

# Purchases of Prescription Antidepressants in the Swedish Population in Relation to Major Workplace Downsizing

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**Abstract:** Organizational downsizing may be a risk factor for morbidity among both the displaced and those who remain in work. However, the knowledge is limited regarding its impact on clinically relevant mental health problems. Our objective was to investigate purchases of prescription antidepressants across 5 years in relation to workplace downsizing. We studied all Swedish residents 2004 throughout 2010, 22–54 years old in 2006, gainfully employed, and with a stable labor market position up to 2006. People primarily employed at a workplace with  $\geq 18\%$  staff reduction were considered exposed to major downsizing (in 2006–2007, 2007–2008, or 2008–2009). We applied repeated measures regression analyses through generalized estimating equations, calculating odds of any purchase of prescription antidepressants (inferred from the prescribed drug register) within five 12-month periods from 2 years before to 2 years after the period of major downsizing and compared the trends for newly exposed ( $n = 632,500$ ) and unexposed ( $n = 1,021,759$ ) to major downsizing. The odds of purchasing prescription antidepressants for exposed increased more than for nonexposed, mainly peridownsizing (1 year before to 1 year after), and postdownsizing (1 year after to 2 years after) for survivors (odds ratio 1.24 vs. 1.14 peridownsizing and 1.12 vs. 1.00 postdownsizing) and those changing workplace (odds ratio 1.22 vs. 1.14 peridownsizing and 1.10 vs. 1.00 postdownsizing) with no previous sickness absence or disability pension ( $\geq 7\%$  more than unexposed peri- and postdownsizing). This large-scale study indicates that downsizing is associated with a slight increase in the odds of purchasing prescription antidepressants among people without previous sickness absence or disability pension.

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Mental health disorders have become one of the major public health concerns in many parts of the world, as they are major contributors to disability, and their prevalence is rising.<sup>1</sup> Moreover, working life has gone through major changes with regard to employer practices since the early 1970s.<sup>2</sup> Organizational changes such as downsizing, outsourcing, spin-offs, and mergers have become common.<sup>2,3</sup> Many people thus face job insecurity, potential job loss, and/or threats of changes in work characteristics, especially during periods of economic instability.<sup>4–6</sup>

A number of studies have consistently found associations between job insecurity and mental health, for many different measures of mental health,<sup>2,5,7,8</sup> and there is also some evidence that job insecurity can precede poorer wellbeing and mental health.<sup>9</sup> Actual job loss and unemployment is moreover known to be associated with decreased mental well-being,<sup>10,11</sup> and may lead to mental health disorders.<sup>12</sup> In addition, it has been indicated that downsizing may predict poor mental health among those who stay in an organization.<sup>7</sup> However, a recent review concluded that evidence on the association between organizational changes and poor mental health is insufficient.<sup>13</sup> Moreover, most previous studies are on public sector employees or on particular organizations and are usually based on self-reported data.<sup>2,7</sup>

In this study, we assess whether major downsizing is associated with purchases of prescription antidepressants, using data from nationwide registers covering the entire population in Sweden, and whether this association can be found among those who remained in the downsizing organization, those who changed jobs, and those who became unemployed. We also examined how workplace downsizing affects the odds of purchasing prescription antidepressants, pre-, peri-, and postdownsizing, while stratifying on previous disability pension and sickness absence, to rule out possible selection by health status.

## METHODS

### Population

The data are drawn from the LISA registry (an integrated database for labor market research) at Statistics Sweden and includes all individuals ages 20–64 years and registered as living in Sweden on December 31, 2004 (in total 5,298,768 individuals). In this study, we selected individuals still alive

and living in Sweden up to December 31, 2010 and ages up to 54 years at the end of 2006. Those with an unstable employment situation, classified as not gainfully employed in any of the years 2004–2006 by Statistics Sweden, were excluded (individuals whose annual income from work exceeds a given amount in a given year are classified as gainfully employed, whereas others are treated as not being in paid work).<sup>14</sup> Moreover, we excluded people not classified as employed according to their primary occupation 2006 (for details, see Figure 1). People in the excluded groups were left out since they often have different subjective expectations and different chances of reemployment than employees of the primary working age with a stable labor market position.<sup>15</sup> A total of 2,244,163 individuals with stable employment before downsizing met our inclusion criteria and could be connected to a specific establishment/workplace for which dynamics could be assessed between two consecutive years. Because of more uncertainty with regard to changes over time in workforce composition, statistics of dynamics of establishment/workplace are limited for small enterprises. Some people employed at small enterprises were therefore also excluded from the study. Furthermore, only people connected to an establishment with a permanent address is included (cf. below). The study has received ethical approval from the Regional Ethical Review Board of Stockholm.

