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Impact of mental disorders during education on work participation: a register-based longitudinal study on young adults with 10 years follow-up

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ABSTRACT

Background Mental disorders are a leading cause of disability and a major threat to work participation in young adults. This register-based longitudinal study aims to investigate the influence of mental disorders on entering and exiting paid employment among young graduates and to explore differences across socioeconomic groups.

Methods Register information on sociodemographics (age, sex, migration background) and employment status of 2 346 393 young adults who graduated from secondary vocational (n=1 004 395) and higher vocational education or university (n=1 341 998) in the period 2010–2019 was provided by Statistics Netherlands. This information was enriched with register information on the prescription of nervous system medication for mental disorders in the year before graduation as a proxy for having a mental disorder. Cox proportional hazards regression models were used to estimate the influence of mental disorders on (A) entering paid employment among all graduates and (B) exiting from paid employment among graduates who had entered paid employment.

Results Individuals with mental disorders were less likely to enter (HR 0.69–0.70) and more likely to exit paid employment (HR 1.41–1.42). Individuals using antipsychotics were the least likely to enter (HR 0.44) and the most likely to exit paid employment (HR 1.82–1.91), followed by those using hypnotics and sedatives. The association between mental disorders and work participation was found across socioeconomic subgroups (ie, educational level, sex and migration background).

Discussion Young adults with mental disorders are less likely to enter and maintain paid employment. These results ask for prevention of mental disorders and for a more inclusive labour market.

INTRODUCTION

The increase in life expectancy and public expenditure on welfare systems is leading to a growing need to enhance work participation, including workers with health problems.^{1 2} Welfare systems may achieve this by facilitating the entrance into the labour market as well as by preventing early exit from paid employment. Mental disorders are a major cause of disability and their impact on population health is on the rise^{3 4} with substantial direct (eg, treatments) and indirect costs (eg, loss of productivity).^{5 6} Mental disorders are a leading cause

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Mental disorders are a leading cause of disability and a major threat to work participation in young adults.
- ⇒ Mental disorders during childhood and adolescents are associated with lower work participation later in life, partly due to lower educational attainment.

WHAT THIS STUDY ADDS

- ⇒ Students who completed postsecondary education are less likely to enter and maintain paid employment if they have suffered from a mental disorder in the year before graduation.
- ⇒ Individuals using antipsychotics were the least likely to enter and maintain paid employment, followed by those using hypnotics and sedatives.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ These findings support the need to implement strategies for the prevention of mental disorders among young adults during education and to promote a more inclusive labour market. More research is recommended to investigate the differences in work participation across and within sociodemographic groups.

of long-term sickness absence^{7 8} and an important risk factor for early exit from paid employment due to disability benefits or unemployment.^{9–11} In Europe, 30%–50% of new disability benefits are due to mental disorders, with the proportion rising to 50%–80% if considering only young adults.^{12 13} However, little is known about the influence of mental disorders on entering and maintaining paid employment among young adults. Insight into the influence of mental disorders on the transition from education to paid employment contributes to the prevention of social exclusion among young adults with mental disorders.

Mental disorders have typically an onset early in life,^{14 15} with three in four cases already present by the mid-20s.¹⁶ Individuals who have suffered from a mental disorder during youth are more likely to never enter paid employment, and to prematurely exit paid employment due to unemployment, disability or economic inactivity.^{17–26}



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The research agenda by Bültmann *et al* has suggested to pay attention to the transition from education to work as a crucial time window.¹² For future research, they propose focusing, for example, on the influence of mental health in childhood and adolescence on school to work transitions of young adults, and on the interplay between major life transitions regarding transition timing and duration.¹² Also, they suggest to adopt a life course approach and, for example, to look at the first job both as the end of a transition and as the start of a new one.¹² Available literature on the association between mental disorders and work participation mainly relies on subjective assessment of mental disorders.^{9 19 27} Moreover, most of these studies are based on cohort studies that do not offer insights across different mental disorders.^{9 19 22 28–30} Studies assessing different mental disorders with an objective measure using national register data on the whole population are needed to understand the burden of mental disorders. For example, one study on over two million of Swedish young adults found that all severe mental disorders (such as bipolar disorders, depression and schizophrenia) with onset before age of 25 years were associated with a higher risk of unemployment later in life.³¹ However, most studies^{19 22 24 25} focus on childhood and adolescence and did not investigate the association between mental disorders during the last stages of education—during which young adults experience major life changes¹² and work participation. Moreover, little is known about sustained employment after initial entrance to the labour market.

In the current study, we investigate associations of mental disorders, using medication use as a proxy, with entering and maintaining paid employment using register data from all individuals who have graduated from intermediate and higher education in the Netherlands in the period

2010–2019. Furthermore, educational level, sex and migration background will be explored because the prevalence of both mental health disorders and participation in paid employment differ across sociodemographic factors.

METHODS

Study design and population

Individual-level information from all residents in the Netherlands concerning the use of medication in the period between 2009 and 2018 and sociodemographics, level of education and paid employment in the period between 2010 and 2019 were provided by Statistics Netherlands. In this longitudinal study, medication use was ascertained prior to completion of education and individuals were followed up for up to 10 years. Individuals were included if they were 35 years or younger when they graduated. Only individuals who have obtained a formal postsecondary degree were included in the study. Lower levels of education and incompletely education due to drop-out are insufficiently reliable in available registers.

