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Inequalities in the impact of having a chronic disease on entering permanent paid employment: a registry-based 10-year follow-up study

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ABSTRACT

Background This study aimed to investigate among unemployed persons (1) the impact of having a chronic disease on entering paid employment and obtaining a permanent contract and (2) whether these associations differed by educational attainment.

Methods Register data from Statistics Netherlands on employment status, contract type, medication and sociodemographic characteristics were linked. Dutch unemployed persons between 18 and 64 years (n=667 002) were followed up for 10 years (2011–2020). Restricted mean survival time analyses (RMSTs) were used to investigate differences in average months until entering paid employment and until obtaining a permanent contract between persons with and without cardiovascular diseases, inflammatory conditions, diabetes, respiratory illness, common mental disorders and psychotic disorders. Interaction terms were included for education.

Results One-third of the unemployed persons at baseline entered paid employment during follow-up. Persons with chronic diseases spent more months in non-employment compared with persons without chronic diseases (difference ranging from 2.50 months (95% CI 1.97 to 3.03 months) to 10.37 months (95% CI 9.98 to 10.77 months)), especially for persons with higher education. Conditional on entering paid employment, the time until a permanent contract was longer for persons with cardiovascular diseases (4.42 months, 95% CI 1.85 to 6.99 months), inflammatory conditions (4.80 months, 95% CI 2.02 to 7.59 months) and diabetes (8.32 months, 95% CI 4.26 to 12.37 months) than for persons without these diseases. These latter differences were similar across educational attainment.

Conclusions Having a chronic disease is a barrier to entering permanent paid employment. The findings underline the need to prevent chronic diseases and promote an inclusive workforce.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ A few studies showed that persons with chronic diseases are less likely to enter paid employment compared with persons without chronic diseases.

⇒ Research points to the negative impact of precarious employment, such as temporary employment contracts, on health outcomes. However, less is known about the selection of persons with health conditions into precarious employment and whether this is moderated by educational attainment.

WHAT THIS STUDY ADDS

⇒ By using objective pharmacy data linked with registry-based data on monthly employment status, this study showed that Dutch unemployed persons with chronic diseases entered paid employment less often and spent more months in non-employment compared with persons without chronic diseases during a 10-year follow-up, which was most pronounced with increasing educational attainment.

⇒ Conditional on entering paid employment, workers with cardiovascular diseases, inflammatory conditions and diabetes needed more time to obtain a permanent contract compared with workers without these diseases, but educational inequalities were not found.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The findings emphasise that policies need to focus on the prevention of chronic diseases and the promotion of stable paid employment among persons with chronic diseases.

INTRODUCTION

In 2019, more than one-third of the European (EU) population aged 16 years and older reported having a chronic disease.[1] A condition lasting for at least 1 year and requiring ongoing medical attention and/or limits daily activities is considered a chronic disease.[2] Persons with chronic diseases have a higher risk of becoming unemployed compared with persons without chronic diseases,[3 4] and the proportion of the ageing working population with a chronic disease is increasing.[5] Alongside, precarious work, such as non-standard employment contracts, also increased in the past decades.[6] In the Netherlands, the number of persons with a temporary contract or contract with varying hours per week increased from approximately 1.5 million in 2010 to almost 2.6 million in 2021.[7] If persons with chronic diseases are more likely to get precarious work, this may further increase health inequalities.

Several studies have investigated the impact of chronic diseases on obtaining paid employment.[8–12] They showed that in general unemployed persons with chronic diseases were less likely to become employed. Some of these studies used self-reported data to determine chronic diseases and employment status,[8 9] while other studies used pharmacy data

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on prescribed medication to determine unemployed persons' health conditions.[10–12] Self-reported measurements of chronic diseases are more prone to reporting bias or justification bias, which occurs when unemployed persons over-report health problems to justify that they do not have paid employment.[13] These sources of bias can be minimised by using pharmacy data to more objectively identify chronic diseases.[14] From the studies on the associations between chronic diseases and entering paid employment, it remains unclear whether persons with chronic diseases are selected for precarious work.