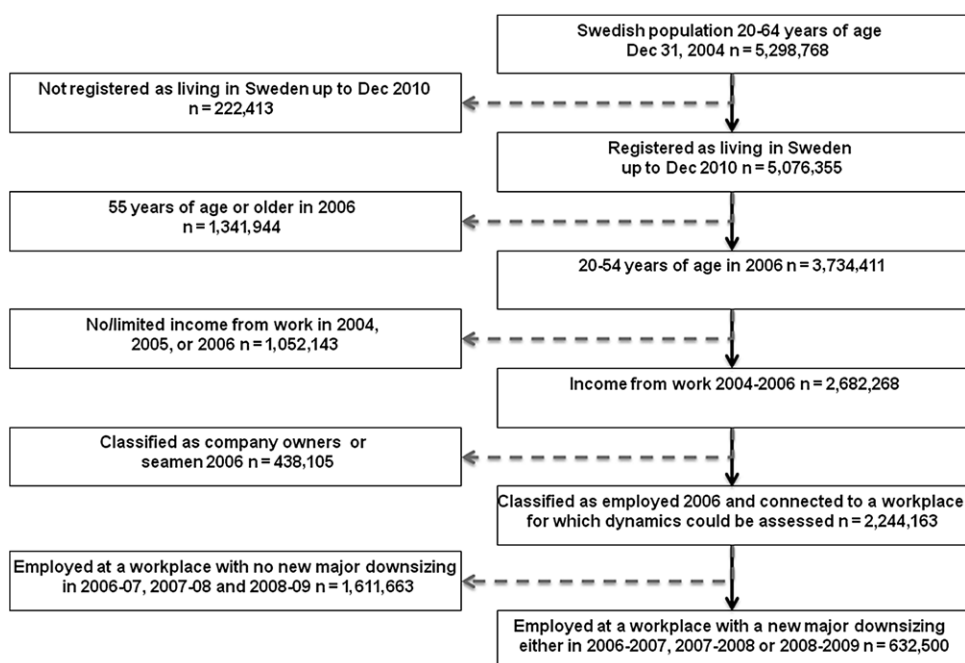
## Downsizing

From the LISA registry, annual data on the main establishment where each individual was recorded as gainfully employed per November 30th each year was linked to Statistics on Dynamics of Enterprises and Establishments (DEE) from 2004 to 2010, also available for research purposes through Statistics Sweden. The DEE data aimed to identify structural changes of enterprises

and establishments is produced from data from the Employment Register in the Labor statistics based on administrative sources, in which individuals are connected to establishments and enterprises through company statements of earnings and tax deductions to the Swedish Tax Agency or individual income taxes. Enterprises and establishments are classified with respect to changes in workforce composition over time rather than changes in owners, industry, and location. An enterprise or establishment is seen as the same enterprise/establishment despite a change in the enterprise or workplace identity number if a group of employees represents a majority of the workforce in both of two consecutive years. If the workforce composition on the other hand has changed considerably the enterprise/establishment will alternatively be classified as closed down or new. DEE data were in this study used to identify “unchanged” establishments (part of an enterprise defined by a permanent address), henceforth referred to as workplaces, which between November 2006 and November 2007, November 2007 and November 2008, or November 2008 and November 2009 reduced their staff by  $\geq 18\%$ . People whose primary employer had reduced their staff by  $\geq 18\%$  were classified as being subject to major downsizing, in accordance with the most commonly used cutoff in the previous literature.<sup>4,16,17</sup> Only new events of downsizing were considered, however. A person was therefore considered exposed to major downsizing the first time he/she was subject to major downsizing and was unexposed the preceding year. Furthermore, individuals not experiencing downsizing in any of these periods were considered unexposed to downsizing.

## Postdownsizing Situation

Information about individuals' occupational status and main workplace was linked to LISA information on number of



**FIGURE 1.** A flowchart of the number of people included or excluded in the study and categorized as exposed to major downsizing.

days with unemployment benefits, to group people according to employment situation after downsizing (i.e., in the end of 2007, 2008, or 2009, respectively). An individual was considered unemployed if categorized as not gainfully employed by Statistics Sweden or having >180 days with unemployment benefits.<sup>14</sup> The rest were categorized either as “stayers” (referring to employed at the same workplace as the year before) or as “job changers” (referring to employed but at another workplace than the previous year).

