleviate the public mental health impact of negative socioeconomic changes on men and women are needed.

INTRODUCTION

Knowledge on how negative socioeconomic changes affect mental health is of importance, particularly given the uncertainties about the current global economy.[1] Key determinants of mental health, such as income and employment, were considerably affected by the global economic crisis, which started in 2007, and currently even advanced economies are struggling to overcome it.[2] Recent longitudinal studies have shown that the transition from employment to joblessness had a negative effect on mental health,[3 4] even when this transition was to stay at home to care for the family.[5] A recent longitudinal study reported, after a 3-year follow-up period, that not only individuals with a

low household income at baseline were at higher risk of mood disorder, but also those who had experienced a reduction in household income during those years were at an increased risk of any mental disorder (OR=1.30; 99% CI 1.06 to 1.60).[6] Another study using data from the Netherlands Mental Health Survey and Incidence Study-2 (NEMESIS-2) showed that, accounting for age and gender, a decrease in household income predicted a first-onset episode of mood (RR=2.58; 95% CI 1.75 to 3.81) or anxiety disorder (RR=1.81 95% CI 1.02 to 3.23) and having recently lost a paid job predicted a first-onset episode of any mood disorder (RR=2.46; 95% CI 1.41 to 4.30).[7]

Job loss is a stressful life event,[8] and the mechanisms by which it can cause psychological deterioration are related not only to financial strain,[5] but also to the absence of the non-financial benefits of work.[9] Social status, interpersonal contact and self-esteem, among others, are important drivers of psychological health among workers.[10] In fact, in advanced economies in which unemployment compensation protects against financial strain, the absence of these psychosocial benefits could be relevant in explaining poor mental health among the recently unemployed.[11] The mechanisms by which income and mental health are related have been extensively studied.[11–13] Not only the direct effect on material circumstances of living,[14] but also the indirect effect of psychosocial and emotional factors may explain the poorer mental-ill health among lower income individuals.[15 16]

At the general population level, it is well established that women are more often unemployed, receive lower wages, are more frequently employed part-time and tend to occupy lower professional positions than men.[17–19] Previous studies have suggested that the effects of unemployment on mental health are not equally distributed by gender. Men experience a greater impact on their mental health when losing their jobs in comparison with women,[20] while women are more affected by changes in family income.[21]

NEMESIS-2 is a longitudinal study of mental health in a representative sample of the Dutch population.[22] The longitudinal data collection time frame encompasses the years of the global economic crisis in two waves: 2007/2009 and 2010/2012. During those years, the Dutch economy was hit by the crisis. In 2009, for the first time in about 20 years, the Netherlands registered a decrease in its Gross Domestic Product (GDP; −3.7% change during 2008). Currently, the Netherlands is one of the 10 countries in the European Union (EU-28)

still in recession (GDP−0.8% change during 2012).[23] The unemployment rate doubled between 2007 and 2012 (2007:3.3% and in 2012:5.8%).[24]

The first objective of the present study was to examine the associations between job loss and substantial household income reduction with incident mental disorders, taking into account known potential confounding variables. We had hypothesised that there would be a significant association between these negative socioeconomic changes and incident mental disorders. We further hypothesised that such association would be stronger for those individuals experiencing both conditions. Our second objective was to examine whether gender modifies the relationship between negative socioeconomic changes and incident mental disorders. We had hypothesised that effects would be different by gender: job loss would be the factor associated with increased risk of incident mental disorders among men and household income reduction would be the one among women.

MATERIAL AND METHODS

Sample

In a multistage sampling procedure, a random sample of 184 of the 443 existing municipalities was drawn. In these municipalities, a random sample of addresses of private households from postal registers was drawn. An individual aged 18–64 years, sufficiently fluent in Dutch, was randomly selected based on his/her most recent birthday for a face-to-face interview (mean duration: 95 min). The first wave (T0) was conducted in November 2007–July 2009. The baseline response rate was 65.1%, resulting in a nationally representative sample, although younger participants were somewhat under-represented. The study design has been detailed elsewhere.[22]

All 6646 participants in the first wave were approached for follow-up (T1) 3 years after baseline (November 2010–June 2012, mean follow-up period=1102 days; SD=64), and 5303 were reinterviewed (80.4% follow-up response rate, excluding those deceased; mean duration: 84 min). Attrition in the first two waves of NEMESIS-2 was 20.2% (n=1343), similar to other cohort studies on mental health.[25 26] Contrary to other studies reporting a weak to moderate association between baseline psychopathology and attrition at follow-up, after controlling for sociodemographics,[25 27] no such significant associations were found either for each disorder or for categories of 12-month disorders.[28] Detailed information on attrition in NEMESIS-2 and its predictors has been recently published.[29]

A medical ethics committee approved the study and respondents provided written informed consent.