Measures

Paid employment

Monthly information on main income components was derived from Dutch tax registers and stored in the social statistical database of Statistics Netherlands. The follow-up started 1 month after the date of diploma. Individuals were considered as having entered paid employment when the main source of income was paid employment or self-employment for at least three consecutive months. Among those who entered paid employment, persons were considered as having exited paid employment when they were not in paid employment or self-employed for at least three consecutive months.

Table 1 Descriptive information about sociodemographics and medication use for mental disorders in the year before graduation among 2 346 393 graduates, stratified by level of education and sex

	Level of education		Sex		
	Secondary vocational (n=1 004 395)	Higher education (n=1 341 998)	Female (n=1 215 136)	Male (n=1 130 006)	Transgender (n=1 251)
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Age at graduation	21.5 (3.5)	23.7 (3.1)	22.7 (3.4)	22.8 (3.6)	22.3 (3.3)
	N (%)	N (%)	N (%)	N (%)	N (%)
Sex					
Female	477 803 (47.6)	737 333 (54.9)	–	–	–
Male	525 955 (52.4)	604 051 (45.0)	–	–	–
Transgender	637 (0.1)	614 (0.0)	–	–	–
Migration background					
Native Dutch	742 413 (73.9)	986 630 (73.5)	881 662 (72.6)	846 441 (74.9)	940 (75.1)
Moroccan	39 010 (3.9)	23 132 (1.7)	34 763 (2.9)	27 373 (2.4)	*
Turkish	44 863 (4.5)	25 520 (1.9)	37 672 (3.1)	32 698 (2.9)	*
Antillean	48 479 (4.8)	38 452 (2.9)	47 829 (3.9)	39 031 (3.5)	71 (5.7)
Other European	25 502 (2.5)	41 621 (3.1)	35 340 (2.9)	31 743 (2.8)	40 (3.2)
Other non-European	104 128 (10.4)	226 643 (16.9)	177 870 (14.6)	152 720 (13.5)	181 (14.5)
Medication use					
At least one medication	52 393 (5.2)	52 783 (3.9)	57 519 (4.7)	47 475 (4.2)	182 (14.5)
Antipsychotics	7808 (0.8)	4606 (0.3)	5903 (0.5)	6470 (0.6)	41 (3.3)
Anxiolytics	5057 (0.5)	5117 (0.4)	6792 (0.6)	3370 (0.3)	12 (1.0)
Hypnotics and sedatives	2191 (0.2)	2227 (0.2)	2839 (0.2)	1567 (0.1)	12 (1.0)
Antidepressants	20 498 (2.0)	25 291 (1.9)	32 255 (2.7)	13 433 (1.2)	101 (8.1)
Psychostimulants	24 698 (2.5)	23 660 (1.8)	19 408 (1.6)	28 893 (2.6)	57 (4.6)
Drugs for addiction	769 (0.1)	438 (0.0)	618 (0.1)	584 (0.1)	*

*Number of individuals below 10 were not showed in the table due to the risk of disclosure.

Table 2 The influence of medication use for mental disorders and sociodemographics on entering paid employment among secondary vocational education graduates (N=1 004 395) and higher education graduates (N=1 341 998)

	Entering paid employment			
	Secondary vocational (n=1 004 395)		Higher education (n=1 341 998)	
	Unadjusted	Adjusted*	Unadjusted	Adjusted*
	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)
Age at graduation	1.07 (1.07 to 1.07)	1.08 (1.08 to 1.08)	1.13 (1.13 to 1.13)	1.15 (1.15 to 1.15)
Sex				
Female	0.86 (0.85 to 0.86)	0.84 (0.84 to 0.85)	1.04 (1.04 to 1.05)	1.13 (1.13 to 1.14)
Male	Ref.	Ref.	Ref.	Ref.
Transgender	0.57 (0.52 to 0.62)	0.54 (0.49 to 0.59)	0.57 (0.51 to 0.63)	0.58 (0.52 to 0.65)
Migration background				
Native Dutch	Ref.	Ref.	Ref.	Ref.
Moroccan	0.58 (0.57 to 0.58)	0.57 (0.57 to 0.58)	0.99 (0.97 to 1.00)	0.86 (0.85 to 0.87)
Turkish	0.62 (0.61 to 0.63)	0.62 (0.62 to 0.63)	0.88 (0.87 to 0.90)	0.77 (0.76 to 0.78)
Antillean	0.59 (0.58 to 0.60)	0.54 (0.53 to 0.55)	0.91 (0.90 to 0.92)	0.73 (0.72 to 0.74)
Other European	0.83 (0.81 to 0.84)	0.79 (0.78 to 0.80)	0.80 (0.79 to 0.81)	0.68 (0.67 to 0.69)
Other non-European	0.60 (0.59 to 0.60)	0.54 (0.53 to 0.54)	0.57 (0.56 to 0.57)	0.45 (0.45 to 0.45)
Medication use†				
Any	0.80 (0.79 to 0.81)	0.70 (0.70 to 0.71)	0.88 (0.87 to 0.88)	0.69 (0.68 to 0.69)
Antipsychotics	0.52 (0.51 to 0.53)	0.44 (0.43 to 0.46)	0.65 (0.62 to 0.67)	0.44 (0.42 to 0.46)
Anxiolytics	0.73 (0.71 to 0.76)	0.63 (0.61 to 0.65)	0.92 (0.89 to 0.95)	0.65 (0.63 to 0.67)
Hypnotics and sedatives	0.64 (0.61 to 0.67)	0.55 (0.52 to 0.58)	0.79 (0.75 to 0.83)	0.54 (0.51 to 0.57)
Antidepressants	0.85 (0.83 to 0.86)	0.70 (0.69 to 0.71)	0.99 (0.97 to 1.00)	0.71 (0.70 to 0.72)
Psychostimulants	0.83 (0.82 to 0.84)	0.78 (0.77 to 0.79)	0.76 (0.75 to 0.77)	0.68 (0.67 to 0.69)
Drugs for addiction	1.11 (1.03 to 1.20)	0.81 (0.75 to 0.87)	1.19 (1.07 to 1.32)	0.78 (0.70 to 0.87)

*Adjusted for sociodemographics (age at graduation, sex, migration background).

