GLUCOSE METABOLISM IN MIDLIFE IS ASSOCIATED WITH PRECEDING 30-YEAR EMPLOYMENT TRAJECTORIES: A NORTHERN FINLAND BIRTH COHORT 1966 STUDY

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ABSTRACT

Objective: To evaluate how glucose metabolism in midlife is related to preceding 30-year-long employment trajectories.

Methods: In the Northern Finland Birth Cohort 1966 we compared glucose metabolism at 46 to employment trajectories (previously defined for men and women and named as high-educated, traditional, self-employed, delayed, and floundering), (n=6399).

Results: Compared to individuals in high-educated trajectories, OR for T2D (95%CI) in traditional and floundering trajectories in men was 1.65 (1.02 to 2.68) and 2.42 (1.38 to 4.23), and in women 1.89 (1.04 to 3.43) and 2.60 (1.46 to 4.62), respectively. In self-employed trajectory in women OR for prediabetes and T2D was 1.66 (1.09 to 2.51) and 2.47 (1.21 to 5.04).

Conclusions: The highest risks for T2D in midlife was associated after traditional and floundering trajectories in men and women, and after self-employment trajectory in women.

Key words: type 2 diabetes, unemployment, longitudinal cohort study, life course epidemiology, employment trajectory

INTRODUCTION

Secure employment in favorable working conditions has been associated with a reduced risk of developing limiting illness,(1). In turn, unstable attachment to labor market and unemployment have been associated negatively with health,(1–9). The relationship between unemployment and health appears bi-directional; unemployment may cause ill-health, and ill-health may cause job loss and hamper re-employment,(9–15). Accumulation of unemployment, through repeated spells or longer periods, has been observed to be more harmful to health than short-term unemployment (accumulation hypothesis),(6,16,17). Moreover, unemployment has been suggested to leave a scarring effect on health (scarring hypothesis),(16), especially if occurring in young adulthood,(4,17).

Genetic, environmental, socioeconomic, and behavioral factors during the life course interplay in the ground of T2D,(18,19). Regarding employment-related factors, low educational level, low income, low occupational class, job insecurity, work stress,(20–23)as well as lack of work, unemployment, have been observed to associate with T2D,(24). However, a larger perspective over the life course, considering childhood and behavioral factors jointly with employment-related T2D risk factors remains needed.

Within the Northern Finland Birth Cohort 1966 (NFBC1966) sample, we found in a retrospective study that accumulation of registered unemployment days during three years was related to impaired glucose metabolism at age 46 in men,(25). As we continued to a two-year follow up of incident unemployment days, we found that the men and women with T2D had increased rates of unemployment days compared to those with normal glucose metabolism,(26). In order to further evaluate the relevance of longer-term patterning of unemployment and labor market attachment, latent class trajectory analysis has been suggested a method of choice for identifying clusters of individual work-life courses into a meaningful set of trajectories,(4,9,27). Ek et al. recently published a 30-year employment trajectory analysis in the NFBC1966, based on life history calendars filled at age 46, where the participants retrospectively listed all their yearly employment-roles between ages 16 to 45 as a full-time employee, part-time employee, self-employed, unemployed, student,

on parental leave and on sabbatical leave or otherwise not working,(28). The resulting five employment trajectories, defined separately for the men and women, were named as highly educated, traditional full-time, self-employed, delayed full-time and floundering employees,(28). In both men and women, the yearly probabilities of unemployment were heavily concentrated to the floundering trajectories throughout the follow-up, and to a smaller extent to the delayed employees' trajectories at 1990s when the participants were in their late twenties and early thirties, whereafter they were largely employed full-time,(28).

The aim of this study was to analyze how clinically measured glucose metabolism at age 46 would associate with the preceding 30-year employment trajectories previously. Alongside the accumulation hypothesis, we expected T2D to associate with the floundering trajectories, and by the scarring hypothesis with the delayed employees' trajectories. Within the traditional employees' trajectories, characterized with lower educational status, we expected to find more T2D cases than in the highly educated trajectories. We set no expectations for the self-employed trajectories as previous evidence is scarce and ambivalent,(29,30). As possible confounders, we considered a wide range of health-related and socioeconomic factors from childhood to middle age.

METHODS

The NFBC1966 started by targeting all pregnant mothers with expected date in 1966 in the two northernmost provinces in Finland (N= 12 058 live-born children, 96% of all births in the area in 1966),(31). In this study, we included data from the maternity clinics on pregnancy and delivery, survey data at age 14 and data from the 46-year follow-up, comprising questionnaires in 2012 and clinical examinations during 2012-2014,(32). All the participants provided written informed consent to use their data in the study, conducted according to the Declaration of Helsinki. The Ethics Committee of Northern Finland Hospital District approved the study.

We included all the participants providing data on both employment trajectories (N= 6496) and glucose metabolism (N= 7042) in the 46-year study (final sample N= 6399, 45.3 % men).