For this particular study, the working population at T0 was selected. A worker was defined as someone with at least 12 h of paid work per week in accordance with the definition used in Statistics Netherlands.[30] Those respondents working at T0, who were pensioners at T1, were excluded (n=579) to avoid the influence of retirement on mental health.[31] The final study sample consisted of 3676 individuals.

Variables

Job loss and substantial household income reduction occurring between T0 and T1 were considered the predictor variables. Having a paid job was a dichotomous variable (yes/no), collected at both waves, from which job loss was assessed. At T1, respondents were asked whether their income or their partner's income had changed since T0 (1. substantially lower; 2. slightly lower; 3. no change; 4. slightly higher; 5. substantially higher). If any of both incomes was substantially reduced, the variable was regarded as 1, otherwise as 0.

Three-year incident cases of any mental, any mood, any anxiety and any substance use disorder were the four outcomes of interest. Mental disorders were assessed using the Composite International Diagnostic Interview (CIDI) 3.0, a structured interview[32] administered by lay interviewers with generally good validity compared to blinded clinical reappraisal interviews.[33] CIDI 3.0 generates diagnoses of mental disorders according to the definitions and criteria of both the International Classification of Diseases (ICD) and Diagnostic and Statistical Manual of Mental Disorders (DSM) systems, although only DSM-IV criteria are used here. Two CIDI versions were used: (1) at baseline, a lifetime CIDI version and (2) at follow-up, a CIDI version with the time frame between baseline and follow-up. The categories of disorders measured in both waves were: mood (major depression, dysthymia, bipolar disorder), anxiety (panic disorder, agoraphobia—without panic disorder— social phobia, specific phobia and generalised anxiety disorder) and substance use disorders (alcohol/drug abuse and dependence).

Incident cases of a category of disorders were defined as individuals who develop a disorder in the category in question (mood, anxiety or substance use disorder) between T0 and T1 among those without any 12-month disorder in that category at T0. Therefore, an incident case was either a new-onset or a recurrent case. Three-year total incidence as a percentage of respondents at risk was calculated for each category of disorder. Population at risk was defined as respondents without a 12-month disorder in any of the categories of mental disorders at T0. It can be assumed that incident cases emerged halfway through the period between both interviews.[34 35]

Covariates

Gender was considered a possible effect modifier of the relationship between negative socioeconomic changes and incident mental disorders. The following baseline variables were considered to be potential confounders: age, educational attainment (higher professional or university, higher secondary, lower secondary and primary-basic vocational), partner status (living with a partner or not), total household income per month (low vs high), having a 12-month physical condition (yes/no), previous mental disorders (having any lifetime mood, anxiety or substance use disorder) and time between interviews. The total household income per month was self-reported. Respondents were asked to select the category which best fitted their total net income per month (after taxes and from all possible sources) and their partner's income. The total household income per month was calculated based on this information. Subsequently, this variable was dichotomised based on the median of its distribution as follows: low (≤2900 €/month) and high (>2900 €/month) household income. The presence of one or more physical conditions was assessed from a standard checklist of 17 chronic physical disorders, treated or monitored by a medical doctor in the 12 months prior to T0. These conditions were: respiratory disorders (asthma, chronic obstructive pulmonary disease, chronic bronchitis and emphysema), cardiovascular disorders (severe heart disease, heart attack, hypertension and stroke), digestive disorders (stomach or intestinal ulcers, severe intestinal disorders like irritable bowel syndrome), diabetes, thyroid disorder, chronic back pain, arthritis, migraine, impaired vision or hearing and other chronic physical disorders.

Statistical analysis

We first calculated summary statistics (percentages and means) to describe the sample. We defined population at risk for each

category of disorder and subsequently calculated the 3-year total incidence with its 95% CIs.