†Individuals not using medication were used as a reference.

Mental disorders

Dispensed medication was used as a proxy for having a mental disorder. Individuals were identified as using a medication when they received a reimbursement by the healthcare insurances for purchasing the medication in the year before graduation. Six classes of medications were classified according to the Anatomical Therapeutic Chemical Classification System 2021. Those six groups include different medications which may be used alone or in combination, and with different dose, each for the treatment of several disorders of varying severity. Likewise, a particular disorder may be treated with different medications. Antipsychotics (N05A), including sulpiride, are mainly used for psychotic disorders including schizophrenia, but also as an add-on for bipolar disorders and severe depression. This group (N05A) also includes lithium, which is mainly used for bipolar disorder, or as an add-on for severe depression. Anxiolytics (N05B), including diazepam, oxazepam and lorazepam, are mainly used for anxiety, but also for epilepsy. Hypnotics and sedative (N05C), including flurazepam, lormetazepam and temazepam, are mainly prescribed for insomnia, but also for anxiety, and epilepsy. Antidepressants (N06A), including fluoxetine, citalopram and sertraline, are mainly used for depression, but frequently also for anxiety, post-traumatic stress disorder and obsessive-compulsive disorder. Psychostimulants (N06B), including methylphenidate, can be used for the treatment of attention deficit-hyperactivity disorder (ADHD). The last group includes medications for addictions (N07B), such as nicotine, alcohol and opioids.

Level of education

After mandatory secondary education, the Dutch education system provides different education careers in which secondary

vocational education and higher education are distinguished. Higher education consists both of universities of applied sciences and research universities.

Sociodemographics

Register information was obtained about sex, age in the year of graduation and migration background. Yearly information about whether individuals were registered as female or male in the national register was provided. Those who were registered for at least two consecutive years as a female and for at least two consecutive years as a male were considered as transgender. Individuals were classified according to the migration background defined by the country of birth of the parents. When the parents had different countries of birth, the maternal country of birth was chosen. Individuals were divided into six groups: native Dutch, Turkish, Moroccan, Antillean-Surinamese, other European and other non-European. Turkish, Moroccan and Antillean-Surinamese were investigated separately as these are the largest minorities in the Netherlands. The division between other-European and non-European was made by convenience to have groups large enough for statistical analysis.

Statistical analyses

Descriptive statistics were used to describe the study population and medication use in the population, stratified by level of education and sex (table 1). Cox proportional hazards regression models were used, first, to estimate the associations of medication use and sociodemographic covariates with entering paid employment among all graduates (table 2), and, second to investigate the associations of medication use and sociodemographic

Table 3 The influence of medication use for mental disorders and sociodemographics on exiting paid employment among secondary vocational education graduates (N=866 545) and higher education graduates (N=969 885) who entered paid employment during the follow-up period

	Exit from paid employment			
	Secondary vocational education (N=8 66 545)		Higher education (N=9 69 885)	
	Unadjusted	Adjusted*	Unadjusted	Adjusted*
	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)
Age at graduation	0.94 (0.94 to 0.94)	0.93 (0.93 to 0.93)	0.93 (0.93 to 0.93)	0.92 (0.92 to 0.93)
Sex				
Female	1.29 (1.28 to 1.30)	1.27 (1.26 to 1.28)	1.17 (1.16 to 1.18)	1.12 (1.11 to 1.13)
Male	Ref.	Ref.	Ref.	Ref.
Transgender	2.03 (1.77 to 2.33)	1.95 (1.70 to 2.24)	2.02 (1.70 to 2.41)	1.89 (1.59 to 2.25)
Migration background				
Native Dutch	Ref.	Ref.	Ref.	Ref.
Moroccan	2.39 (2.35 to 2.43)	2.42 (2.38 to 2.46)	1.57 (1.53 to 1.61)	1.63 (1.59 to 1.67)
Turkish	2.20 (2.17 to 2.24)	2.22 (2.19 to 2.26)	1.59 (1.55 to 1.63)	1.66 (1.62 to 1.70)
Antillean	2.15 (2.12 to 2.18)	2.33 (2.30 to 2.37)	1.52 (1.49 to 1.55)	1.63 (1.60 to 1.66)
Other European	1.43 (1.40 to 1.46)	1.50 (1.46 to 1.53)	1.37 (1.34 to 1.40)	1.45 (1.41 to 1.48)
Other non-European	1.95 (1.93 to 1.97)	2.13 (2.11 to 2.16)	1.47 (1.46 to 1.49)	1.58 (1.57 to 1.60)
Medication use†				
Any	1.28 (1.26 to 1.30)	1.42 (1.40 to 1.44)	1.30 (1.27 to 1.32)	1.41 (1.38 to 1.44)
Antipsychotics	1.69 (1.62 to 1.76)	1.91 (1.83 to 1.99)	1.66 (1.56 to 1.77)	1.82 (1.71 to 1.94)
Anxiolytics	1.38 (1.32 to 1.46)	1.42 (1.35 to 1.49)	1.35 (1.28 to 1.43)	1.39 (1.31 to 1.47)
Hypnotics and sedatives	1.50 (1.39 to 1.63)	1.57 (1.45 to 1.71)	1.38 (1.26 to 1.51)	1.51 (1.38 to 1.66)
Antidepressants	1.25 (1.21 to 1.28)	1.44 (1.40 to 1.47)	1.29 (1.26 to 1.33)	1.41 (1.38 to 1.45)
Psychostimulants	1.23 (1.20 to 1.26)	1.36 (1.33 to 1.39)	1.29 (1.25 to 1.33)	1.40 (1.36 to 1.45)
Drugs for addiction	1.23 (1.09 to 1.40)	1.58 (1.39 to 1.80)	1.32 (1.09 to 1.60)	1.50 (1.24 to 1.82)

