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Depressive symptom trajectories across working life and workload in paid and unpaid work among Swedish men and women

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Abstract Long working hours and high work load are possible risk factors for depressive symptoms, but relatively few prospective studies have been conducted thus far. Little is also known about the influence of the work environment on the course of depressive symptoms. This study aimed to use trajectories of depressive symptoms across working age to examine whether work load from paid and unpaid work predict these trajectories. The study was based on data from 4 waves of the Swedish Longitudinal Occupational Survey of Health (SLOSH, 2008-2014). We applied latent-class growth modelling in order to identify groups with similar development of depressive symptoms (depression trajectories) between ages 20 to 65. We further studied workload from paid and unpaid work as risk factors for certain pattern of symptoms and time-varying modifiers of trajectory level within each group. Six groups were identified with symptoms: 'stable very low', 'stable low', 'mild decreasing', 'recurrent mild-moderate', 'stable moderate-high through midlife', 'stable high'. More hours in unpaid work in 2008 increased the risk of belonging to the groups with 'stable moderate-high through midlife' and 'recurrent mild-moderate' depressive symptoms. When treating workload from unpaid and paid work as time-varying covariates we found that workload from unpaid work was associated with higher depressive symptoms although the effect was not statistically significant for all groups. On the other hand higher workload from paid work in terms of long working hours resulted in higher depressive symptoms for all groups except for individuals belonging to the group 'stable moderate-high through midlife'. Females predicted depressive symptoms in all groups when compared to the 'stable very low' group. This study supported that are heterogeneous individual patterns of depressive symptoms over the working life. The results also indicate that workload both from paid and unpaid work influences the evolution of depressive symptoms across age.

1 Introduction

Mental health problems and especially depression are of major public health concern, owing to the high prevalence and substantial negative consequences on personal functioning but also work productivity. It is well known that onset of depression may vary between individuals and that symptoms occasionally recur over the life course. However, relatively few studies have investigated the course of depressive symptoms in the general population (Steinert et al 2014). Little is also known in about individual trends in the development of depressive symptoms since most longitudinal studies focus on the analysis of the mean trend of depressive symptoms over time by using growth curve modeling techniques or hierarchical linear modelling (Castelao and Kröner-Herwig 2013). Advanced statistical approaches in growth modelling, such as latent class growth analysis, however, provide a flexible and easily applied method for identifying distinctive clusters of individual trajectories within the population and for profiling the characteristics of individuals within the clusters (Nagin 2005). These models can thus be used to identify distinctive trajectory groups of people with different long-term patterns of depressive symptoms, some of which may be associated with more functional limitations.

It has also been suggested that different risk factors may be associated with different long-term patterns of depressive symptoms (Colman, 2010; Papachristou 2013), but very few studies thus far have investigated how environmental factors influence the development of depressive symptoms over the long-term. It has been suggested that factors such as sex, socioeconomic status, history of depression or psychopathology, and stressful life events relate to different courses of development (Musliner et al 2016). One study by Hardeveld et al (2010) also suggested that stress-related factors, including certain work stressors, predicted recurrent major depressive episodes. However, little is still known about the influence of potentially modifiable factors such as work-related characteristics on different long-term patterns of depressive symptoms. Work stressors such as high work demands or high demands in combination with low control (job strain) have generally been implied as risk factors for depressive symptoms (Bonde, Netterstrom 2008, Theorell et al 2015). Bannai and Tamakoshi (2014) concluded that also long working hours is associated with depressive states. However, non-work stressors may also be associated with poorer mental health (Clark et al 2012). Especially a “double burden” of work and non-work related responsibilities could have a negative health effect. This kind of double burden or high total workload has been suggested to contribute to common physical and mental symptoms (Krantz and Ostergren 2001), but more knowledge is needed on both changes in stress from workload in paid and unpaid work, and the interplay between these stressors, over the life course, and how they influence health among men and women (Payne and Doyal 2010).

The aim of this study was to identify different developmental courses /trajectories of depressive symptoms over the working life of Swedish men and women, and examine how work load in terms of long working hours and hours spent in unpaid work are associated with different trajectories.

2 Methods

2.1 Data

Study Population The study population consisted of participants from SLOSH (Swedish Longitudinal Occupational Survey of Health) study, a longitudinal cohort study which focuses on work life participation, social situation, and health/wellbeing with repeat self-reported measures every second year (starting in 2006) on an originally representative sample of the Swedish working population.