Glucose metabolism

As part of the 46-year follow-up, the participants without previous diabetes were invited to oral glucose tolerance test (OGTT). If the person did not undergo OGTT, the possible previous diabetes diagnosis was obtained from nurses' OGTT comments or from survey question about having been diagnosed by a doctor with type 1 or type 2 diabetes. Those with type 1 diabetes were excluded (N=28). If both the OGTT-based and survey-based data were missing, we used glycated hemoglobin concentrations (HbA1c). Glucose metabolism was categorized by WHO criteria for OGTT and ADA criteria for HbA1c as normal (fasting plasma glucose <6.1 mmol/L, 2-hour plasma glucose <7.8 mmol/L or HbA1c <39 mmol/mol), prediabetes (fasting glucose ≥ 6.1 but <7.0, or 2-hour glucose ≥7.8 but <11.1 mmol/L, or HbA1c 39-47 mmol/mol) and T2D (fasting plasma glucose ≥7.0, or 2-hour glucose ≥11.1 mmol/L, or HbA1c ≥ 48 mmol/mol),(33,34).

30-year-long employment trajectories

We used the NFBC1966 employment trajectories, previously identified by latent class analysis (LCA) of life history calendar markings in the 46-year survey,(28). Participants had marked for each year between ages 16 to 45, whether they had occupied one or more of the following roles: 1) student, 2) full-time employee, 3) part-time employed, 4) self-employed, 5) unemployed, 6) in parental leave, 7) on sabbatical leave or otherwise not working. Regarding the gendered labor market, the LCA was done separately for men and women. A five-class solution was considered the best fit for both genders. The classes could be similarly labeled.

The five employment trajectories were named as follows: 1) highly educated employees (men N=711/24.5%; women N=934/26.7%), characterized by several years in studies and later stable full-time employment, 2) traditional full-time employees (men N=889/30.7%; women N=819/23.4%), with less years in studies

followed by high probabilities of working full-time, 3) self-employed (men N=392/13.5%; women N=317/9.1%), typically with some years in studies, then some years in full-time work before switching to self-employment around late twenties or thirties, 4) delayed full-time employees (men N=576/19.9%; women N=676/19.3%), with high probabilities of unemployment and part-time work during the early 1990s' deep recession, followed by full-time work afterwards and 5) floundering (men N=332/11.4%; women N=753/21.5%), with unemployment and part-time work and being out of the workforce heavily concentrated in this trajectory. Further details are presented in the open access article of Ek et al.,(28).

Covariates

We considered a wide range of health-related and socioeconomic factors potentially associating with glucose metabolism and/or employment trajectories during the pre-employment phase and in midlife. Birth weight was corrected for gestational age, stratified for sex,(35) and categorized as normal or low, as indicated by > -1 or ≤-1 standard deviation (SD), respectively. Father's occupational status at age 14 (if missing, mother's) was classified as white collar or other (skilled/unskilled worker or farmer) to depict childhood family socioeconomic status (SES). At age 46, self-rated health was based on question "How would you estimate your current state of health" and dichotomized as good (very good or good) or poor (moderate, poor, or very poor). Weight (kg) and height (cm) were recorded to calculate body mass index (BMI, kg/m2), categorized as normal (<25), pre-obesity (25-29.9) and obesity (≥30). The surveyed behavioral factors were healthy diet, depicted as eating fresh vegetables daily (once a day or more often) or not (nearly daily, couple of times a week, once a week, once or twice a month or never), smoking (current, former, never), alcohol consumption (grams per day trichotomized separately for men and women) and leisure-time physical activity (low, moderate, high),(25). Among those currently employed, perceived job security was categorized as good (very or rather good) or poor (rather or very poor) and working time per week was dichotomized as ≤50 hours or over to consider overtime work. Living in a relationship was categorized into yes (married, cohabiting or in a registered partnership) or no (single, divorced, or widowed). Self-reported annual family income was classified into four groups along Statistics Finland categories in 2012: 1) <20000, 2) 20000 to 50000, 3) 50001

to 80000 and 4) >80000 euros. Educational level was dichotomized into low (college degree at highest) or high (polytechnic or university degree). Current employment situation was based on the question "Which of the following describes your current status" and categorized as full-time employee (permanent or fixed-term) or full-time self-employed, unemployed (unemployed, training under labor market subsidy, or laid-off), retired, part-time worker (permanent/fixed-time/self-employed) or other (student, homemaker, family leave or other). With more than one selection, unemployment was ordered primary, full-time self-employment (entrepreneurship) next, then full-time paid employment, retirement, part-time employment (self- or paid employment) and other.

Statistical analysis

We used cross-tabulations and χ^2-tests to evaluate the differences in the glucose metabolism categories at age 46 according to the potential covariates at ages 0, 14 and 46 and the employment trajectories,(28).

Multinominal logistic regression analysis was used to calculate the odds ratios (ORs) and their 95% confidence intervals (CIs) for having prediabetes or T2D at age 46 in relation to the preceding employment trajectories, first unadjusted, then adjusted separately for each potential confounder, and lastly adjusted for all covariates together.

We conducted all analyses separately for men and women, using IBM SPSS statistics V.25 (1989, 2017).