*Adjusted for sociodemographics (age at graduation, sex, migration background).

†Individuals not using medication were used as a reference.

covariates with exit from paid employment during follow-up among those who have entered paid employment (table 3). Both survival analyses were performed unadjusted and adjusted for sociodemographics. Individuals were censored when having missing information about paid employment for three consecutive months. All analyses were stratified by educational level.

Cox proportional hazards regression models with the same procedure for censoring and stratification and adjusted for sociodemographics were used to perform two additional stratified analyses. First, the associations of using at least one medication with entering and exiting paid employment were estimated within sex and migration groups (online supplemental table S1). Second, the associations of specific medications used with entering and exiting paid employment were estimated within sex and migration background groups (online supplemental tables S2–S3).

RESULTS

Sociodemographics and medication use

The study population encompassed over 2.3 million graduates. Table 1 shows that the group of secondary vocational education graduates consisted of more males (52.4%) than females (47.6%), while the higher education group consisted of more females (54.9%) than males (45.0%). In total, 5.2% of secondary vocational education graduates and 3.9% of higher education graduates used medication for mental disorders in the year before graduation. The prevalence of medication use was the highest among transgender graduates (14.5%), followed by female (4.7%) and male (4.2%) graduates. Antidepressants were the most common used medication among females (2.7%) and transgender graduates (8.1%), while psychostimulants were the

most frequently used medication among males (2.6%). Figure 1 shows that the use of medication for mental disorders was stable from 2009 to 2018, except for psychostimulants whose use gradually increased both among graduates from secondary vocational (from 1.4% to 2.8%) and higher education (from 0.5% to 2.4%).

Entrance to paid employment

During the follow-up period, 86.3% of graduates from secondary vocational education and 72.3% of graduates from higher education (figure 2) entered paid employment. The proportion of individuals entering paid employment was lower among those using at least one medication.

Table 2 shows that using at least one medication for mental disorders was associated with a lower likelihood to enter paid employment among secondary vocational education graduates (adjusted HR 0.70, 95% CI 0.70 to 0.71) as well as higher education graduates (adjusted HR 0.69, 95% CI 0.68 to 0.69). In both groups, this association was strongest for antipsychotics (secondary vocational education: adjusted HR 0.44, 95% CI 0.43 to 0.46; higher education: adjusted HR 0.44, 95% CI 0.42 to 0.46) and weakest for drugs for addiction (secondary vocational education: adjusted HR 0.81, 95% CI 0.75 to 0.87; higher education: adjusted HR 0.78, 95% CI 0.70 to 0.87).

Females were less likely to enter paid employment than males among secondary vocational education graduates (adjusted HR 0.84, 95% CI 0.84 to 0.85) and more likely than males to enter to paid employment among graduates from higher education (adjusted HR 1.13, 95% CI 1.13 to 1.14). Transgender graduates had the lowest likelihood to enter paid employment both after secondary vocational education (adjusted HR 0.54, 95% CI 0.49