Study Sample The present study is based on those who responded to the SLOSH questionnaire and were in paid work more than 30 % of full time in all four waves with start year 2008 (6291 participants).

Time Axis We applied an accelerated longitudinal design (Raudenbush and Chan 1992), using age rather than calendar years as the time variable. This allowed assessment of depression trajectories over an age range between 20 and 70 years based on a 6 year period (2008-2014). However, we limited our analyses to the individuals aged 20-65 years of age, the typical working age.

2.2 Measures

Outcome: Depressive symptoms were measured with a brief subscale from the Hopkins Symptom Checklist (SCL-90), the SCI-CD6 (Magnusson Hanson et al 2014) which assesses perception of being troubled by: Feeling blue; Feeling no interest in things; Feeling lethargy or low in energy; Worrying too much about things; Blaming yourself for things; and Feeling everything is an effort, quantified on a five-category scale from 0=Not at all to 4=Extremely. The six items represent core symptoms, selected based on principals of clinical validity. The scale has validated and was found to have good psychometric properties and results have showed that the items are suitable to add into a composite score indicative of depression severity (Magnusson Hanson et al 2014).

Workload: Workload was measured repeatedly 2008-2014 by a modified version of a measure developed and psychometrically evaluated by Mardberg et al (1991). In addition to hours/week in paid employment and overtime at work, constituting a measure of workload from paid work, the instrument covers unpaid work activities, such as household duties (mending, sewing, laundry, gardening), childcare (homework/teaching, care-taking, playing) and other unpaid duties (voluntary work in unions and organizations, care of sick or elderly relatives). Hours/week spent on household duties (shopping, cleaning, cooking, mending, sewing, laundry and gardening) and on childcare (homework/ teaching, care taking, playing) were added to a measure of unpaid work. In this study workload from paid work was divided into 4 categories: <40, 40-49, 50-59, 60+ working hours/week. An exception was in SLOSH 2010, then the corresponding categories were <41, 41-50, 51-60, 61+. Workload from unpaid work was also divided into 4 categories: <8, 8-11, 12-20, 21+ hours on average/week). The total number of hours spent on paid and unpaid work constituted the total workload measure also divided into the following 4 categories: <58, 58-67, 68-80, and >80 h/week.

2.3 Statistical Analysis

Group-based trajectory modelling (GBTM) was used in order to identify distinctive groups of individuals who can be classified into groups with similar developmental trajectories over time, and examine whether work load predicts the development of depressive symptoms.

Group-based trajectory modelling (GBTM) is a semi-parametric model-based clustering technique that is mostly applied for the identification of latent groups of individuals following a similar progression of an outcome over time (Nagin 2005). Model estimation produces posterior probabilities of membership in each trajectory group for each participant. These probabilities are then used to assign individuals to the trajectory group to which they have the highest probability of belonging.

An accelerated longitudinal design was adopted in our analysis in order to use age rather than calendar years as the time variable. The first step before the GBTM analyses was to rearrange data from the 4 SLOSH waves (years 2008 to 2014) so as to follow a longitudinal design covering an age span ranging from 20 to 65 years of age.

In order to select the best model we followed Nagins' recommended two-step procedure for model selection. Firstly the number of latent trajectories is selected based on fit indices. Subsequently the order of the polynomials describing the level and shape of the latent trajectories is determined. We first considered with a single trajectory model for depression described by a cubic polynomial. In the

next step we revised the model by increasing the number of groups using fit criteria. Trajectory models with two to eight groups and varied shapes were compared. Estimation of depression trajectories was accomplished using the censored normal model (CNORM), which is appropriate for continuous data.

We relied on several criteria to choose the best model. The Bayesian Information Criterion (BIC) is one of the most commonly used fit statistics to determine the number of subgroups with the model with value closer to zero providing the best fit (Nagin 1999, 2005). In general BIC measures improvement in model fit gained by adding more parameters (e.g. more groups and more complex trajectory shapes) but also emphasizes model simplicity by applying a penalty for complex models (Kass and Raftery, 1995). We further considered the Akaike's Information Criterion [AIC], the significance of polynomial terms (at the confidence level α 0.05), the values of group membership probabilities and of average posterior probability (entropy) (Nagin and Odgers, 2010; Andruff et al., 2009). Entropy is an index used in classification accuracy based on posterior probabilities with higher values denoting better classification. A value greater than 0.7 for all groups is generally recommended since it indicates that the trajectory encompasses individuals with similar patterns of change and discriminates between those with dissimilar patterns of change (Nagin, 2005). Although there is a big discussion in the literature on which measures to use for the selection of the best model, there is no commonly accepted single standard model fit statistic but there are several suggestions from existing simulation studies (Henson et al. 2007, Nylund et al. 2007). The magnitude of difference in BIC, the Bayes factor as well as the BIC-based probability approximation were used to choose between more complex and simpler models (Nagin, 1999; Nagin and Odgers, 2010; Jones, Nagin and Roeder, 2001). A Bayes factor is the ratio of the probability of model 1 being the correct model to the probability of model 2 being the correct model (Nagin, 2005). If two models have equal probability of being correct the Bayes factor would be one. Values than 1 favor model 2 whereas values greater than one imply that model one has a higher probability of being the correct model.