### Predownsizing Demographics and Health Status

From the LISA registry, we obtained annual data on age, sex, family situation, region of living, educational level, and income for the years 2004–2010. These demographics from the year before downsizing were considered as potential confounders. People were categorized into three age groups representing early adulthood (22–34 years of age), midlife (35–49 years), and mature adulthood (50–56 years). Family situation was categorized as (1) living with a partner (married, registered partner, or cohabiting) with children living at home, (2) living with a partner without children living at home, (3) living with children only at home, and (4) living alone. Region of residence was categorized according to type of municipality into three groups: big cities (metropolitan areas), medium-sized cities, and small cities/villages (areas with <27,000 inhabitants within a 30 km radius from the largest municipality center). Educational level was categorized according to Swedish Educational Terminology into the following four groups: (1) primary and secondary education, (2) upper secondary education, (3) postsecondary education <3 years, and (4) postsecondary education ≥3 years.

From the LISA registry, information on sickness absence and (part time) disability pension was also used as an indicator of health status before a recorded downsizing. Those who were registered with sickness benefits from the Social Insurance Agency (which usually means >14 sick-leave days, because sick pay is provided by the employer for the first 14 days of a sick-leave spell) during the 2 years preceding the downsizing were considered to have previous sickness absence. Similarly, those registered with disability pension during that period were considered to have previous disability pension. Previous sickness absence or disability pension was considered as a potential effect modifier, as health consequences of downsizing may depend on pre-existing health problems.<sup>18</sup>

### Purchases of Prescription Antidepressants

Data on antidepressant medication were obtained from the Swedish National Prescribed Drug Register from July 2005 to June 2010. All filled prescriptions coded N06A according to the Anatomical Therapeutic Chemical system with exact dates of purchase were extracted. We calculated whether people had at least one purchase within each 12-month period in the 5-year window around downsizing as described below.

### Data Analysis

The analyses were based on up to five observations per person, one for each of five 12-month periods covering 2 years before downsizing (years –2, –1 in relation to downsizing), the year of downsizing (year 0 in relation to downsizing), and 2 years after the year of downsizing (years +1, +2 in relation to downsizing). The study sample was divided into three subcohorts depending on in which of the three periods (November 2006–November 2007, November 2007–November 2008, or November 2008–November 2009) people were exposed to downsizing for the first time, and their odds of purchases of prescribed antidepressants were followed accordingly as illustrated in eAppendix 1. For people with no downsizing in between November 2006 and November 2009, we also created three corresponding subcohorts, randomly assigning them a reference period (i.e., a calendar period coded as time 0 and followed the odds of purchases of prescription antidepressants across the 5 years of interest). To assess changes in purchases of prescription antidepressants, we applied repeated-measures logistic regression models using generalized estimating equations taking into account the intraindividual correlation between measurements.<sup>19</sup> To adjust for the repeated observations for the same individual, the independent correlation structure fitted the data best. We first calculated the odds ratios (ORs) and their 95% confidence intervals (CIs) for antidepressant treatment for every 12-month period before, during, and after downsizing. To test whether there was a change in purchases of prescription antidepressants within 3 periods, “pre” (i.e., year –2 to –1), “peri” (i.e., year –1 to 1), and “post” downsizing (i.e., year +1 to +2), we calculated ORs contrasting the last and first year within each of these period. We performed separate analyses according to the status at the end of the downsizing period (year 0) for stayers, job changers, and unemployed. To take into account the general annual increase in antidepressant treatment and different timing of downsizing, we adjusted the models for calendar year. The final models were also adjusted for sex and those predownsizing demographics that appeared to influence purchases of prescription antidepressants. The analyses were further stratified for previous sickness absence or disability pension to examine whether the odds of purchasing prescription antidepressants in relation to downsizing differed depending on previous health. Because health consequences may also differ depending on demographic factors, we also assessed whether the main results differed by age and sex.

## RESULTS

### Characteristics and Overall Prevalence of Purchases of Prescription Antidepressants

All in all, 632,500 of the employees in this population-based Swedish cohort had been exposed to major downsizing between any 12-month period during 2006–2009, and 1,021,759 were regarded unexposed to major downsizing. Table 1 presents numbers and percentages according to the

postdownsizing situation as well as predownsizing demographics and health status. The prevalence of purchases of prescription antidepressants was highest for those who, after downsizing, were unemployed. The prevalence was also higher for those who had previous sickness absence or disability pension, were in older ages, were women, with a minimum of 3 years of university education, or had no partner and/or children at home. People in medium sized and small

cities/villages, on the other hand, had lower prevalence of purchases of prescription antidepressants than those in big cities.