In order to assess the relationships between job loss and household income reduction and incident mental disorders, logistic regression analyses were used. The analytic strategy described here was performed separately for each of the four mental health outcomes of interest (ie, 3-year incidence of any mental, any mood, any anxiety and any substance use disorder). First, a crude logistic regression model was fitted in order to determine the effects of job loss and household income reduction on the incidence of mental disorder. Second, a multivariate logistic model with a two-way interaction term between job loss and household income reduction was fitted in order to determine whether the joint effect of job loss and household income reduction was higher than the sum of their separated effects. The interaction term (multiplicative model) was not statistically significant in any of the four models, meaning that the combined effect was not significantly different from considering the two effects separately. Thus, in the subsequent analyses, only separate effects of job loss and household income reduction were considered. Third, in order to test whether gender was modifying the effect between job loss and household income reduction on incident mental disorders, two interaction terms between gender and each predictor were included. Both interaction terms were statistically significant; therefore, two different models (for men and women) were fitted for 'any incident mental disorder'. No effect modification by gender was found for the categories of disorders.

All analyses were performed with STATA V.11.1 (Statacorp, 2009), using weighted data. On the one hand, a poststratification weighting factor of the first wave was constructed to account for different response rates among different sociodemographic groups at baseline and differences in the probability of respondent selection within households. On the other hand, attrition at the second wave was related to younger age, lower educational level, not having a partner, not being in paid employment and not being born in the Netherlands.[29] In order

to be able to generalise the data of the second wave to the general Dutch population, the poststratification factor of the first wave was combined with a specific weight factor that accounted for the differences found among the respondent and non-respondent samples. Significance was assessed with Wald χ^2 tests or Wald F tests, using design-based coefficients and their variance–covariance matrix, evaluated at the 0.05 level with two-sided tests.

RESULTS
Sociodemographic and socioeconomic characteristics
Sociodemographic characteristics of the male and female workers at baseline are displayed in table 1. Mean age was 40 years (SE=0.3), with a higher proportion of workers in the group aged 30–49 years. Proportions of male and female workers were similar for all age categories, except in the range of 50–64 years, in which a higher proportion of male workers was found (24.6% vs 20.7%, p=0.02). About one-fifth of the sample reported up to lower secondary as their highest educational attainment. One-third reported living without a partner and the same proportion reported having some physical condition. Four in 10 reported having a prior mental disorder (41.1%). No gender differences were found except that women reported a higher proportion of physical conditions than men (35.8% vs 24.2%, p<0.001).

Of the total respondents working at baseline, 6.2% (n=198) had lost their job at follow-up. There were important gender differences in job loss: among men, 4.1% (n=71) had lost their jobs during the research period, while among women it was twice that proportion (8.7%, n=127). A substantial household income reduction was reported by 11% (n=400) of the total sample.

3-year total incidence of mental disorders
Table 2 shows a 3-year total incidence of categories of disorders for the total working population and separately for men and women. Over one in 10 respondents (12.2%) developed some

Table 1 Sample characteristics of workers at baseline. The NEMESIS-2 follow-up study (2007/2009–2010/2012)

Socio-demographic characteristics (at baseline)	Total (n=3676) % (SE)	Men (n=1832) % (SE)	Women (n=1844) % (SE)	Design-based F test (p value)
Age mean (SE)	40.1 (0.3)	40.6 (0.4)	39.6 (0.4)	4.00 (0.05)
18–29	19.8 (1.1)	18.3 (1.4)	21.7 (1.4)	
30–49	57.4 (0.9)	57.1 (1.2)	57.6 (1.3)	
50–64	22.9 (0.8)	24.6 (1.1)	20.7 (1.1)	**3.95 (0.02)**
Education				
Primary-basic vocational	4.7 (0.6)	4.4 (0.7)	5.0 (1.0)	
Lower secondary	19.6 (1.1)	20.4 (1.5)	18.5 (1.3)	
Higher secondary	42.4 (1.6)	41.9 (2.0)	43.0 (1.8)	
Higher professional-University	33.4 (2.1)	33.3 (2.4)	33.5 (2.2)	0.50 (0.66)
Household income (low)*	55.9 (1.3)	55.3 (1.8)	56.8 (1.5)	0.51 (0.47)
Partner status (no partner)	29.2 (1.4)	29.1 (1.7)	29.3 (1.7)	0.01 (0.91)
Previous mental disorder (presence)†	41.1 (1.2)	40.7 (1.6)	41.4 (1.4)	0.12 (0.72)
Physical condition (presence)	29.3 (0.9)	24.2 (1.2)	35.8 (1.2)	**45.72 (<0.001)**
Socioeconomic worsening (at follow-up)				
Job loss	6.2 (0.6)	4.1 (0.6)	8.7 (1.1)	**14.47 (<0.001)**
Household income reduction	11.0 (0.7)	10.5 (0.9)	11.6 (1.0)	0.80 (0.37)