After selecting the optimal model in terms of fit we selected the shape for each of these groups. The trajectory model was fitted using maximum likelihood methods that allow for incomplete data and assumes that missing data were missing at random.

After finding the optimal trajectory model we included risk factors i.e. factors influencing the probability of membership of a particular trajectory group in 2008, and covariates. Workload from paid work and from unpaid work were considered simultaneously relative to the defined trajectory groups as time-invariant covariates (risk factors) and time varying covariates (TVCs) measured in 2008-2014). Coefficients for risk factors indicate the increase in relative odds of being in a trajectory (relative to the lowest group) per unit change in the risk factor (Nagin, 2005). Coefficients for TVCs can be interpreted as: given membership in a trajectory group, how much higher (if coefficient is positive) or lower (if coefficient is negative) is the depression trajectory for a unit increase in the covariate. Unadjust-

ed models as well as models adjusted for sex (0 men, 1 women), civil status (0 not married, 1 married or cohabiting) and socioeconomic status (Statistics Sweden, 1982) were presented. We further conducted the same analyses for men and women separately. In addition, we have considered the potential influence of life stage at baseline by adjusting for three age groups: young adulthood (20-34), midlife (35-49) and mature adulthood (50-65).

The GBTM analyses were conducted using the PROC TRAJ procedure developed by Jones and Nagin, which can be downloaded from <http://www.andrew.cmu.edu/user/bjones> (Jones et al., 2007; 2001) in the SAS software (version 9.4; SAS Institute).

3 Results

Our fit evaluation of the different models resulted in the selection of a model with six trajectories with a linear order for four groups suggesting a linearly decreasing or increasing trajectory, and a cubic order for two of the groups suggesting a trajectory where there are two turning points (inflections), a maximum and a minimum in depressive symptoms. Figure 1 depicts the shapes of the six trajectories obtained from the GBTM analysis as well as their class sizes. The pattern of symptoms over the working life could be described as either “stable very low”, “stable low”, “mild decreasing”, “recurrent mild-moderate”, “stable moderate-high through midlife” and “stable high”. The trajectories named ‘stable very low’, ‘stable low’ and ‘stable high’ followed a slight downward linear trend as people got older, but remained either at a low to mild level (<12 on the depression scale) or at a high level (>16 on the depression scale). The majority of individuals were classified in either the ‘stable low’ (43.8%) or ‘mild decreasing’ (25.3%) group. The ‘stable high’ group represented the smallest group (2.1%). The ‘stable moderate-high through midlife’ group (8.8 %) followed a quadratic trend with two turning points. In this group a moderate decrease in symptoms was evident during young adulthood (until about 35 years of age), after which symptoms remained on a moderate level throughout midlife, followed by a steeper decrease during mature adulthood (from ages 50 and onwards). For the ‘recurrent mild-moderate’ group (8.2 %) the pattern was also described by a quadratic trend with a decrease in symptoms from mild to low during young adulthood, but with an increase in symptoms to moderate in midlife. The former group thus appeared to have recurrent symptoms over the working life, while two groups the ‘stable very low’ and the ‘stable low’ group, appeared to be free of limiting symptoms over the working life. Altogether there were 3 favorable (mild decreasing, stable low and stable very low) and 3 unfavorable (recurrent mild-moderate, stable moderate-high through midlife, and stable high) trajectories.