### Trends in Purchases of Prescribed Antidepressants in Relation to Major Downsizing

Next, we studied prevalence of purchases of prescription antidepressants in relation to the 12-month period of major

**TABLE 1.** Characteristics of the 632,500 Individuals Who Were Employed at an Organization That Downsized and the 1,021,759 Individuals Considered Unexposed to Major Downsizing, and Odds Ratios with 95% CI, for Purchasing Prescription Antidepressants During the 12-month Periods -2 to 2 in Relation to the Period of Downsizing (Time 0 in Relation to Downsizing), Obtained from the GEE Logistic Regression Model Controlled for Period in Relation to Downsizing

Characteristics	Exposed to Major Downsizing			Not Exposed to Major Downsizing		
	Number (%)	Percentage Purchasing Any Prescription Antidepressants	Odds Ratio (95% CI) for Purchasing Any Prescription Antidepressants	Number (%)	Percentage Purchasing Any Prescription Antidepressants	Odds Ratio (95% CI) for Purchasing Any Prescription Antidepressants
<b>Subcohort</b>						
Downsized between 2006 and 2007 <sup>a</sup>	130 937 (20.7]	6.1	1.00	-	-	-
Downsized between 2007 and 2008	34 428 (34.4)	6.6	1.04 (1.02, 1.05)	-	-	-
Downsized between 2008 and 2009	284 135 (44.9)	6.3	1.02 (1.01, 1.04)	-	-	-
<b>Employment status after downsizing</b>						
Stayers <sup>a</sup>	523 329 (82.7)	6.0	1.00			
Changers	62 207 (9.8)	5.9	1.01 (0.99, 1.03)			
Unemployed	46 964 (7.5)	11.1	1.46 (1.43, 1.48)			
<b>Previous health status</b>						
Previous SA/DP <sup>a</sup>	122 233 (19.3)	18.0	1.00	195,186 (19.1)	18.12	1.00
No previous SA/DP	510 267 (80.7)	3.6	0.22 (0.21, 0.23)	826,573 (80.9)	3.65	0.22 (0.21, 0.22)
<b>Age group (in years)</b>						
Early adulthood (22–34) <sup>a</sup>	181 927 (28.8)	4.5	1.00	246,299 (24.1)	4.29	1.00
Middle life (35–49)	328 219 (51.9)	6.8	1.56 (1.54, 1.59)	557,751 (54.6)	6.76	1.58 (1.56, 1.59)
Mature adulthood (50–56)	122,354 (19.3)	7.9	1.64 (1.61, 1.67)	217,709 (21.3)	7.94	1.68 (1.65, 1.70)
<b>Sex</b>						
Female <sup>a</sup>	288,683 (45.6)	8.8	1.00	508,773 (49.8)	8.65	1.00
Male	343,817 (54.4)	4.3	0.60 (0.59, 0.61)	512,986 (50.2)	4.20	0.60 (0.59, 0.61)
<b>Educational level</b>						
Primary and secondary <sup>a</sup>	69,425 (11.0)	6.9	1.00	91,190 (8.9)	6.89	1.00
Upper secondary	355,101 (56.2)	6.2	0.99 (0.97, 1.01)	498,734 (48.8)	6.42	1.01 (0.99, 1.02)
Post upper secondary < 3 years	41,747 (6.6)	5.6	1.05 (1.02, 1.08)	66,111 (6.5)	5.45	1.06 (1.04, 1.08)
Post upper secondary ≥ 3 years	165,262 (26.2)	6.7	1.11 (1.09, 1.14)	364,569 (35.7)	6.48	1.09 (1.07, 1.10)
<b>Family type</b>						
Partner with children <sup>a</sup>	333,545 (52.7)	5.4	1.00	562,986 (55.1)	5.44	1.00
Partner without children	52,178 (8.3)	7.0	1.09 (1.07, 1.12)	89,700 (8.8)	7.11	0.92 (0.90, 0.93)
No partner with children	57,895 (9.2)	10.4	1.48 (1.45, 1.50)	90,921 (8.9)	10.77	1.40 (1.38, 1.43)
No partner without children	188,882 (29.8)	6.6	1.42 (1.40, 1.44)	278,151 (27.2)	6.75	1.31 (1.29, 1.33)
<b>Region of residence</b>						
Big cities <sup>a</sup>	222,776 (35.2)	6.7	1.00	372,471 (36.5)	6.68	1.00
Medium-sized cities	227,697 (36.0)	6.3	0.92 (0.91, 0.93)	379,086 (37.1)	6.37	0.95 (0.94, 0.96)
Small cities/villages	182,027 (28.8)	6.0	0.86 (0.85, 0.87)	270,202 (26.4)	6.12	0.89 (0.88, 0.90)
Total	632,500	6.4	-	1,021,759	6.42	-

<sup>a</sup>Reference category.