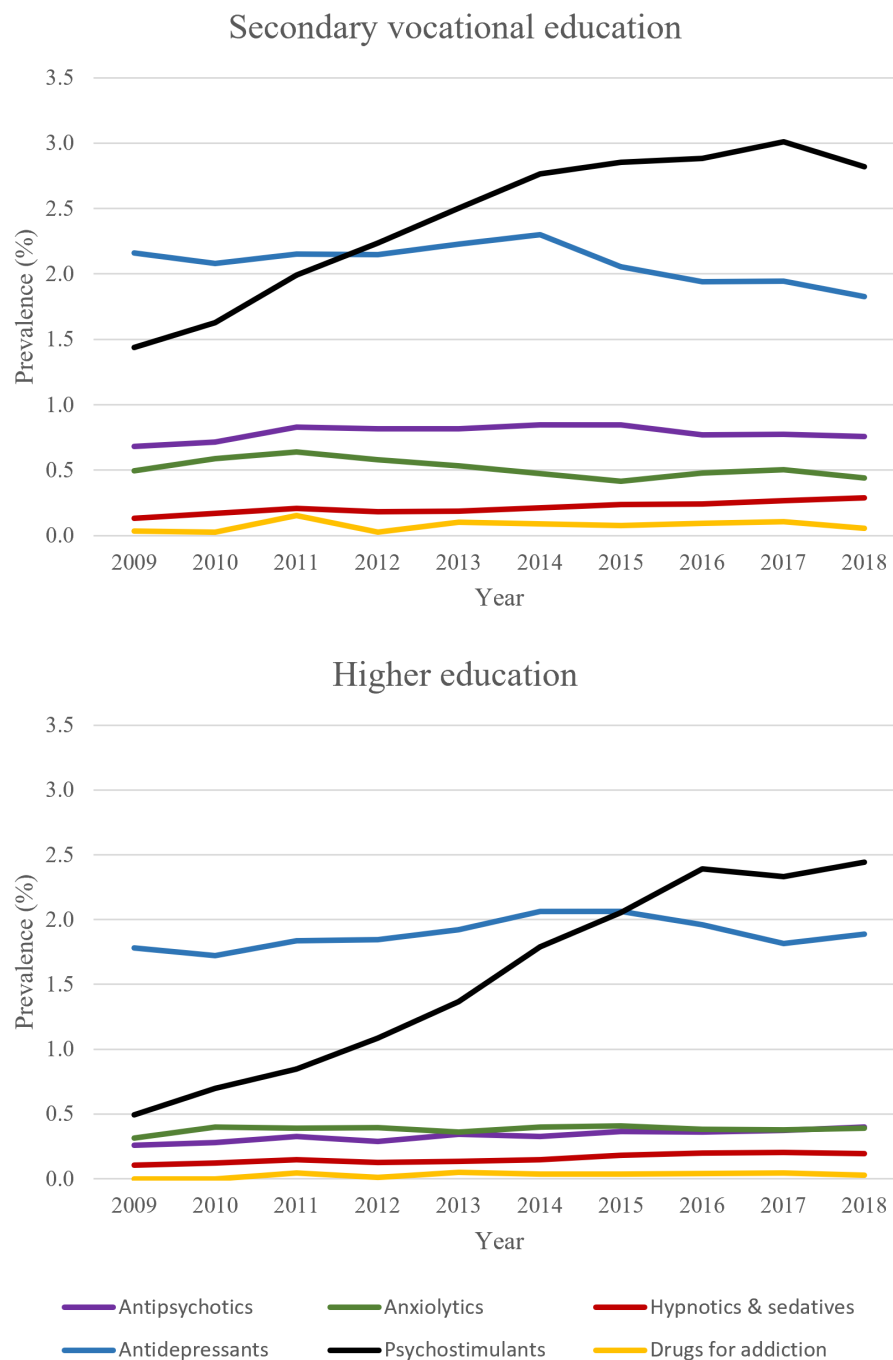


Figure 1 Trends in the prevalence in medication use over time (2009–2018) among secondary vocational education and higher education graduates.

to 0.59) and higher education (adjusted HR 0.58, 95% CI 0.52 to 0.65). Compared with those with native Dutch background, graduates with any migration background had a lower likelihood of entering paid employment. The adjusted HR ranged between 0.54 (Antillean, other non-European) and 0.79 (other European) among secondary vocational education graduates, and between 0.45 (other non-European) and 0.86 (Moroccan) among higher education graduates.

In total, 96.5% of secondary vocational graduates who did not use medication for mental health disorders entered paid employment, compared with 89.2% among graduates who used at least one medication. Among higher education graduates, the

percentage was 95.9% among persons who did not use any medication, and 90.3% among persons who used at least one medication. The percentage of secondary vocational education graduates who entered paid employment after 1, 3 and 5 years from graduation was, respectively, 77.2%, 89.9% and 94.0% among those not using medication, compared with 69.8%, 82.5% and 86.3% among graduates using at least one medication. Also among higher education graduates, the percentages of those who entered paid employment after 1, 3 and 5 years from graduation were higher among those not using medication (respectively, 68.6%, 80.7% and 89.2%) compared with graduates using at least one medication (respectively, 63.5%, 76.0% and 83.8%).