RESULTS

Compared to those with normal glucose metabolism, the men and women with T2D were more often born with low birth weight ($p< 0.05$), and rated less often their health as good, were more often with obesity, were less frequently physically active, and were more often unemployed at age 46 ($p< 0.001$). The prevalence of T2D was 5.3% among men and 3.3% among women (table 1).

The distributions of covariates by the employment trajectories are shown in table 2 for men and in table 3 for women. Normal birth weight was the least common in men belonging to the floundering trajectory

(p<0.05) but was not associated with employment trajectories in women. High childhood family SES was the least common in the floundering trajectory in men, and in the delayed trajectory in women. At age 46, good self-rated health was the least common, whereas obesity, non-daily consumption of fresh vegetables, high alcohol intake and low physical activity were the most common in the floundering trajectories in both men and women. Current smoking was the most prevalent in the floundering trajectory in men and in self-employed trajectory in women. Family income was low (<20000 euros) for more than a third of men and a quarter of women belonging to the floundering trajectories and for a sixth of women in the self-employed trajectory, rarely in other trajectories. Working over 50 hours per week was over four times more common in the self-employed trajectories of men and women compared to other categories. At age 46, current unemployment in men was more prevalent in the floundering (28.8%) and delayed (9.5 %) trajectories compared to others (<6%). In women, the corresponding figures were 14.3%, 6.3% and <4 %, respectively.

Regarding glucose metabolism in men, prediabetes was not associated with employment trajectories. In men, the prevalence of T2D appeared over two-fold in the floundering trajectory as compared to those in high-educated trajectory (8.1% and 3.7%, respectively) (p=0.096). Among women, prediabetes was more prevalent in the self-employed trajectory (12.0%) than in the others (ranging 7.8% to 9.8%). The prevalence of T2D was over two-fold among women in the self-employed or floundering trajectories compared to the highly educated (4.4%, 4.8%, 1.9%, respectively) (p<0.05).

The risks for prediabetes and T2D by the trajectories are shown in table 4 for men and in table 5 for women. Among men, odds for prediabetes were not associated with the trajectories. The men in the traditional employee's trajectory had an elevated risk for T2D (OR 1.65, 95% CI 1.02 to 2.68) compared to the high-educated trajectory, significant even after adjustments for birth weight or employment at age 46, but diluted when health-related, behavioral, and socioeconomic covariates were considered. The highest risk for T2D (OR 2.42, 95% CI 1.38 to 4.23) emerged in the floundering trajectory in men, withstanding adjustments for childhood factors, obesity status, health behaviors, relationship, education, or current work.

Among women, the risk for prediabetes was heightened (OR 1.66, 95%CI 1.09 to 2.51) after the self-employed trajectory as compared to the high-educated, robustly even when birth weight and general health, obesity status, health behaviors, marital status, education, job security or employment status at age 46 were adjusted for, and not much changed when childhood SES, family income or overwork were considered. Notably, also the risk for T2D was very robustly heightened among women in the self-employed trajectory (OR 2.47, 95% CI 1.21 to 5.04), with only adjustments for job insecurity or overworking diluting the association. Moreover, the odds for T2D were heightened in women in the traditional employees' (OR 1.89, 95% CI 1.04 to 3.43), and floundering trajectories (OR 2.60, 95% CI 1.46 to 4.62), as compared to the high-educated trajectory. Again, in the traditional employee's trajectory, the association vanished when many of the indicators of socioeconomic status and health were considered, whereas in the floundering category, only adjusting for job security diluted the observed robust association between belonging to the floundering employment trajectory and having T2D at age 46 among women.

Controlling for all potential covariates at the same time, with inherent risk of overadjustment, diluted the associations to non-significant in all models.

DISCUSSION

To the best of our knowledge, this is the first general population-based study comparing employment trajectories from adolescence onwards to clinically measured glucose metabolism in midlife. In both men and women, odds for T2D were about 2.5-fold after floundering employment trajectories and over 1.5-fold after traditional employees' trajectories, compared to the high-educated ones. As a novel finding, belonging to the self-employed employment trajectory associated with 2.5-fold odds for T2D, and 1.7-fold odds for prediabetes in women.

All observed associations were robust to controlling for birth weight and largely also for childhood socioeconomic status, suggesting an independent association between employment trajectories over the life course and glucose metabolism in midlife. The results support our assumption of a higher risk for T2D after floundering employment trajectories, characterized by lifelong higher exposure to unemployment, and thus strengthen earlier evidence in favor of the accumulation hypothesis. Within the traditional trajectories in men and women, the poorer health and behaviors, lower education and lower family income appeared important underlying factors behind the association with T2D, whereas in the self-employed trajectory in women, overwork and job insecurity seemed to play a role. We found no evidence supporting the scarring hypothesis, since glucose metabolism in midlife was not related to the delayed employees' trajectories with higher unemployment exposure in young adulthood. Indeed, re-employment has been observed to be associated with regaining health,(1,14,36). Also the relatively high educational level in the delayed employees' categories might have buffered for the risk for T2D,(21).