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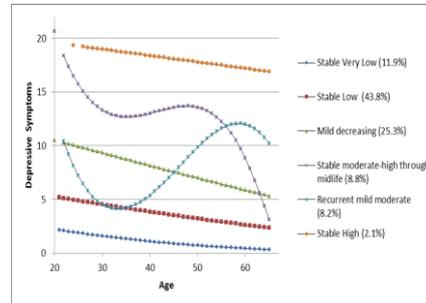


Fig. 1: Depression trajectories (20-65 years), (six-group model, no-time invariant covariates or TVCs), SLOSH, 2008-2014; standard errors are given in parentheses

A description of the demographic characteristics and the distribution of paid-unpaid workload in the year 2008 for the six trajectory groups are given in Table 1. The mean age was lowest in the ‘stable moderate-high through midlife’ trajectory (46.4 years), followed by ‘very low stable’ trajectory and ‘mild decreasing’ (Table 1). The proportion of women varied from 46.6 % in the ‘very low stable’ to 69.4% in the ‘stable moderate-high through midlife’ and 65% in the ‘stable high’ trajectory whereas proportion of married individuals varied from 83% in the ‘stable very low’ trajectory to 50.7% in the ‘stable high’ trajectory. Overall there was a higher proportion of women in the unfavorable trajectories. The highest proportion of unskilled manual workers was in the ‘stable high’ group, while the highest proportion of skilled manual workers was in the ‘stable very low’ trajectory. Assistant non-manual employees represented the highest proportion in the ‘stable moderate-high through midlife’ group while the ‘mild decreasing’ group was represented by a high proportion of other non-manual employees. The higher proportion for self-employed appears to be in the ‘stable very low’ trajectory. Generally it also seemed as a higher proportion of individuals spent high number of hours on unpaid work in the unfavorable trajectory than in the favorable trajectory groups.

Table 1. Characteristics of the trajectory groups in terms of demographic characteristics and workload from paid and unpaid work in Wave 2008

		Stable very low	Stable Low	Mild de- creasing	Stable moderate- high through midlife	Recurrent mild- moderate	Stable High
Mean Age		49.82	52.29	50.17	46.37	56.14	50.67
Sex (% females)		46.64	55.83	62.35	69.46	63.82	68.32
Civil sta- tus (% married)		83.13	80.91	78.46	73.50	79.02	65
SEI	Unskilled Manual Workers	16.07	14.18	15.49	14.88	13.81	20.83
	Skilled Manual Workers	18.21	14.40	12.93	14.05	15.02	13.54
	Assistant Non-Manual Employees	11.07	12.40	13.06	12.12	15.02	13.54
	Intermediate Non-manual Employees	29.64	31.45	32.59	31.96	30.63	26.04
	Higher non- manual em- ployees	17.68	20.95	21.35	20.11	19.22	18.75
	Self- employed	7.32	6.62	4.58	6.89	6.31	7.29
Work Load paid work (hrs per week)	(% <40 or 41)	28.93	30.60	29.29	33.33	36.14	30.77
	(% 40/41- 49/50)	50.49	50.76	50.80	51.07	44.91	51.28
	(% 50/51- 59/60)	13.20	12.04	12.28	9.48	12.28	12.82
	(% 60/61+)	7.38	6.60	7.63	6.12	6.67	5.13
Workload unpaid Work (hours per week)	<8	24.15	20.16	17.74	10.37	18.58	14.49
	8-11	21.79	22.43	21.45	17.39	16.21	21.74

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12-20	20.94	22.04	22.03	19.73	26.88	18.84
21+	33.12	35.37	38.78	52.51	38.34	44.93

When examining the role of workload as risk factor for trajectory group, higher workload from paid work at the baseline measurement (2008) were not clearly associated with a higher or lower likelihood of a certain trajectory in the model adjusting for sex, civil status and socioeconomic status. Individuals with higher workload from unpaid work, however, had increased likelihood of being in the three unfavorable trajectory groups and the mild decreasing trajectory compared to the very low stable trajectory group, but the results were statistically significant only for 'mild decreasing', 'stable moderate-high through midlife', and 'recurrent mild-moderate' groups in the adjusted model.

Sex, civil status and socioeconomic status were included in the adjusted models as potential predictors (risk factors) of the trajectory group membership. Females were a statistically significant predictor (results not shown) of membership in all the groups compared to the 'stable very low' group. Being married or cohabiting predicted the membership in the 'stable moderate-high through midlife' and 'high stable' groups (statistically significant at 5%) compared to the 'very low stable group'. Similar results were found for the unadjusted models although there were some differences in terms of the statistical significance of the estimates. We further adjusted for three age groups. In that case we found that people in the age group (35-49) had a lower likelihood for being in most of the groups compared to the 'stable very low' group but the results were only statistically significant for those with 'stable low' symptoms. Regarding the age group (50-65) we found that people in this group showed higher likelihood of being in the stable moderate-high through midlife group and lower likelihood in all other trajectory groups with statistically significant effects only for group 'stable low'. We also tested for interaction effects between the different age groups and workload from paid/unpaid work but there was no indication of statistically significant interaction effects.