Although there is no single agreed definition of precarious employment yet, existing frameworks indicate the following characteristics: employment insecurity, low financial compensation and lack of rights and protection.[15 16] Non-standard employment contracts, such as temporary contracts, are used as a measure of precarious work.[17 18] While studies primarily have focused on the impact of precarious work on health,[19] studies on the selection of persons with health conditions for precarious employment are scarce. Persons with disabilities were found to have temporary employment contracts more often compared with persons without disabilities.[20] Likewise, Wagenaar *et al*[21] found that having musculoskeletal symptoms was associated with a lower likelihood to obtain permanent employment among Dutch workers with temporary work, although this association was not statistically significant after adjustment for demographic characteristics.

The impact of having a chronic disease on entering paid work and obtaining a permanent position might differ depending on educational attainment. Previous research demonstrated that differences in paid work between persons with and without chronic diseases were most pronounced for persons with lower educational attainment.[22] It could be hypothesised that persons with lower educational attainment with a chronic disease are less likely to obtain a permanent contract.

The current registry-based study with a 10-year follow-up aimed to investigate among working-age unemployed persons in the Netherlands: (1) the impact of having a chronic disease on entering paid employment and subsequently on obtaining a permanent contract and (2) the extent to which these associations differ by educational attainment.

METHODS

Study design and population

In this Dutch longitudinal study, registry-based databases provided by Statistics Netherlands on monthly income components, contract type, purchased medication, demographics and educational attainment were linked at the individual level by means of pseudonymised numbers for each respondent.[23] The linkage level was high because the information from tax registries based on national citizen service numbers was used. However, variables for educational attainment and household characteristics had missing values (1%–21%). To prevent individuals from being excluded due to missing values, these categorical variables had an extra category 'missing'. Informed consent from respondents was not required for this study because, according to Dutch legislation, research institutes are permitted to use pseudonymised registry-based data. In this study, 667 002 Dutch residents were selected who (1) consecutively received unemployment benefits or social security benefits in October, November and December 2010 and (2) were aged between 18 and 64 years old at baseline (January 2011). The impact of having a chronic disease on obtaining paid employment and on obtaining a permanent position was investigated over a 10-year follow-up period between January 2011 and December 2020.

Employment status and contract type

Employment status was defined by monthly income components from Statistics Netherlands. Persons who received unemployment benefits or social security benefits were considered as being unemployed. Persons receiving income from paid employment or self-employment were defined as being in paid employment. The transition from unemployment to paid work was measured as the first month at which persons were in paid employment for at least three consecutive months. Registry-based data on contract type was used to distinguish between persons with a temporary employment contract and those with a permanent contract. In the Netherlands, a temporary contract may typically vary between 2 months and 48 months, depending on national legislation and collective labour agreements. The transition to a permanent contract was operationalised as the first time persons had a permanent employment contract for at least three consecutive months since the first month they were in paid work.

Chronic diseases

The presence of chronic diseases was measured with data from 2009 and 2010 on purchased medication from pharmacies and reimbursed by insurance companies. The WHO Anatomical Therapeutic Chemical classification of medication was used to categorise persons with and without chronic diseases.[24] In total, 21 chronic diseases could be identified based on medication.[12 14] The following six chronic diseases were investigated in this study: cardiovascular diseases, inflammatory conditions (such as rheumatoid arthritis), diabetes, respiratory illness, common mental disorders (including anxiety and depressive disorders) and psychotic disorders.[12] These six chronic diseases concern diseases with the highest prevalence among unemployed persons. Persons were considered as having a specific chronic disease when they purchased medication for one of these chronic diseases in both 2009 and 2010.