As a novelty, we observed a heightened risk for T2D in women belonging to the self-employed trajectory, convincingly accompanied with a heightened risk for prediabetes. Possible contributors might be poorer health behaviors, low income, possible inadequate recovery following long weekly worktime, exposing to long-term stress,(6). Indeed, smoking was the most prevalent, and overworking four times more common among these women than in the other trajectories. A large Swedish register-based study found solo self-

employment to increase the risk of substance use in women, and to reduce it in men,(6). Notably, the heterogeneity of self-employed individuals ranges from entrepreneurs working alone to owners and employers of big firms,(28). So far, studies on the health of self-employed have produced inconsistent evidence on outcomes and possible gender differences, (8,30,36,37). Altogether, in our study the heightened T2D-risk in women in the self-employed trajectory sustained adjustments for all covariates but job security and overwork.

Like in most countries, labor markets are gendered in Finland, as men and women have different distributions of occupations,(38). Women also take more responsibility for homework and childcare,(39). Nevertheless, in the Finnish society the men and women are equally engaged in full-time employment,(39). In countries alike, both genders are hit by the health consequences of accumulated unemployment,(40). In our study, the T2D risk was heightened most robustly and with highest odds in the floundering categories in both men and women, although the covarying risk factors in health and behaviors were even more obvious in men.

Strengths and limitations

The strengths of this study include the objectively measured glucose metabolism completed with information concerning previously diagnosed T2D, thus including all T2D cases in the population by age 46. Another strength is the longitudinal retrospective survey data for identifying 30-year employment trajectories, with its reliability ascertained by the accordance of the self-reported employment statuses with corresponding data from national registers,(28). Our data are based on an unselected general population sample, thus covering all branches of working life and occupations.

Within the NFBC1966 cohort, participation rate has decreased by years. The attrition has been somewhat greater among men compared to women, and among those in lower occupational status and or not in employment compared to those with higher occupational status,(32). While the trajectories depict groups of

individuals that deviate from those in other groups and simultaneously resemble each other within the group, a limitation is the relative heterogeneity in any employment trajectory, warranting caution in interpretations. Another limitation is that the prevalence of T2D increases by age and is still low at the age of 46. Lastly, the generalisability of our results should be confirmed under other types of welfare state regimens,(11,24).

Practitioners and future studies

Our results call for designing targeted interventions for T2D prevention for those with accumulating unemployment, and for self-employed women. In Finland as in most countries, the occupational health services are paid by the employers leaving unemployed out and are voluntary for the self-employed working alone. That might leave not only unemployed but also self-employed outside health education and check-ups for disorders in glucose metabolism. In addition, the gendered health patterning regarding self-employment needs to be further studied.

CONCLUSIONS

Our results give further support for the association between accumulating unemployment and type 2 diabetes. As a novel finding, belonging to an employment trajectory characterized with self-employment was associated with T2D in women. Notably, the prevalence of T2D in midlife associated with preceding employment trajectories even after controlling for birth weight and largely also for childhood socioeconomic status, endorsing an independent association between employment trajectories and glucose metabolism.

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Table 1. Descriptive Statistics: Covariates in Relation to Glucose Metabolism Categories at Age 46 Years in Men and Women

			Men					Women			
		N	Normal	Pre-diabetes	T2D	p (χ^2)	N	Normal	Pre-diabetes	T2D	p (χ^2)
		2900	2346	399	155		3499	3966	316	117	
In childhood			%	%	%			%	%	%	
Birth weight/gestation	> -1 SD	2778	*82.5*	*81.1*	*73.8*	*0.029*	3332	*82.7*	*77.9*	*76.4*	*0.029*
Family SES at age 14	White collar	2550	36.4	34.2	32.8	*0.549*	3089	33.1	27.5	29.7	*0.148*
At age 46											
Self-rated health	Good	2851	*68.0*	*56.1*	*35.3*	*0.000*	3450	*69.5*	*56.8*	*45.2*	*0.000*
Obesity status	Normal	2895	*34.8*	*15.5*	*5.2*	*0.000*	3497	*50.2*	*23.1*	*9.4*	*0.000*
	Pre-obesity		*48.1*	*49.4*	*32.3*			*32.5*	*36.1*	*23.1*	
	Obesity		*17.1*	*35.1*	*62.6*			*17.3*	*40.8*	*67.5*	
Eating vegetables daily	Yes	2835	*25.4*	*20.5*	*17.3*	*0.013*	3445	42.3	36.9	41.2	*0.182*
Smoking	Never	2824	45.6	42.1	38.9	*0.123*	3429	*57.0*	*60.8*	*48.2*	*0.014*
	Former		29.9	35.4	32.2			*24.5*	*19.3*	*22.3*	
	Current		24.5	22.6	28.9			*18.6*	*19.9*	*29.5*	
Alcohol intake g/day	≤4.1/1.1	2864	*32.1*	*34.4*	*46.1*	*0.010*	3463	32.7	36.9	31.9	*0.156*
men/women	4.1-16/1.1-5.8		*34.6*	*34.4*	*28.3*			34.1	33.0	26.7	
	≥16/5.8		*33.4*	*31.1*	*25.7*			33.2	30.1	41.4	
Physical activity	High	2837	*38.4*	*28.4*	*20.5*	*0.000*	3455	*39.3*	*25.3*	*16.7*	*0.000*
	Moderate		*41.7*	*44.2*	*43.0*			*40.6*	*42.0*	*45.6*	
	Low		*38.4*	*28.4*	*20.5*			*20.1*	*32.7*	*37.7*	
Married or cohabiting	Yes	2854	*78.6*	*81.8*	*68.2*	*0.003*	3463	77.7	76.0	72.4	*0.339*
Level of education	High	2860	*24.1*	*20.3*	*15.2*	*0.016*	3467	*31.8*	*27.2*	*19.8*	*0.008*
Family income	>80000	2703	*25.5*	*23.9*	*13.7*	*0.002*	3098	*10.5*	*9.4*	*20.2*	*0.003*
€/year	50001-80000		*34.6*	*38.4*	*29.5*			*35.3*	*43.0*	*31.3*	
	20000-50000		*31.5*	*29.6*	*43.9*			*30.5*	*30.7*	*31.3*	
	<20000		*8.4*	*8.1*	*12.9*			*23.7*	*17.0*	*17.2*	
Job security	Good	2506	*85.8*	*78.4*	*86.6*	*0.001*	3054	*85.7*	*82.7*	*77.1*	*0.048*
Worktime	>50 h/week	2514	*11.0*	*10.0*	*18.5*	*0.031*	3058	3.3	4.4	4.8	*0.472*
Current employment	Full-time employee	2888	*72.5*	*73.9*	*58.1*	*0.000*	3480	*73.2*	*69.8*	*63.5*	*0.000*
status	Entrepreneur		*12.7*	*11.8*	*16.8*			*6.6*	*7.0*	*3.5*	
	Unemployed		*8.2*	*6.5*	*11.0*			*5.5*	*7.6*	*12.2*	
	Retired		*2.6*	*1.8*	*5.8*			*2.1*	*3.8*	*8.7*	
	Part-time employed		*2.1*	*2.5*	*1.9*			*7.5*	*7.3*	*7.0*	
	Other		*1.9*	*3.5*	*6.5*			*5.1*	*4.4*	*5.2*	