Table 2. Increase in relative odds of being in a certain trajectory group as compared to being in the very low stable group, according to workload at baseline

	Coefficients (SE) Unadjusted model		Coefficients (SE) Model adjusted for sex, civil status and SEI	
	Workload Paid Work	Workload Un- paid Work	Workload Paid Work	Workload Un- paid Work
Stable very low	-	-	-	-
Stable low	-0.02 (0.01)	0.20(0.09)*	-0.02 (0.01)	0.14 (0.09)
Mild decreasing	-0.01 (0.01)	0.14 (0.08)	-0.00 (0.01)	0.04 (0.08)*

Stable moderate-high through mid-life	-0.01 (0.01)	0.39 (0.09)*	-0.01 (0.01)	0.33 (0.09)*
Recurrent mild-moderate	-0.03 (0.01)*	0.43 (0.10)*	-0.02 (0.02)	0.32 (0.10)*
Stable High	-0.01(0.02)	0.38 (0.18)*	0.005 (0.02)	0.31 (0.18)

* p value < 0.05

These analyses were also stratified by sex. However, there were no major differences between men and women. If anything, workload due to unpaid work seemed a stronger predictor of group membership in the 'recurrent mild-moderate' group for women, but the power was insufficient for further comparisons (data not shown).

Both paid work and unpaid work over the study period were associated with depressive symptoms across the working age but the results varied in terms of direction and statistical significance for the various groups (Table 3). An increasing level of workload due to paid work was associated with higher depressive symptoms (when adjusted for sex, civil status and socioeconomic status) in all groups except for the 'stable very low' group. Higher work load due to unpaid work (adjusted model) was statistically significantly related to an increase in depressive symptoms in the 'stable low', 'recurrent mild-moderate' groups but associated with a downward trend in depressive symptoms in the 'stable moderate-high through midlife' group (statistically significant at 5%).

Table 3. Influence of workload on the trajectory level within each group (standard errors are given in parentheses; * statistically significant at 5%)

	Coefficients Unadjusted model		Coefficients Model adjusted for sex, civil status, SEI	
	Workload Paid Work	Workload Unpaid Work	Workload Paid Work	Workload Unpaid Work
Stable very low	-0.04 (0.03)	0.26 (0.18)	-0.01 (0.03)	0.15 (0.17)
Stable low	0.03 (0.01)*	0.12 (0.06)*	0.07 (0.02)*	0.49 (0.11)*
Mild decreasing	0.05 (0.01)*	0.34 (0.08)*	0.03 (0.01)*	0.09 (0.06)
Stable moderate-high through midlife	-0.04 (0.03)	0.14 (0.13)	-0.12 (0.04)*	-1.35 (0.35)*

Recurrent mild-moderate	0.82 (0.10)*	4.63 (0.82)	0.08 (0.04)*	1.60 (0.35)*
High stable	0.05 (0.04)	0.16 (0.21)	0.10 (0.04)*	0.19 (0.22)

Analyses of the total work load (measured as <58hrs/week, 58-67 hrs/week, 68-80 hrs/week, >80hrs/week) finally showed that a higher total workload increased the likelihood of being in the ‘mild decreasing’ trajectory and tended to increase the likelihood of being in the ‘high stable’ group, although the latter risk estimate was not statistically significant in the adjusted model. Furthermore, no significant interaction was observed between the workload paid work and workload unpaid work for any of the six trajectories.

4 Discussion

The current study examined patterns of depressive symptoms throughout ages 20-65 years for an initially representative sample of working men and women as part of the Swedish Longitudinal Occupational Survey of Health (SLOSH) study (waves 2008-2014), and the influence of workload due to paid and unpaid work.

The first objective was to determine whether there are distinct trajectories of depressive symptoms in the working population. This work identified six distinct depression trajectories between ages 20 and 65.

In accordance with data on major depressive disorder in different ages (Ferrari et al 2013), we observed higher levels of symptoms around the ages 45-54 in one of the groups, although the peak occurred little later in one of the groups. However, a relatively high proportion, around 5 % of the population, already experience depression around 20-24 years of age (Ferrari et al 2013). It has also been found that a relatively high proportion of people in the general population have a recurrent episode of depression and that a considerable proportion of the general population experience a stable recovery after a depressive episode (Steinert 2014). It is therefore not surprising that we also found several groups with a decreasing symptoms levels. A smaller proportion could also be expected to have a more chronic course as observed in the present study.