*Net household income per month at baseline was based on n=3357 (289; 7.9% missing values). The median of the income distribution was used to dichotomise low vs high (≤2.900 € per month).
†Previous mental disorder: having any lifetime mood, anxiety or substance use disorder.
Bold indicates statistically significant <0.05.

Table 2 Three-year incidence rate of DSM-IV mental disorders

	Total			Men			Women			Design-based F test for gender differences (p Value)
	At risk population n	Number of 3-year incident cases (unweighted)	3-year total incidence (weighted) % (95% CI)	At risk population n	Number of 3-year incident cases (unweighted)	3-year total incidence (weighted) % (95% CI)	At risk population n	Number of 3-year incident cases (unweighted)	3-year total incidence (weighted) % (95% CI)	
Any mental	3105	329	12.2 (10.4 to 14.1)	1583	151	10.6 (8.7 to 12.8)	1522	178	14.2 (11.5 to 17.4)	**4.71 (0.03)**
Any mood	3485	218	6.9 (5.9 to 8.1)	1770	90	5.1 (3.8 to 6.7)	1715	128	9.3 (7.2 to 11.8)	**8.09 (0.005)**
Any anxiety	3331	168	5.9 (4.8 to 7.2)	1705	53	3.5 (2.5 to 5.0)	1626	115	9.0 (6.9 to 11.6)	**17.20 (<0.001)**
Any substance use	3521	112	3.9 (3.0 to 5.0)	1724	81	5.7 (4.2 to 7.5)	1797	31	1.8 (1.1 to 2.8)	**23.51 (<0.001)**

The NEMESIS-2 follow-up study (2007/2009–2010/2012).
Bold indicates statistically significant <0.05.

mental disorder after 3 years with women having a significantly (p=0.03) higher rate. The highest incidence was observed for mood disorders (6.9%), followed by anxiety (5.9%) and substance use disorder (3.9%). Women showed a significantly higher incidence of mood (p<0.01) and anxiety disorders (p<0.001), while men showed about three times more risk of substance use disorders (p<0.001).

Job loss and household income reduction and mental health

The association of job loss and household income reduction and any incident mental disorders can be seen in table 3. After adjustment for the confounding variables, household income reduction was significantly associated with incident mental disorders (aOR=1.77). In particular, both job loss and household income reduction increased the risk of an incident mood disorder (aOR=2.02 and aOR=2.24, respectively) after 3 years. No association was observed between predictors and incident anxiety or substance use disorders.

In table 4, the effect modification of gender on the association between job loss and household income reductions and incidence of any mental disorders is shown. Job loss was associated with a significantly higher risk of incident mental disorders among men (aOR=3.04), and household income reduction was associated with a higher risk of incident mental disorders among women (aOR=2.32).

DISCUSSION

This paper shows that, when controlling for a range of covariates, job loss and substantial household income reduction increased the risk of incident mental disorders among workers from the general population after 3 years of follow-up. Job loss and household income reduction particularly increased the risk of mood disorders. Gender differences were observed: job loss was a more important stressor for men while household income reduction was so for women. These results add evidence that negative socioeconomic changes are associated not only with psychological distress[5] [36] but also with the development of full-blown mental disorders. These findings are similar to preliminary results using NEMESIS data.[7] However, we have shown that, even after adjustment for a range of well-known confounding variables, the deleterious effect of job loss and household income reduction on mental disorders was still significant. Nevertheless, residual confounding due to factors that we have not controlled for cannot be completely ruled out. Another improvement was the selection of the study sample. Individuals with a paid job at baseline were selected in order to avoid other developmental pathways, such as retirement, long-term unemployment or others, which could also have led to poor mental health outcomes. Finally, the issue of whether individuals who experienced both negative changes were at a much higher risk of incidence of mental disorders than the mere sum of each separate risk was addressed. An interaction term (in a multiplicative model) between job loss and household income reduction was tested. Contrary to what we expected, the associated risk of experiencing both negative changes would correspond to the sum of each separate risk.