DP indicates disability pension; GEE, generalized estimating equation; SA, sickness absence.



downsizing. Figure 2 shows the 12-month prevalence across the five 12-month periods of interest for people exposed by postdownsizing employment status and previous health status, as well as for unexposed. Table 2 further presents the results assessing if there were any changes in purchases of prescription antidepressants across the three periods pre- (year -2 to -1), peri- (-1 to +1), as well as post- (+1 to +2) downsizing. Among those exposed to major downsizing, there was a 5%–6% increase in the odds of purchases of prescription antidepressants across all of the three time periods (OR: 1.05 pre-, 1.06 peri-, 1.05 postdownsizing), after adjusting for sex, age, family type, region of residence, and calendar year. This increase depended, however, on postdownsizing employment status and previous health status (test of interaction  $p < 0.001$ ). Among unexposed, the odds of purchases of prescription antidepressants also increased by about 1%–2% during the pre- (OR: 1.01) and peri- (OR: 1.02) downsizing period. The change over time in purchases of prescription antidepressants, however, differed between exposed and unexposed to major downsizing in some of the 12-month periods as indicated by contrasts of the ORs in the periods of interest (eTable 1; <http://links.lww.com/EDE/A988>). Among those who remained at the same workplace after downsizing (stayers), the odds of purchasing prescription antidepressants was 5%–7% higher at the end of each of the three time periods than at the beginning of the period (OR: 1.05 pre-, 1.06 peri-, 1.05 postdownsizing). Stayers also increased the odds of purchases of prescription antidepressants more than unexposed in the peri- and postdownsizing period as presented in eTable 1 (<http://links.lww.com/EDE/A988>). Among those who changed workplace after downsizing, the odds of purchasing prescription antidepressants increased 15% in the predownsizing period (OR: 1.15) and 7% in the postdownsizing period (OR: 1.07; Table 2), which was also more than among the unexposed (eTable 1; <http://links.lww.com/EDE/A988>), but increased only marginally across the peridownsizing period (Table 2). Among those who were unemployed in the end of the 12-month period when downsizing had taken place, an increase in the odds of purchasing prescription antidepressants was observed only in predownsizing period, but this trend did not differ markedly from that of the unexposed.

### Trends in Purchases of Prescribed Antidepressants in Relation to Major Downsizing by Previous Health Status and Demographics