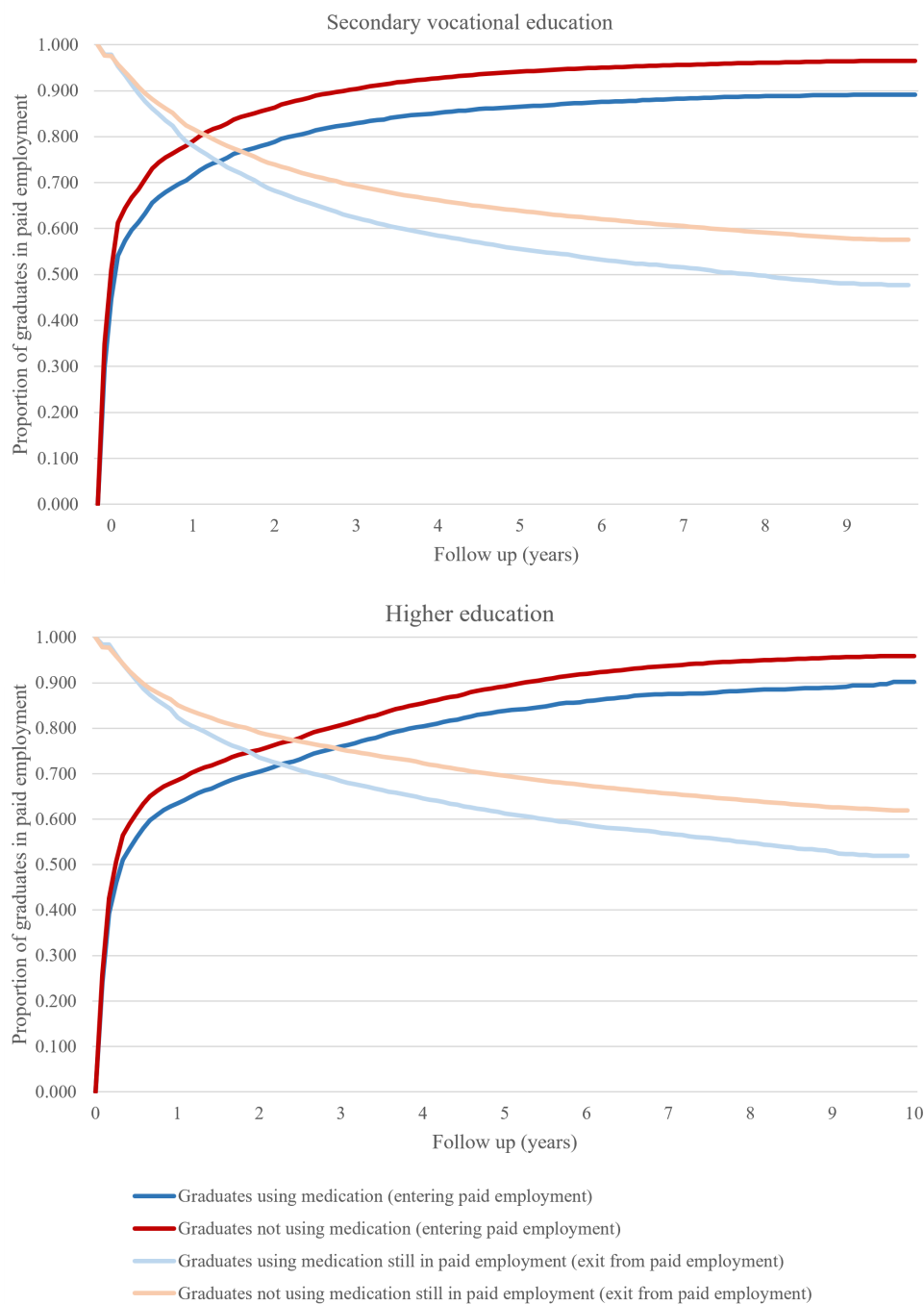


Figure 2 Proportion of individuals in paid employment stratified by medication for mental disorders. The upper panel presents for persons with secondary vocational education the proportion entering paid employment ($n=1\ 004\ 395$) and the proportion exiting paid employment among those who entered paid employment during 10 years follow-up ($n=866\ 545$). The lower panel provides these proportions for higher education graduates (entering paid employment: $n=1\ 341\ 998$, exiting paid employment $n=969\ 885$).

Exit from paid employment

Among those who had entered paid employment, 26.1% of graduates from secondary vocational education and 18.5% of graduates from higher education (figure 2) exited paid employment for at least 3 months during the follow-up period. The proportion of individuals exiting from paid employment during the follow-up was higher among those using at least one medication.

Table 3 shows that medication use was associated with a higher likelihood of exiting paid employment both among secondary vocational education (adjusted HR 1.42, 95% CI 1.40 to 1.44)

and among higher education graduates (adjusted HR 1.41, 95% CI 1.38 to 1.44). Antipsychotics had the strongest association both among secondary vocational education (adjusted HR 1.91, 95% CI 1.83 to 1.99) and higher education graduates (adjusted HR 1.82, 95% CI 1.71 to 1.94).

Female graduates (intermediate education, adjusted HR 1.27, higher education, adjusted HR 1.12) and transgender graduates (intermediate education, adjusted HR 1.95, higher education, adjusted HR 1.89) were more likely to exit paid employment compared with males. Compared with individuals with a native

Dutch background, graduates with another migration background were more likely to exit paid employment, with HRs ranging from 1.50 (other European) to 2.42 (Moroccan) among secondary vocational education graduates and from 1.45 (other European) to 1.66 (Turkish) among higher education graduates.

By the end of the follow-up, the percentages of secondary vocational graduates who maintained paid employment were 57.5% among individuals who did not use any medication and 47.7% among those who used at least one medication. The percentages among graduates from higher education were, respectively, 62.0% and 51.9%. The percentages of secondary vocational education graduates who maintained paid employment after 1, 3 and 5 years from graduation were, respectively, 83.7%, 69.9% and 64.2% among those not using medication, 80.4%, 63.1% and 55.9% among those using at least one medication. The percentage of higher education graduates who maintained paid employment after 1, 3 and 5 years from graduation was, respectively, 85.1%, 75.3% and 69.5% among those not using medication, 82.4%, 68.4% and 61.3% among those using at least one medication.

Additional analyses

Within all subgroups of sex and migration background, the use of at least one medication in the year before graduation was associated with a lower likelihood of entering paid employment and a higher likelihood of exiting paid employment. Non-European from higher education was the only exception. Similar results were also found across type of medication (online supplemental tables S1–S3).

DISCUSSION

Mental disorders during postsecondary education are associated to lower work participation. This study identified two mechanisms through which young adults with mental disorders are less likely to be in paid employment: (A) a lower likelihood of entering paid employment after education and (B) a higher likelihood of exiting paid employment among graduates who had entered paid employment. These patterns were observed among all sociodemographic subgroups, with varying magnitude of risk of being out of paid employment.