Covariates

Sociodemographic data from Statistics Netherlands on age, gender, household composition and migration background from 2010 were used. Age was categorised into the following categories: 18–29 years old, 30–44 years old, 45–54 years old and 55–64 years old. With regard to household composition, persons with and without a partner (married or cohabiting) or children in the household were identified. To prevent the exclusion of persons with missing values for household composition (0.6%), an additional category 'missing' was added to the variables 'having children' and 'living with a partner'. Migration background was divided into native Dutch, Turkish, Moroccan, Surinamese and Antillean, and other (European and non-European). Educational attainment from 2016 was used since this was the first year Statistics Netherlands followed the International Standard Classification of Education from 2013.[25] Education was categorised into low (primary, lower secondary education and the first 3 years of higher secondary education), intermediate (upper higher secondary and intermediate vocational education) and high (higher vocational education, or university). To prevent the exclusion of persons with missing values for education (21%), a fourth category was added to the education variable indicating 'missing' information. Based on monthly income components from January 2009 up until September 2010, the number of months in paid employment prior to baseline was categorised

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into 0 months, 1–12 months and 13–21 months. Persons not in paid employment prior to baseline were unemployed, disabled, economically inactive, early retired or had missing information on employment status.

Statistical analysis

Descriptive statistics were used to investigate the baseline characteristics. Restricted mean survival time (RMST) analyses were performed to investigate the impact of each of the six chronic diseases on (1) entering paid employment among all persons who were unemployed at baseline and (2) obtaining a permanent contract among persons who entered paid employment during the 10-year follow-up period. RMST was used instead of traditional Cox proportional hazard models, because it does not require the proportional hazard assumption to be met and it allows the outcomes to be expressed as the absolute difference in the average number of months to paid work or obtaining a permanent contract between persons with and without a chronic disease.[26] For each specific disease, a comparison is made to persons without that specific disease. Both persons with the specific disease as well as persons without the specific disease may have one of the other diseases. Persons were censored when (1) they reached the statutory retirement age of 65 years, (2) information on employment status was missing for at least 3 consecutive months, (3) persons with a chronic disease at baseline stopped using medication for the chronic disease of interest, (4) persons without a chronic disease at baseline started using medication for the chronic disease of interest or (5) at the end of the follow-up period (December 2020). In the analyses of the impact of having a chronic disease on obtaining a permanent contract, persons were additionally censored when they exited paid employment.

First, descriptive analyses and RMST analyses were performed for each chronic disease in general and stratified by educational attainment to determine (1) the proportions of persons who entered paid employment or obtained a permanent contract and (2) the average number of months until the transition of interest. The time difference in months until the specific event occurred between persons with and without a chronic disease was adjusted for the following covariates: age, gender, living with a partner, having children, migration background, educational attainment, number of months in paid employment before baseline and the presence of an additional chronic disease (any of the 21 diseases) at baseline. We additionally determined whether the adjusted time differences in months until the events of interest between persons with and without chronic diseases differed by educational attainment. Therefore, the interaction terms, 'intermediate_education*chronic_disease', 'higher_education*chronic_disease' and 'missing_education*chronic_disease' were added to the RMST model. With these interaction terms, it was tested whether the influence of a chronic disease on entering paid employment and on obtaining a permanent contract among intermediate respectively higher educated persons differed from lower educated persons. Statistically significant interaction effects are indicated by '†' in the tables. All analyses were performed with R-studio V.1.4.1103. The 'rmst2' function of the 'survRM2' package was used for the RMST analyses.

RESULTS

Characteristics of the study population

One-third (33.6%) of the unemployed persons entered paid employment during follow-up (table 1). In total, 43.1% had low educational attainment, 25.2% had intermediate, 10.8% had high educational attainment and 20.9% did not have information on educational attainment. Persons with a chronic disease most often had inflammatory conditions (13.3%), common mental disorders (13.3%) or cardiovascular diseases (13.1%), and 25.4% had two or more chronic diseases. Almost 70% of the unemployed persons did not have any paid employment in the 2 years before baseline. During the follow-up period, 33.6% (n=2 24 006) entered paid employment.