We found that gender matters in the relationship between socioeconomic changes and incidence of mental disorders. A higher proportion of women experienced job loss during the period of study, yet effects on mental health were seen only among men. Thus, losing one's job might be a much more stressful experience, at least in the short term, for Dutch men than for Dutch women. Previous studies have also reported this association.[3] [20] The mechanisms that could explain a worse

Table 3 Effects of job loss and substantial household income reduction on 3-year total incidence of any mental, any mood and any anxiety disorders

	3-year incident mental disorder (n=2825)		3-year mood disorder (n=3175)		3-year anxiety disorder (n=3041)		3-year substance use disorder (n=3211)	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Job loss	**2.37 (1.27 to 4.43)**	1.51 (0.83 to 2.73)	**2.98 (1.68 to 5.29)**	**2.02 (1.13 to 3.60)**	**2.39 (1.05 to 5.42)**	1.44 (0.72 to 2.86)	1.22 (0.56 to 2.66)	1.08 (0.36 to 3.22)
Household income reduction	1.24 (0.80 to 1.92)	**1.77 (1.09 to 2.87)**	**1.84 (1.19 to 2.86)**	**2.24 (1.49 to 3.36)**	1.08 (0.56 to 2.04)	1.63 (0.94 to 2.82)	1.08 (0.58 to 1.76)	1.46 (0.73 to 2.91)
Covariates (all measured at baseline)								
Age		**0.96 (0.94 to 0.97)**		**0.97 (0.95 to 0.99)**		**0.97 (0.95 to 0.99)**		0.94 (0.92 to 0.97)
Gender (female)		1.26 (0.94 to 1.68)		1.32 (0.80 to 2.02)		**2.43 (1.52 to 3.90)**		**0.34 (0.21 to 0.57)**
Education								
Primary-basic vocational		**3.55 (1.75 to 7.18)**		1.98 (0.61 to 6.48)		2.09 (0.68 to 6.41)		**5.38 (2.05 to 14.12)**
Lower secondary		**1.74 (1.13 to 2.70)**		**1.77 (1.03 to 3.04)**		1.71 (0.89 to 3.29)		**1.73 (1.02 to 2.94)**
Higher secondary		1.33 (0.96 to 1.86)		**1.68 (1.11 to 2.54)**		1.26 (0.74 to 2.14)		0.87 (0.50 to 1.53)
Higher professional-university		1		1		1		1
Household income (low)		0.88 (0.64 to 1.21)		0.93 (0.60 to 1.46)		0.91 (0.56 to 1.47)		1.08 (0.57 to 2.05)
Partner status (no partner)		**1.74 (1.13 to 2.70)**		1.15 (0.68 to 1.95)		1.37 (0.79 to 2.38)		**2.30 (1.23 to 4.29)**
Previous mental disorder (presence)*		**2.04 (1.52 to 2.74)**		**3.73 (2.40 to 5.80)**		**3.20 (2.09 to 4.90)**		**2.29 (1.34 to 3.93)**
Physical condition (presence)		**1.53 (1.13 to 2.07)**		1.40 (0.97 to 2.02)		**1.48 (0.96 to 2.27)**		1.40 (0.79 to 2.49)
Time between waves	1.32 (0.59 to 2.97)	0.95 (0.37 to 2.40)	1.41 (0.59 to 3.40)	1.33 (0.51 to 3.46)	0.79 (0.20 to 3.09)	0.56 (0.12 to 2.56)	2.01 (0.65 to 6.23)	1.90 (0.50 to 7.20)

The NEMESIS-2 follow-up study (2007/2009–2010/2012).
*Previous mental disorder: when any incident mental disorder was the outcome, a previous mental disorder included any mood, anxiety or substance use disorder. For each category of disorder, a previous mental disorder corresponded to each category (eg, 3-year incident mood disorder was adjusted by having a mood disorder previous baseline).
Bold indicates statistically significant <0.05.