This study showed that mental disorders may represent an important barrier for entering and maintaining paid employment among young adults. The findings are in line with studies on older adults.^{9 10 32} Previous research showed that the risk of lower work participation among individuals who suffered from a mental disorder during childhood and adolescence¹⁹ could partially be explained due to a lower education attainment (eg, drop-out).³³ Investigating only individuals who successfully graduated from non-mandatory secondary education may have led to an underestimation of the negative influence of mental disorders on work participation because individuals with most severe mental disorders may be more likely to drop-out. However, this study design permits to suggest that mental disorders impact work participation also through other less investigated mechanisms than drop-out. The negative impact of mental disorders on work participation may be explained by different factors such as disease characteristics, employer factors, and institutional arrangements and policies. These factors may explicate their effect on work participation at multiple levels of the transition from education to work, including the process of job hunting, job recruitment and first work experiences. Previous studies have identified that individuals suffering from a mental disorder during education are more likely to have

poorer academic performance,³⁴ which may negatively influence the attractiveness to employers with a consequent lower likelihood of entering paid employment or lead them to find job with poorer work conditions. Unfavourable working conditions can affect mental health and may contribute to the higher risk of exit paid employment among persons with mental health problems. Because mental disorders are often persistent or recurrent,³⁵ individuals suffering from a mental disorder in the year before graduation are at higher risk of suffering from a mental disorder during the transition from education to work. This could have a negative impact on the daily functioning of young adults during job hunting and job recruitment. Moreover, individuals suffering from a mental disorder at the time of entering paid employment may be less likely to be confirmed at the end of the trial period and/or to receive a new contract after the end of their fixed-term contract due to worse performance, more sick leave and stigma in the workplace. Employers may be less likely to hire individuals suffering from a mental disorder and to offer a permanent contract due to stigmatisation of mental disorders and to prevent the potential burden of mental disorders for the company.³⁶ This may be particularly true for small companies due to lack of financial support for employers in case of sickness absences.

The negative influence of mental disorders on performance and the chronicity of some mental disorders may also explain the differences across types of medications found in this study. Medications used for addictions had only a modest influence on work participation, possibly due to the relatively high number of individuals using medication against nicotine addiction, which is an intervention often concerning individuals with a relatively good mental health compared with persons who use the other medications. Contrarily, individuals using antipsychotics were the least likely to enter and maintain paid employment, followed by individuals using hypnotics and sedatives. The two most common conditions treated with antipsychotics are schizophrenia and bipolar disorder, which are chronic conditions and among the most disabling mental disorders.³⁷ As a consequence, individuals suffering from a mental disorder requiring a treatment with antipsychotics in the year before graduation are more likely to be suffering from a mental disorder in the following years compared with those treated with anxiolytics, with a long-term negative influence on work participation.

Sociodemographics characteristics were associated with differences in medication use and work participation. The prevalence of medication use was higher among students from lower vocational education, in transgender and females, and among students with a native Dutch or other European migration background. Differences in medication use across these groups may be due to differences in the actual prevalence of mental disorders as well as in access to healthcare.^{38 39} However, we have found a similar influence of mental disorders on the likelihood of entering and maintaining paid employment within sociodemographics groups. This suggests that although there are some differences and inequalities across groups, mental disorders negatively impact work participation within each sociodemographic group.

The increase in prescription of psychostimulants, commonly used for the treatment of ADHD) among young adults, is in line with previous European studies.⁴⁰ Many factors have been pointed out to explain the worldwide rise in ADHD diagnosis and treatment, including diagnosis migration, changes in guidelines and increasing detection.^{41 42}

Strengths and weaknesses

This study has several strengths and weaknesses. It is a strength that the study focuses both on entrance to paid employment as well as on exit from paid employment. The use of register data is also a strength due to the magnitude of the study population and its high representativeness as selection bias will not play a role. The use of medication as a proxy for mental disorder has several implications. Measuring mental health is complicated due to the descriptive approach used in the clinical setting. Other authors have investigated the association of mental disorders and work participation using self-report questionnaires on relatively large samples and clinical information on smaller samples. The use of objective data from the entire target population with results in line with these studies strengthens the understanding of the negative impact of mental disorders on work participation. A weakness of the use of register data is linked with the impossibility to identify and distinguish the clinical conditions of individuals due to the broad use of the investigated medications. Only pharmacological treatment was taken into account. The choice of annual information about medication use as a proxy does not allow insights into the severity and duration of the disorders. The magnitude of the association may be influenced by the fact that individuals not receiving treatment may have milder conditions in some cases, but more severe disorders due to the lack of treatment in others. While the observational nature of this study does not allow conclusions on causality, reversed causality is not likely—as the transition to paid employment cannot determine medication use for mental disorders earlier in life. However, some persons may have been more prone to develop mental health problems than others. We can therefore not rule out that other factor(s) influenced both the presence or severity of mental disorders as well as participation in paid employment.

CONCLUSIONS

Students with mental disorders have a lower likelihood to enter and maintain paid employment compared with their peers without mental disorders, using medication as a proxy for mental disorders. These findings support the need to implement strategies for the prevention of mental disorders among young adults during education and to promote a more inclusive labour market.