Table 1 Baseline characteristics of the study population (N=667 002)

	n (%)
Age	
18–29 years	123 381 (18.5)
30–44 years	215 807 (32.4)
45–54 years	166 467 (25.0)
55–64 years	161 347 (24.2)
Male	328 696 (49.3)
Education	
Low	287 746 (43.1)
Intermediate	167 809 (25.2)
High	71 737 (10.8)
Missing	139 710 (20.9)
Living with a partner	
Yes	279 953 (42.0)
No	383 087 (57.4)
Missing	3962 (0.6)
Having children	
Yes	287 712 (43.1)
No	375 328 (56.3)
Missing	3962 (0.6)
Migration background	
Native Dutch	403 011 (60.4)
Moroccan	37 524 (5.6)
Turkish	32 994 (4.9)
Surinamese and Antillean	46 306 (6.9)
Other European	29 643 (4.4)
Other non-European	117 524 (17.6)
Chronic diseases	
Cardiovascular diseases	87 351 (13.1)
Inflammatory conditions	88 489 (13.3)
Diabetes	34 288 (5.1)
Respiratory illness	51 053 (7.7)
Common mental disorders	89 038 (13.3)
Psychotic disorders	40 863 (6.1)
Two or more chronic diseases	169 464 (25.4)
Months employed 2009–baseline	
0 months	463 607 (69.5)
1–12 months	120 518 (18.1)
13–21 months	82 877 (12.4)

Impact of having a chronic disease on entering paid employment

Table 2 (and online supplemental table S1) shows that the proportions of unemployed persons who obtained paid employment were lower for persons with chronic diseases (ranging from 7.7% for psychotic disorders to 17.0% for respiratory illness) compared with those without chronic diseases (ranging from 23.3% to 34.1%). Persons with cardiovascular diseases, inflammatory conditions, diabetes, respiratory illness, common mental disorders and psychotic disorders all spent more months

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Table 2 Restricted mean survival time (RMST) analyses on the influence of chronic diseases on entering paid employment during a 10-year follow-up among persons who were initially unemployed, stratified by education

	RMST chronic disease		RMST no chronic disease		RMST chronic disease versus no chronic disease
	Entering paid employment (%)	Months until paid employment	Entering paid employment (%)	Months until paid employment	Adjusted difference in months until paid employment (95% CI)*
Cardiovascular diseases	15.6	101.76	32.8	84.68	**10.37** (9.98 to 10.77)
Low education	11.7	107.43	26.6	93.44	**9.74** (9.23 to 10.25)
Intermediate education	30.7	83.59	52.1	63.67	**16.42**† (15.47 to 17.37)
High education	34.4	78.47	60.4	51.91	**19.30**† (17.84 to 20.76)
Inflammatory conditions	12.3	98.53	23.3	87.53	**2.50** (1.97 to 3.03)
Low education	9.5	103.93	16.5	95.75	**3.27** (2.56 to 3.99)
Intermediate education	22.7	77.86	38.0	66.40	**3.17** (1.71 to 4.63)
High education	23.0	77.24	49.9	53.81	**4.48** (1.97 to 6.98)
Diabetes	14.7	104.32	34.1	86.26	**7.96** (7.45 to 8.48)
Low education	11.2	109.13	27.9	94.96	**7.35** (6.70 to 7.99)
Intermediate education	33.7	83.43	54.4	65.64	**13.54**† (12.03 to 15.05)
High education	36.0	80.06	61.9	54.45	**19.21**† (16.86 to 21.57)
Respiratory illness	17.0	99.10	31.9	86.21	**3.98** (3.55 to 4.42)
Low education	12.4	105.85	25.7	94.72	**4.13** (3.53 to 4.72)
Intermediate education	33.7	77.31	51.1	65.46	**5.94**† (4.71 to 7.17)
High education	41.3	66.82	59.2	54.64	**6.88**† (4.83 to 8.92)
Common mental disorders	12.5	105.71	32.0	83.49	**7.33** (7.00 to 7.66)
Low education	9.5	109.78	25.2	92.63	**6.04** (5.61 to 6.47)
Intermediate education	23.4	91.61	51.4	61.38	**14.02**† (13.20 to 14.84)
High education	28.8	84.89	60.3	50.63	**15.91**† (14.57 to 17.26)
Psychotic disorders	7.7	112.46	34.0	85.09	**9.28** (8.88 to 9.68)
Low education	7.8	112.42	27.2	94.51	**6.65** (6.10 to 7.20)
Intermediate education	14.6	104.86	54.5	63.67	**19.62**† (18.60 to 20.64)
High education	17.0	102.60	62.3	52.68	**26.03**† (24.35 to 27.72)