Table 4 Effect modification of gender on the association between job loss and household income reduction and 3-year total incidence of any mental disorder

	Total sample Adjusted OR+interaction terms (95% CI) (n=2825)*	Men Adjusted OR (95% CI) (n=1482)	Women Adjusted OR (95% CI) (1343)
Job loss	**3.27 (1.38 to 7.73)**	**3.04 (1.23 to 7.49)**	1.07 (0.52 to 2.22)
Household income reduction	1.05 (0.52 to 2.10)	1.11 (0.53 to 2.31)	**2.32 (1.34 to 4.01)**
Two-way interactions			
Job loss×gender (female)	**0.28 (0.11 to 0.75)**		
Income reduction×gender (female)	**2.41 (1.12 to 5.18)**		
Adjusted Wald test	**F=4.51, p=0.012**		
Covariates (all measured at baseline)			
Age	**0.96 (0.95 to 0.97)**	**0.96 (0.94 to 0.98)**	**0.96 (0.94 to 0.98)**
Gender (female)	1.23 (0.92 to 1.67)		
Education			
Primary-basic vocational	**3.52 (1.76 to 7.06)**	**2.87 (1.10 to 7.53)**	**4.12 (1.15 to 14.75)**
Lower secondary	**1.75 (1.13 to 2.70)**	**2.33 (1.36 to 4.00)**	1.12 (0.58 to 2.19)
Higher secondary	1.31 (0.94 to 1.83)	1.08 (0.71 to 1.64)	**1.61 (0.98 to 2.63)**
Higher professional-University	1	1	1
Partner status (no partner)	**1.70 (1.15 to 2.50)**	**2.32 (1.33 to 4.04)**	1.23 (0.70 to 2.15)
Household income month (low)	0.87 (0.63 to 1.21)	0.89 (0.54 to 1.45)	0.87 (0.55 to 1.37)
Previous mental disorder (presence)	**2.06 (1.53 to 2.77)**	**2.03 (1.26 to 3.27)**	**2.10 (1.42 to 3.11)**
Physical condition (presence)	**1.53 (1.14 to 2.06)**	**2.03 (1.26 to 3.27)**	1.31 (0.88 to 1.94)
Time between waves	0.91 (0.36 to 2.31)	0.89 (0.27 to 2.92)	0.86 (0.23 to 3.22)

The NEMESIS-2 follow-up study (2007/2009–2010/2012).
Bold indicates statistically significant <0.05.

mental health among unemployed men are not only related to the direct economic consequences of unemployment, such as financial strain, hardship and poverty,[8][14] but also to the absence of important psychosocial benefits of work, such as social activity, life satisfaction and participation.[9] A recent report, using 14 waves of the British Household Panel Survey, showed that redundancies worsened men's mental health as a result of both the decrease in the wage rate and the deterioration in individual self-esteem and perceived role in society.[37] In 2011, the Netherlands ranked third, after Denmark and France, as the European country (EU-28) with the highest expenditure on social protection as a proportion of the total GDP (ie, 32.3%). Sickness and healthcare, along with social exclusion, were the social functions in which the highest proportion of expenditure was observed in comparison with all European countries (EU-28).[38] Unemployment benefits are paid, under certain conditions, up to a maximum of about 3 years in the Netherlands. In addition, the Netherlands has a high net replacement rate (ie, ratio of unemployment benefits a worker receives relative to the worker's last net earnings). In 2010, the net replacement rate was 67%, similar to Belgium and France (about 68%).[39] A high replacement rate prevents workers from falling into poverty when they lose their jobs as they still retain their purchasing power. Thus, given that good social protection exists in the country and that the period of follow-up was relatively short, we believe that among recently unemployed Dutch men, the mechanisms leading to poorer mental health outcomes were more likely to have been related to the absence of non-financial benefits. However, this hypothesis should be investigated further. It is worth mentioning that NEMESIS-2 data was collected during the years of the economic crisis (2007–2012). During that period, the unemployment rate in the country doubled. We have calculated the proportion attributable risk proportion (PARP) that shows what per cent of the incidence of