p≤0.05 are in bold

Table 2. Descriptives and glucose metabolism categories at age 46 by employment trajectories from age 16 to 45 in men.

		N	High-educated	Traditional employees	Self-employed	Delayed employees	Floundering employees	p
		2900	711	889	392	576	332	
			%	%	%	%	%	
Covariates								
In childhood								
Birth weight/gestation	> -1 SD	2778	81.4	81.5	87.0	82.4	76.5	*0.011*
Family SES at age 14	White collar	2550	50.7	28.0	36.0	35.0	24.9	*0.000*
At age 46								
Self-rated health	Good	2851	77.2	62.7	62.4	66.3	42.1	*0.000*
Obesity status	Normal	2895	35.6	28.4	23.8	31.3	32.3	*0.000*
	Pre-obesity		46.1	48.9	51.4	48.9	39.3	
	Obesity		18.3	22.7	24.8	19.8	28.4	
Eating vegetables daily	Yes	2835	37.8	19.4	21.7	23.2	13.4	*0.000*
Smoking	Never	2824	62.3	34.4	45.5	44.5	34.1	*0.000*
	Former		25.7	34.4	33.6	33.6	23.8	
	Current		12.0	31.2	20.9	21.9	42.1	
Alcohol intake g/day	<4.1/1.1	2864	33.5	36.4	29.5	31.3	31.1	*0.002*
men/women	4.1-16/1.1-5.8		34.6	35.2	34.7	35.7	27.4	
	>16/5.8		31.9	28.4	35.8	32.9	41.5	
Physical activity	High	2837	50.3	30.4	33.1	37.4	21.7	*0.000*
	Moderate		33.9	48.4	37.5	43.1	47.2	
	Low		15.9	21.1	29.4	19.5	31.1	
Married or cohabiting	Yes	2854	87.5	77.1	85.5	78.8	53.4	*0.000*
Level of education	High	2860	49.9	6.4	11.4	29.8	12.0	*0.000*
Family income	>80000	2703	48.6	14.6	23.6	20.1	5.4	*0.000*
€/year	50001-80000		34.9	40.7	32.0	38.1	14.8	
	20000-50000		14.7	39.8	37.1	33.0	41.5	
	<20000		1.7	4.8	7.3	8.8	38.3	
Job security	Good	2506	86.5	86.9	88.5	80.6	72.8	*0.000*
Worktime	>50 h/week	2514	7.8	7.9	31.9	7.1	7.6	*0.000*
Current employment	Full-time employee	2888	93.6	84.6	28.4	77.8	33.0	*0.000*
status	Entrepreneur		2.3	4.6	65.0	6.5	6.7	
	Unemployed		3.2	5.9	2.6	9.5	28.8	
	Retired		0.1	1.6	0.0	0.4	17.9	
	Part-time employed		0.3	1.2	2.6	3.3	6.1	
	Other		0.4	2.1	1.5	2.6	7.6	
Glucose metabolism category at age 46	Normal	2900	83.5	79.4	82.1	81.4	76.8	*0.096*
	Prediabetes		12.8	14.8	12.0	13.7	15.1	
	T2D		3.7	5.7	5.9	4.9	8.1	

Table 3. Descriptives and glucose metabolism categories at age 46 by employment trajectories from age 16 to 45 in women.