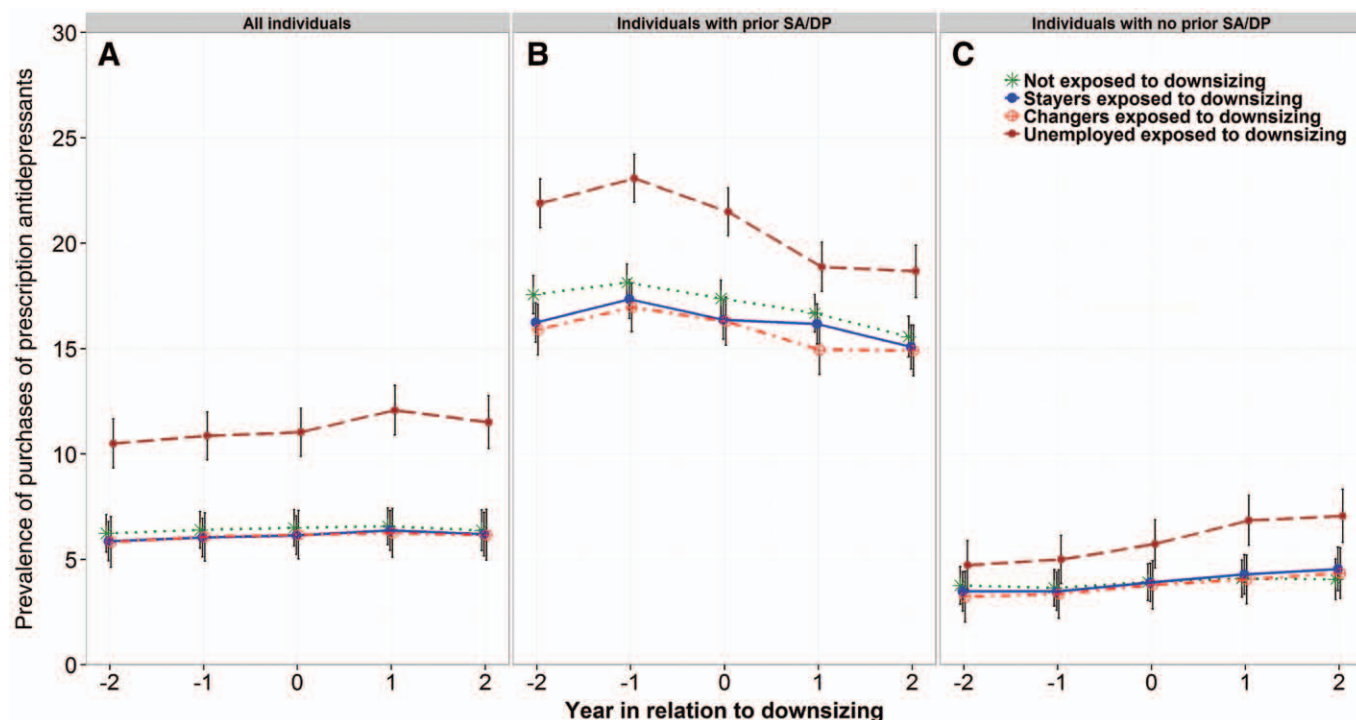
The analyses were, moreover, stratified by predownsizing health status. Most of the associations differed by predownsizing health status. Among those with previous health problems in terms of sickness absence or disability pension, the odds of purchasing prescription antidepressants increased 8%–16% in the period before (pre) downsizing depending on their postdownsizing employment status (OR: 1.10 stayers, 1.16 job changers, 1.08 unemployed). During the period of

(peri-) downsizing, the corresponding OR indicated a 9%–24% decrease in prevalence of antidepressant purchasing (OR: 0.91 stayers, 0.86 job changers, 0.76 unemployed), with the greatest decrease observed among the unemployed. In the period after (post) downsizing, these odds remained at the same level in all employment groups. However, the pattern for those exposed to major downsizing having previous sickness absence or disability pension did not evidently differ from that of unexposed with previous sickness absence or disability pension. For those with no health problems at baseline, the opposite was observed: the odds increased 22%–34% in peridownsizing period, depending on postemployment status (OR: 1.24 stayers, 1.22 job changers, 1.34 unemployed), and 10%–12% in the postdownsizing period (OR: 1.12 stayers, 1.10 job changers, 1.10 unemployed), but stayed approximately at the same level among all employment groups in the predownsizing period. Both stayers, job changers, and unemployed without previous sickness absence or disability pension increased their odds of purchasing prescription antidepressants more than the unexposed without previous sickness absence or disability pension during the peri- and the postdownsizing period. We found similar trends in purchases of prescription antidepressants when stratifying by sex and age groups (eFigures 2–3; <http://links.lww.com/EDE/A988>), and among the exposed groups only the trend for unemployed with prior sickness absence or disability pension differed from the other exposed groups (eTable 2; <http://links.lww.com/EDE/A988>).

### DISCUSSION

This article reports the results from a large register-based study including all residents in Sweden 2004–2010 with a stable labor market position before downsizing and gainfully employed at a workplace going through major downsizing between 2006 and 2007, 2007 and 2008, or 2008 and 2009. The results indicate that a new event of major downsizing can increase the odds of purchasing prescription antidepressants among stayers, job changers, as well as unemployed without previous health problems in terms of sickness absence or disability pension.