mood disorders in the general population could have been attributed to job loss. One of the assumptions of valid estimations of the PARP includes a causal relationship between the risk factor and the dependent variable.[40] We found that the rise in the unemployment rate during the research period has represented a 7% increase in the incidence of mood disorders at the population level (adjusted PARP=7.0%; 95% CI 1.5 to 12.1), highlighting the importance of investments on social protection to fight the negative impact of the economic crisis on health.[41] Finally, a substantial household income reduction significantly increased the risk of incidence of mental disorders among women. A possible explanation is that despite Dutch women having increased their presence in the workforce in the last 20 years, men are still the primary earners in many Dutch households (ie, 'male-breadwinner' model).[42] Therefore, if the husband loses his job, the family income will suffer the largest shock. We believe that the deleterious effect of job loss on men's mental health that occurred in a short period of time is also having an impact on women's mental health.[37] Given that the follow-up period is short, we believe that we are only capturing the very first part of the phenomenon. Therefore, a future line of investigation could be to expand these results by investigating the long-term effects of socioeconomic changes in men and women's mental health.

Our results should be interpreted in the light of the following limitations. First, we did not have the date of job loss or household income reduction, while we did have information on the onset of the 12-month mental disorder. It might be possible that, for some cases, in the 3-year period between waves, the onset of the mental disorder preceded the socioeconomic change. However, it should be noted that our baseline sample was composed only of workers with at least 12 h of paid work per week, who thus were more likely to be healthy individuals, without any 12-month mental disorder at baseline. Therefore,

we have assumed social causation to be a more plausible path, whereby the negative socioeconomic changes would have caused the mental disorder, rather than the other way round.[43] Second, selection bias could have occurred since job loss was inferred from having a paid job at baseline and not having one at follow-up. Becoming a student or taking a career break for caring for the family would have been incorrectly classified as having lost the job in our study. If so, this would imply a stronger effect on mental health as this might have lead to an underestimation of the real association between job loss and mental disorders. In the Netherlands, women tend to occupy more part-time jobs in comparison with men.[44] Therefore, it would be relatively convenient and easier for women to enter and leave the labour market, to care for the family, for instance. According to our data, a higher proportion of women lost their jobs in comparison with men. This is different from what has been reported at the national level. In the period of the study (2007–2012) in the Netherlands, the unemployment rate among males doubled while among women it also increased, but to a lesser extent (about 1.5 times). Hence, it is plausible that mechanisms other than involuntary job loss have driven women out of the workforce. In this regard, 18 women (16.3%) of those who had *lost* their jobs had had a baby between T0 and T1; therefore, it is possible that they voluntarily chose to stay at home. It may be advisable in future studies to address the differences between voluntary and involuntary unemployment to clarify the link with mental health outcomes in both genders. Third, we have included not only new-onset but also recurrent cases of mental disorders. We assumed that the mechanisms by which socioeconomic changes affect mental health would be operating similarly in new diagnoses as well as in recurrent cases of mental disorders. Pathways of recurrence and onsets might be different across individual disorders, though the evidence is somewhat unclear. For instance, stressful life events, like job loss, were associated with recurrent episodes of depression and not with their onset.[45] Contrarily, de Graaf et al[7] showed that no longer being in a paid employment was significantly increasing the risk of new-onset mood and anxiety disorders. Therefore, a more fine-tuned analysis on how these negative socioeconomic changes are associated with each individual mental disorder would be advisable. Furthermore, it would be interesting to establish if these putative risk factors are actually pushing the incidence of mental disorders in the general population or if they are somehow interacting with an underlying genetic vulnerability for recurrence.[46]

In conclusion, the mental health of male and female workers in a high-income country is being negatively influenced by job loss and reductions in household income. These negative socioeconomic changes are powerful threats to public mental health. Policies addressed to prevent job and substantial income losses and to maintain health equity would be helpful to alleviate the public mental health challenges of the current economic crisis.

What is already known on this subject?

Previous longitudinal studies have shown that experiencing negative socioeconomic changes results in the appearance of mental disorders. Within a context of global economic crisis, addressing the impact of these negative changes on the general population's mental health is of importance.

What does this study add?

Negative socioeconomic changes increase the risk of incidence of full-blown mental disorders, particularly of mood disorders. Job loss was a much more important risk factor for men, and household income reductions were so for women. Negative socioeconomic changes are powerful threats to public mental health.

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