*Models are adjusted for age, gender, living with a partner, having children, migration background, educational attainment, number of months in paid employment before baseline and the presence of an additional chronic disease at baseline.
†Difference in RMST between persons with and without chronic diseases was statistically significantly different among persons with intermediate or high education compared with persons with low education at the 0.05 level.
‡Bold indicates that estimate is statistically significant.

in non-employment before they obtained paid employment (ranging from 98.53 months to 112.46 months) compared with persons without these chronic diseases (ranging from 83.49 months to 87.53 months). With increasing educational attainment, the proportions of unemployed persons who obtained paid employment increased and the number of months until entering paid employment decreased. The adjusted difference in months until obtaining paid employment was lowest for persons with inflammatory conditions (2.50 months, 95% CI 1.97 to 3.03 months), and highest for persons with cardiovascular disease (10.37 months, 95% CI 9.98 to 10.77 months). Except for persons with inflammatory conditions, the adjusted difference in time spent until entering paid employment was statistically significantly larger among persons with intermediate or high educational attainment compared with persons with low educational attainment. Adjusted differences were most pronounced for persons with a high educational attainment and psychotic disorders; they spent 26.03 more months (95% CI 24.35 to 27.72 months) in non-employment before obtaining paid employment.

Impact of having a chronic disease on obtaining a permanent contract

The differences in the proportions of persons with or without a chronic disease who obtained a permanent contract were smaller compared with the differences in the proportions of persons with or without a chronic disease who gained paid employment (table 3 and online supplemental table S2). In the unadjusted analyses, the time until obtaining a permanent contract was shorter for persons with cardiovascular diseases, diabetes, respiratory illness, common mental disorders and psychotic disorders (ranging from 39.00 months to 53.91 months) compared with those without these chronic diseases (ranging from 55.27 months to 56.02 months). With increasing educational attainment, the proportion of persons who obtained a permanent contract decreased for persons with a chronic disease and slightly increased for persons without chronic diseases. The time until obtaining a permanent contract was longer among persons with intermediate or higher education. In the adjusted analyses, the time until obtaining a permanent contract was longer for persons with cardiovascular diseases (4.42 months, 95% CI 1.85 to 6.99 months), inflammatory conditions (4.80 months, 95% CI 2.02 to 7.59 months) and diabetes (8.32 months, 95% CI 4.26 to 12.37 months). The time until obtaining a permanent contract was 7.04 months (95% CI −9.94 to −4.14 months) shorter for persons with psychotic disorders. Adjusted differences in time spent until obtaining a permanent contract did not consistently change with increasing educational attainment.

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Table 3 Restricted mean survival time (RMST) analyses on the influence of chronic diseases on obtaining a permanent contract during a 10-year follow-up among persons who entered paid employment, stratified by education