		N	High-educated	Traditional employees	Self-employed	Delayed employees	Floundering employees	p
		3499	934	819	317	676	753	
			%	%	%	%	%	
Covariates								
In childhood								
Birth weight/gestation	> -1 SD	3332	81.6	82.1	86.5	80.5	82.3	*0.274*
Family SES at age 14	White collar	3089	42.9	26.9	31.3	24.5	32.4	*0.000*
At age 46								
Self-rated health	Good	3450	77.7	66.6	65.7	66.5	57.6	*0.000*
Obesity status	Normal	3497	51.8	43.3	46.2	45.9	43.5	*0.000*
	Pre-obesity		32.5	33.1	32.3	34.0	30.7	
	Obesity		15.6	23.6	21.5	20.1	25.8	
Eating vegetables daily	Yes	3445	53.7	37.5	42.8	37.3	35.1	*0.000*
Smoking	Never	3429	71.2	51.8	51.3	47.0	56.5	*0.000*
	Former		19.6	26.7	24.5	29.5	21.1	
	Current		9.1	21.5	24.2	23.6	22.4	
Alcohol intake g/day	<4.1/1.1	3463	32.3	33.3	40.5	32.6	30.9	*0.000*
men/women	4.1-16/1.1-5.8		38.6	36.7	28.6	33.8	26.8	
	>16/5.8		29.1	30.0	30.9	33.5	42.3	
Physical activity	High	3455	50.3	34.2	33.8	33.7	29.0	*0.000*
	Moderate		31.7	44.5	43.7	44.9	43.6	
	Low		18.0	21.3	22.5	21.3	27.4	
Married or cohabiting	Yes	3463	79.0	76.8	78.5	79.7	73.3	*0.025*
Level of education	High	3467	56.0	16.2	19.2	26.2	25.2	*0.000*
Family income	>80000	3098	40.6	16.4	21.2	15.6	14.0	*0.000*
€/year	50001-80000		28.0	37.5	23.8	36.0	23.9	
	20000-50000		28.4	38.4	38.5	41.6	36.3	
	<20000		3.0	7.7	16.5	6.8	25.9	
Job security	Good	3054	89.5	88.0	87.4	84.3	73.4	*0.000*
Worktime	>50 h/week	3058	2.2	3.2	14.4	1.8	1.6	*0.000*
Current employment	Full-time employee	3480	92.1	86.5	30.6	84.4	40.5	*0.000*
status	Entrepreneur		2.0	2.3	48.9	1.2	3.3	
	Unemployed		1.6	3.8	3.8	6.3	14.3	
	Retired		0.1	0.9	1.9	0.9	8.8	
	Part-time employed		2.0	3.9	7.9	4.3	20.6	
	Other		2.1	2.6	6.9	2.8	12.6	
Glucose metabolism category at age 46	Normal	3499	90.3	87.8	83.6	87.3	86.2	*0.019*
	Prediabetes		7.8	8.7	12.0	9.8	9.0	
	T2D		1.9	3.5	4.4	3.0	4.8	

Table 4. Odds ratios and their 95% confidence intervals for glucose metabolism categories at age 46 in relation to the preceding employment trajectories from age 16 to 45 in men.