Studies on individual trajectories of depressive symptoms in the general adult populations are still relatively rare. Musliner et al, however, reviewed mainly population based studies in different age periods and concluded that stable patterns were common such as stable low symptoms. A small group with stable high symptoms as in our study have also commonly been found in other studies. Patterns with varying degree of symptoms over time were more seldom observed. Howev-

er, in line with some previous work on depressive and anxiety symptoms (Colman et al 2007) we also identified trajectory profiles with decreasing symptoms in adulthood, repeated mild-moderate symptoms, moderate symptoms starting in midlife. In contrast to Colman et al (2007) studying depressive and anxiety symptoms up to age 53, we did, however, not observe any group with onset of severe symptoms during the study period.

Our next goal was to determine whether work load influenced the above trajectories. Consistent with other reports (Musliner et al 2016) sex predicted depressive symptoms in all trajectory groups but neither civil nor socioeconomic status was associated with depression for the majority of the six groups. Some other studies did, on the other hand, find that educational level or income predicted trajectories with high symptom burden (Musliner et al 2016) as well as occupational grade (Melchior et al 2013). Moreover, it has previously been indicated that factors such as problems with peers and parents, alcohol/tobacco/drug use, parental history of depression and negative cognitive styles could lead to worse depression trajectories over time among children/adolescents (Musliner et al 2016). Among older people, poor self-rated health, past history of somatic illness, functional and cognitive impairment and low social support have been associated with negative development of symptoms. Stressful life events has also a found to be a predictor of poor depressive symptom trajectories (Musliner et al 2016). This work suggest that also workload is associated with unfavorable long-term trajectories of depressive symptoms. Both workload from paid work and unpaid were associated with depression over age progression. Analyses of work load as a time-varying covariate showed that workload from both paid and unpaid work was generally associated with an increase in depressive symptoms supporting some previous findings (Virtanen et al 2011, 2012, Shields 1999, Krantz Ostergren 2001, Krantz et al 2005). It is possible that this increase may lead to a rise in symptoms from moderate level to severe in some cases.

Individuals with higher work load from unpaid work at baseline were also at increased risk of belonging to the 'mild decreasing', 'recurrent mild-moderate', and 'stable moderate-high through midlife' groups compared to the 'stable very low' group. Higher workload from paid work was, however, not clearly associated with a certain trajectory. The study further indicated that a higher total (double) burden increased the likelihood of one of the most unfavorable trajectories.

Some strengths of the study are that it was conducted in a sample from the general working population, and with measures of depressive symptom every second year over a period of 8 years. In contrast to studies of depression trajectories in clinical population, studies in the entire population may more accurately represent the true underlying continuum of the disorder (Musliner et al 2016). The accelerated design also allowed us to characterize depressive symptoms trajectories over the entire working age. Dropout from the study, however, may have restricted the possibility to detect heterogeneity. Given that the subjects were originally working and repeatedly in paid work for more than 30 % over the study period, the sample

is probably characterized by relatively healthy individuals with high educational level etc.

We based the trajectories on four time points, which is above the minimum required for estimating quadratic trajectories, but the more time points to estimate cubic trends the better (Andruff et al., 2009). We further used an accelerated design to make the most of these data. This allowed us to model symptom trajectories over a much longer time period. There are, however, potential problems associated with this approach. One is inferential ambiguity due to an age-cohort interaction (Raudenbush and Chan 1993). We tested and found no evidence of an age interaction in the main models but this may be associated with uncertainty due to a relatively small number of overlapping time points in adjacent cohorts. A longer time series of measurement may also have contributed to more power for identifying heterogeneity in symptoms over time and potential determinants of different trajectories.

Another limitation of the present study is that we were not able to measure symptoms in childhood. Some individuals may therefore already have had high symptoms in childhood making it difficult to disentangle onset of moderate or severe symptoms. Data were also missing on family history of mental health problems and childhood/adolescent characteristics, which may be predictors of depressive symptoms trajectories and workload and may confound the relationships of interest. Finally, when relating time-varying covariates to the trajectory it is possible that the depressive symptoms over time may influence later workload measures, thus we are not able to draw any causal conclusions based on these analyses. It is less likely though that the depression trajectory influences the initial measurement of workload suggesting that there may be a causal association between unpaid workload and depression trajectories over the working life.

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