	RMST chronic disease		RMST no chronic disease		RMST chronic disease versus no chronic disease
	Obtaining a permanent contract (%)	Months until permanent contract	Obtaining a permanent contract (%)	Months until permanent contract	Adjusted difference in months until permanent contract (95% CI)*
Cardiovascular diseases	42.3	53.91	40.3	55.88	**4.42** (1.85 to 6.99)
Low education	43.6	49.19	39.2	52.05	**6.69** (1.01 to 12.36)
Intermediate education	40.6	55.16	39.9	55.29	**6.89** (1.25 to 12.54)
High education	36.5	64.33	42.3	60.79	–5.20† (–13.32 to 2.92)
Inflammatory conditions	33.6	57.63	37.1	57.54	**4.80** (2.02 to 7.59)
Low education	35.6	54.73	36.3	53.99	6.15 (–1.54 to 13.85)
Intermediate education	30.5	59.63	36.0	56.92	3.29 (–4.64 to 11.23)
High education	30.5	60.88	38.4	61.30	–2.73 (–19.47 to 14.01)
Diabetes	41.3	53.79	41.5	55.27	**8.32** (4.26 to 12.37)
Low education	42.7	49.75	40.3	51.24	9.57 (–0.17 to 19.31)
Intermediate education	38.9	55.16	41.1	54.84	8.12 (–2.36 to 18.61)
High education	36.1	64.79	43.3	60.48	3.93 (–12.10 to 19.96)
Respiratory illness	40.4	53.72	40.7	55.69	1.26 (–0.91 to 3.43)
Low education	41.2	49.63	39.8	51.76	3.94 (–3.01 to 10.89)
Intermediate education	38.6	53.10	40.2	55.39	–5.27 (–10.73 to 0.18)
High education	39.7	61.42	42.3	60.64	5.17 (–5.76 to 16.09)
Common mental disorders	40.4	51.35	41.3	56.02	1.91 (–0.05 to 3.88)
Low education	40.6	47.63	40.3	52.20	3.11 (–2.90 to 9.12)
Intermediate education	39.3	51.49	40.7	55.72	0.78 (–4.69 to 6.26)
High education	36.9	59.64	43.0	60.70	4.22 (–4.82 to 13.25)
Psychotic disorders	46.9	39.00	41.6	55.57	**–7.04** (–9.94 to –4.14)
Low education	46.7	37.20	40.6	51.16	**–9.91** (–13.94 to –5.89)
Intermediate education	43.0	40.08	41.2	55.15	2.58† (–4.63 to 9.80)
High education	39.2	49.30	43.3	59.79	**–15.19** (–22.29 to –8.09)

*Models are adjusted for age, gender, living with a partner, having children, migration background, educational attainment, number of months in paid employment before baseline and the presence of an additional chronic disease at baseline.
†Difference in RMST between persons with and without chronic diseases was statistically significantly different among persons with intermediate or high education compared with persons with low education at the 0.05 level.
‡Bold indicates that estimate is statistically significant.

DISCUSSION

This study showed that unemployed persons with chronic diseases entered paid employment less often and spent more months in non-employment during follow-up than persons without chronic diseases. For most chronic diseases, differences in time until entering paid employment between persons with and without chronic diseases were larger with increasing educational attainment, most pronounced for persons with a high educational attainment and psychotic disorders. For most categories of chronic diseases, these profound differences between persons with and without chronic diseases in entering paid employment were substantially less for gaining a permanent contract, conditional on having entered paid employment. The time until obtaining a permanent contract was longer for persons with cardiovascular diseases, inflammatory conditions and diabetes. For persons with psychotic disorders, the time until obtaining a permanent contract was shorter.

The majority of unemployed persons at baseline (66%) did not enter paid employment during the 10-year follow-up. In line with this finding, Yildiz *et al*[12] found that only 32% of the unemployed persons entered paid employment during 3 years of follow-up. A possible explanation is the prolonged non-employment history of the included persons. The majority of unemployed persons did not have any paid employment in the 2 years prior to baseline, which might have decreased their likelihood to re-enter the labour market. Likewise, Schuring *et al* showed that, for Dutch persons who left paid employment, the likelihood to re-enter paid employment was lower with increasing non-employment duration.[27] The selection of long-term non-employed persons in the current study might be the result of also defining persons with social security benefits as unemployed, in addition to those with unemployment benefits. In the Netherlands, most workers who become unemployed will first receive an unemployment benefit and after an extended period will be transferred to the much lower social security benefit.