		High-educated	Traditional employees	Self-employed	Delayed employees	Floundering employees
PREDIABETES	**Unadjusted**	1	1.22 0.92 to 1.63	0.95 0.65 to 1.39	1.10 0.80 to 1.52	1.28 0.88 to 1.86
Adjustments In childhood	Birth weight corrected for gestation age	1	1.26 0.94 to 1.68	0.90 0.61 to 1.34	1.15 0.83 to 1.60	1.33 0.91 to 1.94
	Family socioeconomic status at age 14	1	1.13 0.83 to 1.55	0.96 0.65 to 1.43	1.16 0.83 to 1.63	1.20 0.80 to 1.80
At age 46	Self-rated health	1	1.13 0.84 to 1.51	0.86 0.59 to 1.26	1.03 0.74 to 1.43	1.03 0.70 to 1.52
	Obesity status	1	1.14 0.85 to 1.53	0.84 0.57 to 1.24	1.07 0.77 to 1.48	1.18 0.81 to 1.73
	Eating vegetables daily	1	1.13 0.84 to 1.51	0.89 0.61 to 1.31	1.04 0.75 to 1.45	1.17 0.79 to 1.71
	Smoking	1	1.24 0.92 to 1.67	0.94 0.64 to 1.38	1.09 0.79 to 1.52	1.26 0.85 to 1.85
	Alcohol intake	1	1.21 0.90 to 1.61	0.94 0.64 to 1.38	1.09 0.79 to 1.51	1.28 0.88 to 1.87
	Physical activity	1	1.12 0.83 to 1.50	0.85 0.58 to 1.24	1.04 0.75 to 1.44	1.06 0.72 to 1.56
	Living in a relationship	1	1.26 0.94 to 1.68	0.94 0.64 to 1.38	1.12 0.81 to 1.55	1.38 0.94 to 2.03
	Level of education	1	1.12 0.82 to 1.53	0.87 0.59 to 1.29	1.05 0.75 to 1.46	1.18 0.80 to 1.75
	Family income	1	1.23 0.91 to 1.68	0.99 0.67 to 1.47	1.09 0.77 to 1.54	1.46 0.94 to 2.26
	Job security	1	1.22 0.90 to 1.64	0.92 0.62 to 1.36	1.05 0.75 to 1.48	1.53 0.96 to 2.43
	Worktime >50h/week	1	1.23 0.91 to 1.66	0.95 0.64 to 1.42	1.10 0.78 to 1.54	1.57 0.99 to 2.50
	Current employment status	1	1.21 0.91 to 1.62	1.01 0.69 to 1.48	1.11 0.80 to 1.53	1.28 0.88 to 1.87
	All aforementioned	1	0.92 0.62 to 1.34	0.77 0.47 to 1.28	1.05 0.71 to 1.56	0.95 0.50 to 1.78
DIABETES	**Unadjusted**	1	**1.65** **1.02 to 2.68**	1.63 0.92 to 2.91	1.36 0.79 to 2.36	**2.42** **1.38 to 4.23**
Adjustments In childhood	Birth weight corrected for gestation age	1	**1.72** **1.04 to 2.84**	1.70 0.93 to 3.11	1.53 0.87 to 2.67	**2.33** **1.30 to 4.19**
	Family socioeconomic status at age 14	1	1.64 0.96 to 2.80	1.61 0.86 to 3.03	1.56 0.87 to 2.80	**2.49** **1.35 to 4.60**
At age 46	Self-rated health	1	1.34 0.82 to 2.20	1.25 0.69 to 2.27	1.13 0.64 to 1.97	1.36 0.75 to 2.45
	Obesity status	1	1.45 0.88 to 2.38	1.30 0.72 to 2.36	1.30 0.74 to 2.27	**1.98** **1.11 to 3.54**
	Eating vegetables daily	1	1.60 0.98 to 2.63	1.53 0.85 to 2.76	1.29 0.74 to 2.26	**2.15** **1.20 to 3.85**
	Smoking	1	1.61 0.97 to 2.66	1.62 0.89 to 2.92	1.34 0.77 to 2.35	**2.31** **1.29 to 4.13**
	Alcohol intake	1	1.62 1.00 to 2.64	1.61 0.90 to 2.89	1.34 0.77 to 2.32	**2.45** **1.39 to 4.32**
	Physical activity	1	1.46 0.90 to 2.38	1.30 0.72 to 2.35	1.21 0.69 to 2.10	1.77 0.99 to 3.15
	Living in a relationship	1	1.58 0.97 to 2.58	1.55 0.87 to 2.79	1.27 0.73 to 2.21	**1.92** **1.07 to 3.46**
	Level of education	1	1.40 0.84 to 2.35	1.35 0.74 to 2.47	1.22 0.70 to 2.14	**1.96** **1.08 to 3.53**
	Family income	1	1.28 0.77 to 2.13	1.23 0.67 to 2.26	0.91 0.50 to 1.64	1.32 0.68 to 2.57
	Job security	1	1.46 0.87 to 2.42	1.65 0.92 to 2.98	1.21 0.67 to 2.18	1.73 0.79 to 3.81
	Worktime >50h/week	1	1.45 0.87 to 2.42	1.40 0.76 to 2.58	1.21 0.67 to 2.18	1.70 0.77 to 3.74
	Current employment status	1	**1.64** **1.01 to 2.67**	1.71 0.95 to 3.07	1.37 0.80 to 2.38	**2.43** **1.39 to 4.24**
	All aforementioned	1	0.88 0.44 to 1.73	1.19 0.54 to 2.63	0.95 0.46 to 1.96	0.81 0.30 to 2.23

Table 5. Odds ratios and their 95% confidence intervals for glucose metabolism categories at age 46 in relation to the preceding employment trajectories from age 16 to 45 in women.