Only people with no prior sickness absence or disability pension, and who were comparably healthy, before a downsizing event had a higher increase in the odds of purchasing prescription antidepressants than those unexposed to downsizing and this was most apparent in the peri- and postdownsizing period for stayers and job changers. Unemployed people with no prior sickness absence or disability pension also had an increase in the odds of purchasing prescription antidepressants compared with those unexposed to downsizing in the peridownsizing period in particular. As this pattern was differed from that seen in those unexposed to downsizing, it did not seem to be fully explained by a general drift toward poorer health. Purchases of prescription antidepressants also continued to increase in these groups postdownsizing, but this increase was less apparent 1 to 2 years after the event. This finding suggests relatively short-term effects of



**FIGURE 2.** Prevalence of purchases of prescription antidepressants across five 12-month periods from 2 years before downsizing (−2) to 2 years after downsizing (+2) among all unexposed and exposed according to postdownsizing status, also stratified according to prior or no prior SA or DP. DP indicates disability pension; SA, sickness absence.

major downsizing. A study by Falkenberg et al.<sup>20</sup> has also shown that major organizational changes involving restructuring were associated with short-term health effects (including psychiatric morbidity) that diminished at later phases. Regarding job loss, Brenner and Levi<sup>21</sup> also believe that different phases might be associated with different reactions. They inferred, based on their findings, that both anticipation of job loss and actual job loss is associated with severe psychological and physiological stress. This phase may then be followed by a relatively unstressed state in the first 6 months, and for most people an increased stress after 6 months, reflected in poorer economic prospects, followed by a phase of adaptation after 2 years of unemployment. Our findings are also in line with the studies by Kivimaki et al.<sup>22</sup> and Dahl<sup>23</sup> regarding psychotropic medication use in relation to major organizational changes. The study by Dahl<sup>23</sup> showed a stronger association in the year closest to organizational change but also found associations the two subsequent years.

Possible selection by health status has, however, not always been feasible to account for in previous studies.<sup>22</sup> By stratifying for previous sickness absence or disability pension, we might more effectively take into account previous physical and mental health problems, which indicated a different pattern for those presumably healthier before the organizational change. Interestingly, those unemployed after downsizing had a much higher odds of purchasing prescription antidepressants already 2 years before the change, especially if they also had previous sickness absence or disability pension. This higher

need for medication seems to support the selection hypothesis, which assumes that people with pre-existing health problems are under higher threat of being displaced in situations of redundancies. A high absence level is suspected to contribute to the risk of displacement, as discussed by Kivimaki et al.<sup>18</sup> As the data by Kivimaki et al.<sup>18</sup> also indicate, our findings suggest that downsizing also increased health problems in subsequent years for those possibly losing their jobs because of redundancies, but only among those with no previous SA/DP. These present results do not, however, suggest further mental health deterioration for those with poorer health, which could have been suspected based on previous findings.<sup>24</sup> Surprisingly, the results indicated no apparent difference in the odds of purchasing prescription antidepressants over time for unemployed people as compared with those remaining in work, or for stayers compared with job changers. If workers voluntarily removed themselves from potentially poor work situations, as in the case of job change, a more favorable course could have been expected. A change of employer or even of occupation can on the other hand be associated with a period of adjustment, or even poorer working conditions in other respects, which might explain the pattern observed. A recent study also found that moving from insecure to secure employment was not beneficial to psychological well-being.<sup>25</sup>

To our knowledge, this is the largest downsizing study to date based on a national sample. A particular advantage is that we utilized data from several years both before and after

**TABLE 2.** Odds Ratios for Purchases of Prescription Antidepressants and Their 95% CI Comparing Different Time Points According to Postdownsizing Employment Status and Predownsizing Characteristics

Characteristics	Odds Ratio (95% CI) for Purchases of Prescription Antidepressants		
	Predownsizing Period (t -1 vs. -2)	Peridownsizing Period (t +1 vs. -1)	Postdownsizing Period (t +2 vs. +1)
All individuals unexposed to downsizing	1.01 (1.00, 1.03)	1.02 (1.01, 1.04)	0.95 (0.95, 0.98)
Previous health status <sup>a</sup>			
Previous SA/DP	1.06 (1.04, 1.08)	0.92 (0.90, 0.93)	0.93 (0.91, 0.95)
No previous SA/DP	0.98 (0.96, 1.00)	1.14 (1.12, 1.16)	1.00 (0.98, 1.02)
All individuals exposed to downsizing	1.05 (1.04, 1.07)	1.06 (1.04, 1.07)	1.05 (1.02, 1.08)
Employment status after downsizing <sup>a</sup>			
Stayers	1.05 (1.03, 1.06)	1.07 (1.05, 1.09)	1.05 (1.01, 1.08)
Changers	1.15 (1.07, 1.23)	1.04 (0.99, 1.09)	1.07 (1.02, 1.13)
Unemployed	1.07 (1.02, 1.12)	0.94 (0.89, 1.00)	1.06 (0.97, 1.16)
Previous health status <sup>a</sup>			
Previous SA/DP	1.09 (1.07, 1.12)	0.89 (0.86, 0.91)	0.99 (0.95, 1.03)
No previous SA/DP	1.02 (1.00, 1.04)	1.24 (1.21, 1.27)	1.11 (1.07, 1.15)
All individuals with previous SA/DP <sup>a</sup>			
Stayers	1.10 (1.07, 1.12)	0.91 (0.89, 0.94)	0.98 (0.93, 1.03)
Changers	1.16 (1.04, 1.28)	0.86 (0.80, 0.93)	1.02 (0.94, 1.11)
Unemployed	1.08 (1.02, 1.42)	0.76 (0.70, 0.81)	1.04 (0.93, 1.18)
All individuals without previous SA/DP <sup>a</sup>			
Stayers	1.01 (0.99, 1.03)	1.24 (1.20, 1.27)	1.12 (1.07, 1.17)
Changers	1.10 (0.99, 1.21)	1.22 (1.14, 1.31)	1.10 (1.03, 1.18)
Unemployed	1.06 (0.98, 1.15)	1.34 (1.22, 1.46)	1.10 (0.96, 1.26)