This study pointed out that persons with chronic diseases obtained paid employment less often and spent more months in non-employment before entering paid employment. These findings corroborate results from previous studies on the lower likelihood to enter paid employment for persons with chronic diseases.[8–12] While the difference in prevalence of persons who entered paid employment was largest for persons with psychotic disorders compared with persons without psychotic disorders, differences in time spent in non-employment were most pronounced for persons with cardiovascular diseases in comparison with persons without cardiovascular diseases. The difficulties persons with chronic diseases experience in entering paid employment could partly be explained by their functional limitations or lower psychological resources.[28] Other explanations may be self-stigmatisation, and stigmatised attitudes and

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discrimination from employers in case employees disclose about their conditions, which was shown for persons with disabilities in a recent systematic review.[29]

In general, persons with higher education entered paid employment more often and spent less time in non-employment than persons with low education. However, differences in time before entering paid employment between persons with and without chronic diseases were more pronounced among persons with higher educational attainment. Since persons with higher education experienced fewer difficulties in entering paid employment compared with persons with low education, having a chronic disease may be a stronger limiting factor for participation in paid employment than those with higher education. Having a chronic disease might have played a smaller role for persons with low education because, besides reasons related to health, their participation in paid employment could be hampered by various other individual-level factors (eg, weaker cognitive skills or financial hardship),[30 31] economic and technological developments (eg, demand shift away from low-skilled workers).

Other new insights were that, compared with the health-based selection into paid employment and educational differences in these associations, obtaining a permanent contract was affected less by having chronic diseases and educational inequalities were less present. Employers might be more reluctant to offer persons with chronic diseases a permanent contract because they are less inclined to implement continued workplace adaptations,[32] and because, in the Netherlands, they are obliged to pay wages for up to 2 years in case employees with chronic diseases report sick. A surprising observation was that persons with psychotic disorders had a shorter time until obtaining a permanent contract compared with those without psychotic disorders. Unemployed persons with psychotic disorders entered paid employment least often, which may have introduced the strongest health-based selection into paid employment. Since this group likely consists of persons with high motivation to work and persons who receive support in obtaining and retaining employment, for instance by means of 'Individual Placement and Support' programmes,[33] this might explain the shorter time until obtaining a permanent contract.

A major strength of the current study is the use of registry-based information over a 10-year follow-up period. The information from tax registers on monthly employment status of all Dutch citizens made it possible to include a large study population and to avoid the risk of selective non-response in cohort studies. This increased the generalisability to the Dutch population and provided sufficient statistical power to evaluate the associations across educational attainment. In addition, precise statements could be made about the long-term impact of having a chronic disease on entering paid employment and obtaining a permanent contract. Another important strength is that the use of RMST analyses, compared with Cox proportional hazard models, allowed for a more intuitive interpretation of the impact of chronic disease on paid employment in terms of the difference in the average number of months until the event of interest.[26]

Several limitations also have to be addressed. By using data on prescribed medication, purchased at pharmacies and reimbursed by insurance companies, persons with chronic diseases who are not treated with medication were not defined as having a chronic disease in this study.[12] This could have underestimated the proportion of the study population having a chronic disease, especially for common mental disorders. In addition, since only yearly information was available on medication, censoring based on a change in medication for a particular chronic disease during follow-up resulted in some imprecision when determining the RMST in months. A limitation of RMST analysis is that the estimates are dependent on the length of the examined follow-up period and the proportion of outcome events.[34] We observed that the majority of unemployed persons did not enter paid employment and were censored at the end of the follow-up period. Hence, the estimated RMST must be interpreted within the period of 10 years in mind, and shorter follow-up periods would have resulted in lower RMST values. Last, 20% of the included persons missed information on educational attainment. To prevent the exclusion of these persons, a separate category was added indicating this 'missing' information.

For future research, it would be relevant to get insight into gender-specific associations, as well as into the influence of comorbidity on entering paid employment and on obtaining a permanent contract. This would be relevant as the patterns of participation in paid employment differ between men and women, with women being more often non-employed and more often working part time.[35 36] However, similar patterns have been observed for men and women concerning differences in participation in paid employment between persons with and without a chronic illness.[22]

In conclusion, this study showed that having a chronic disease was a barrier to entering paid employment, especially for persons with higher education and a chronic disease, and to a lesser extent also for obtaining a permanent contract. These results underline the need to prevent chronic diseases and to promote stable employment among persons with chronic diseases.

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