		High-educated	Traditional employees	Self-employed	Delayed employees	Floundering employees
PREDIABETES	**Unadjusted**	**1**	1.14	**1.66**	1.29	1.21
			0.81 to 1.61	**1.09 to 2.51**	0.91 to 1.83	0.86 to 1.71
Adjustments In childhood	Birth weight corrected for gestation age	**1**	1.21	**1.76**	1.29	1.21
			0.86 to 1.71	**1.15 to 2.68**	0.90 to 1.84	0.85 to 1.72
	Family socioeconomic status at age 14	**1**	1.10	1.49	1.28	1.04
			0.77 to 1.58	0.95 to 2.33	0.89 to 1.85	0.72 to 1.52
At age 46	Self-rated health	**1**	1.10	**1.59**	1.27	1.13
			0.77 to 1.55	**1.04 to 2.42**	0.89 to 1.81	0.80 to 1.61
	Obesity status	**1**	1.00	**1.55**	1.19	1.04
			0.70 to 1.41	**1.01 to 2.37**	0.84 to 1.70	0.73 to 1.49
	Eating vegetables daily	**1**	1.11	**1.61**	1.25	1.18
			0.79 to 1.57	**1.06 to 2.45**	0.88 to 1.78	0.83 to 1.67
	Smoking	**1**	1.16	**1.61**	1.34	1.22
			0.82 to 1.64	**1.05 to 2.47**	0.94 to 1.91	0.86 to 1.73
	Alcohol intake	**1**	1.15	**1.59**	1.31	1.24
			0.81 to 1.62	**1.04 to 2.43**	0.92 to 1.86	0.88 to 1.76
	Physical activity	**1**	1.06	1.51	1.20	1.05
			0.75 to 1.50	0.99 to 2.30	0.85 to 1.71	0.74 to 1.50
	Living in a relationship	**1**	1.14	**1.64**	1.31	1.20
			0.81 to 1.61	**1.08 to 2.50**	0.92 to 1.86	0.85 to 1.70
	Level of education	**1**	1.07	**1.54**	1.24	1.16
			0.75 to 1.53	**1.00 to 2.38**	0.87 to 1.78	0.81 to 1.65
	Family income	**1**	1.07	1.54	1.25	1.12
			0.74 to 1.55	0.98 to 2.42	0.86 to 1.81	0.76 to 1.65
	Job security	**1**	1.19	**1.56**	1.27	1.04
			0.84 to 1.69	**1.01 to 2.42**	0.88 to 1.83	0.69 to 1.56
	Worktime >50h/week	**1**	1.18	1.52	1.28	1.07
			0.83 to 1.67	0.97 to 2.38	0.89 to 1.83	0.72 to 1.60
	Current employment status	**1**	1.23	**1.63**	1.30	1.24
			0.80 to 1.59	**1.08 to 2.48**	0.92 to 1.85	0.88 to 1.76
	All aforementioned	**1**	1.07	1.42	1.27	0.85
			0.69 to 1.66	0.79 to 2.55	0.82 to 1.98	0.50 to 1.44
DIABETES	**Unadjusted**	**1**	**1.89**	**2.47**	1.59	**2.60**
			1.04 to 3.43	**1.21 to 5.04**	0.83 to 3.03	**1.46 to 4.62**
Adjustments In childhood	Birth weight corrected for gestation age	**1**	**1.88**	**2.45**	1.45	**2.43**
			1.03 to 3.43	**1.18 to 5.08**	0.75 to 2.81	**1.35 to 4.35**
	Family socioeconomic status at age 14	**1**	1.80	**2.47**	1.61	**2.48**
			0.93 to 3.52	**1.12 to 5.45**	0.79 to 3.30	**1.30 to 4.71**
At age 46	Self-rated health	**1**	1.64	**2.21**	1.35	**2.13**
			0.90 to 3.00	**1.08 to 4.53**	0.70 to 2.60	**1.19 to 3.82**
	Obesity status	**1**	1.47	**2.17**	1.37	**1.95**
			0.80 to 2.70	**1.04 to 4.50**	0.71 to 2.65	**1.08 to 3.52**
	Eating vegetables daily	**1**	**1.85**	**2.50**	1.44	**2.61**
			1.01 to 3.39	**1.23 to 5.10**	0.74 to 2.80	**1.46 to 4.66**
	Smoking	**1**	1.83	**2.19**	1.44	**2.38**
			0.99 to 3.37	**1.05 to 4.61**	0.74 to 2.81	**1.31 to 4.32**
	Alcohol intake	**1**	**1.90**	**2.51**	1.50	**2.54**
			1.05 to 3.46	**1.23 to 5.11**	0.78 to 2.88	**1.43 to 4.52**
	Physical activity	**1**	1.65	2.05	1.34	**2.15**
			0.90 to 3.01	0.99 to 4.26	0.70 to 2.59	**1.20 to 3.84**
	Living in a relationship	**1**	**1.89**	**2.49**	1.51	**2.55**
			1.04 to 3.43	**1.22 to 5.07**	0.78 to 2.90	**1.44 to 4.54**
	Level of education	**1**	1.59	**2.11**	1.31	**2.25**
			0.86 to 2.95	**1.02 to 4.37**	0.68 to 2.56	**1.25 to 4.05**
	Family income	**1**	1.58	**2.36**	1.44	**1.94**
			0.83 to 2.98	**1.11 to 4.98**	0.73 to 2.84	**1.02 to 3.69**
	Job security	**1**	**2.03**	1.62	1.25	1.81
			1.08 to 3.80	0.69 to 3.84	0.61 to 2.59	0.91 to 3.62
	Worktime >50h/week	**1**	**2.04**	1.57	1.31	**2.01**
			1.09 to 3.83	0.65 to 3.78	0.63 to 2.70	**1.02 to 3.99**
	Current employment status	**1**	**1.83**	**2.42**	1.52	**2.69**
			1.00 to 3.33	**1.19 to 4.94**	0.79 to 2.92	**1.51 to 4.81**
	All aforementioned	**1**	1.02	1.39	0.86	1.03
			0.45 to 2.30	0.47 to 4.12	0.34 to 2.15	0.40 to 2.65