The odds ratios were obtained from GEE logistic regression models including year in relation to downsizing, subcohort, educational level, age, sex, family type, and region of living.

<sup>a</sup>Interaction with time was significant at  $p < 0.001$ .

DP indicates disability pension; SA, sickness absence.

a major downsizing at the workplace, which can give some indication of the importance of the phases in the change process as well as regarding the proximity to the event, although the exact timing of the change varied. The economic instability during the period is not likely to have influenced the results since we adjusted for calendar period, but the changes studied could include a mix of strategic and reactive changes.

One possible limitation of the study is that the data on downsizing is purely register based. An individual was classified as exposed to downsizing if he or she worked at a workplace that reduced their workforce by  $\geq 18\%$ , even if he or she was not personally affected by the change. Only a small portion of the exposed individuals may actually have been personally affected, i.e., working in a unit or a certain position threatened by redundancy or experiencing job insecurity in response to a threat of downsizing, especially for large workplaces which may consist of many units. Conversely, even in organizations which do not reduce their workforce by  $\geq 18\%$ , some employees could be strongly affected if they work in a division or unit which is heavily downsized. Exposure misclassification could thus contribute to an underestimation of any true effects.

The outcome measure represents clinically diagnosed problems severe enough to motivate treatment with antidepressants. However, it should be acknowledged that only parts

of the population with depressive disorders seek health care and get treated with antidepressant medication<sup>26</sup> and not all who are prescribed medication fill their prescription at a pharmacy. Antidepressant medication could also be an indicator of treatment for mental disorders other than depression as well as various somatic diseases.<sup>27</sup> The exact timing within each 12-month period of interest of the purchases of prescription antidepressants is also not taken into account. Likewise, the exact timing of downsizing within a certain 12-month period is uncertain. Hence, we cannot be sure that, within the 12-month period when someone has been exposed to downsizing, downsizing precedes the filling of antidepressant prescriptions rather than the other way around, and that job changers and unemployed were actually working at the downsized workplace at the time of downsizing. However, even if job changers and unemployed did not work at the downsized workplace at the time of downsizing they may still have experienced uncertainty before the event or a change in working conditions if the company was under (e.g., economic pressure). Following purchases of prescribed antidepressants over several years, as well as before an event, may also contribute to a better understanding of temporality and underlying mechanisms. Employment status over a longer time perspective should, however, ideally have been taken into account.

Our results indicate that downsizing may have negative consequences in terms of increased purchases of antidepressants in certain groups of working age, although the differences were modest. Still, a relatively large group of the population may be at risk, indicating that downsizing may account for a notable proportion using antidepressant medication among the working population. Considering the limitations above, it may also be suspected that downsizing is associated with a higher degree of poor mental health than observed in this study possibly including subthreshold symptoms of poor mental health. Moreover, the results are not directly generalizable to people with unstable job contracts, working in smaller organizations, or older employees. Older employees may, for example, have larger difficulties getting back into active work when laid off close to retirement age. In Sweden, as in for example Norway, strong employment protection by the seniority principle (last in, first out) might also contribute to alleviated health effects,<sup>28</sup> so stronger associations may be expected in other settings.

In conclusion, this study supports the hypothesis that major downsizing slightly increases the risk of purchasing prescription antidepressants among Swedish employed people without sickness absence or disability pension during the years before the event.

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