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REFERENCES

- Ilmarinen J. The ageing workforce -- challenges for occupational health. *Occup Med (Lond)* 2006;56:362–4.
- European Commission. Communication from the commission to the European parliament, the council, the European economic and social committee and the committee of the regions; Available: [https://ec.europa.eu/transparency/documents-register/detail?ref=COM\(2014\)130&lang=en&lang=en](https://ec.europa.eu/transparency/documents-register/detail?ref=COM(2014)130&lang=en&lang=en) [Accessed 02 Mar 2022].
- Lopez AD, Mathers CD. Measuring the global burden of disease and epidemiological transitions: 2002–2030. *Ann Trop Med Parasitol* 2006;100:481–99.
- World Health Organization (WHO). The global burden of disease, 2004 update. Ginebra Organización Mundial de la Salud; 2016. Available: <https://apps.who.int/iris/handle/10665/204178> [Accessed 02 Mar 2022].
- Gustavsson A, Svensson M, Jacobi F, et al. Cost of disorders of the brain in Europe 2010. *Eur Neuropsychopharmacol* 2011;21:718–79.
- Greenberg PE, Ronald MA, Kessler C, et al. *United States was estimated to be \$43.7 billion, the economic burden of depression in the United States: how did it change between 1990 and 2000?*
- Kaltenbrunner Bernitz B, Grees N, Jakobsson Randers M, et al. Young adults on disability benefits in 7 countries. *Scand J Public Health* 2013;41:3–26.
- Narusyte J, Ropponen A, Alexanderson K, et al. Internalizing and externalizing problems in childhood and adolescence as predictors of work incapacity in young adulthood. *Soc Psychiatry Psychiatr Epidemiol* 2017;52:1159–68.
- Porru F, Burdorf A, Robroek SJW. The impact of depressive symptoms on exit from paid employment in Europe: a longitudinal study with 4 years follow-up. *Eur J Public Health* 2019;29:134–9.
- van Rijn RM, Robroek SJW, Brouwer S, et al. Influence of poor health on exit from paid employment: a systematic review. *Occup Environ Med* 2014;71:295–301.
- Boardman J, Grove B, Perkins R, et al. Work and employment for people with psychiatric disabilities. *Br J Psychiatry* 2003;182:467–8.
- Bültmann U, Arends I, Veldman K, et al. Investigating young adults' mental health and early working life trajectories from a life course perspective: the role of transitions. *J Epidemiol Community Health* 2020;74:179–81.
- Layard R. Mental health: the new frontier for labour economics. *IZA J Labor Policy* 2013;2:2.
- Solmi M, Radua J, Olivola M, et al. Age at onset of mental disorders worldwide: large-scale meta-analysis of 192 epidemiological studies. *Mol Psychiatry* 2022;27:281–95.
- Jones PB. Adult mental health disorders and their age at onset. *Br J Psychiatry Suppl* 2013;54:s5–10.
- Kessler RC, Amminger GP, Aguilar-Gaxiola S, et al. Age of onset of mental disorders: a review of recent literature. *Curr Opin Psychiatry* 2007;20:359–64.
- OECD. Sick on the job?: myths and realities about mental health and work | en |. Available: <https://www.oecd.org/els/mental-health-and-work-9789264124523-en.htm> [Accessed 02 Mar 2022].
- Whooley MA, Kiefe CI, Chesney MA, et al. Depressive symptoms, unemployment, and loss of income: the cardia study. *Arch Intern Med* 2002;162:2614–20.
- Veldman K, Reijneveld SA, Ortiz JA, et al. Mental health trajectories from childhood to young adulthood affect the educational and employment status of young adults: results from the trails study. *J Epidemiol Community Health* 2015;69:588–93.
- Fletcher J. Adolescent depression and adult labor market outcomes. *Southern Economic Journal* 2013;80:26–49.
- Fletcher JM. The effects of childhood ADHD on adult labor market outcomes. *Health Econ* 2014;23:159–81.
- Veldman K, Reijneveld SA, Verhulst FC, et al. A life course perspective on mental health problems, employment, and work outcomes. *Scand J Work Environ Health* 2017;43:316–25.
- Clayborne ZM, Varin M, Colman I. Systematic review and meta-analysis: adolescent depression and long-term psychosocial outcomes. *J Am Acad Child Adolesc Psychiatry* 2019;58:72–9.

- 24 Mousteri V, Daly M, Delaney L, *et al.* Adolescent mental health and unemployment over the lifespan: population evidence from Sweden. *Soc Sci Med* 2019;222:305–14.
- 25 de Groot S, Veldman K, Amick Iii BC, *et al.* Does the timing and duration of mental health problems during childhood and adolescence matter for labour market participation of young adults? *J Epidemiol Community Health* 2021;75:896–902.
- 26 Alaie I, Ssegonja R, Philipson A, *et al.* Adolescent depression, early psychiatric comorbidities, and adulthood welfare burden: a 25-year longitudinal cohort study. *Soc Psychiatry Psychiatr Epidemiol* 2021;56:1993–2004.
- 27 Butterworth P, Leach LS, Pirkis J, *et al.* Poor mental health influences risk and duration of unemployment: a prospective study. *Soc Psychiatry Psychiatr Epidemiol* 2012;47:1013–21.
- 28 Hakulinen C, McGrath JJ, Timmerman A, *et al.* The association between early-onset schizophrenia with employment, income, education, and cohabitation status: nationwide study with 35 years of follow-up. *Soc Psychiatry Psychiatr Epidemiol* 2019;54:1343–51.
- 29 Berg N, Kiviruusu O, Huurre T, *et al.* Associations between unemployment and heavy episodic drinking from adolescence to midlife in Sweden and Finland. *Eur J Public Health* 2018;28:258–63.
- 30 Hartge J, Toledo P. Attention Deficit Hyperactivity Disorder (ADHD) and its comorbid mental disorders: an evaluation of their labor market outcomes. *J Ment Health Policy Econ* 2018;21:105–21.
- 31 Hakulinen C, Elovainio M, Arffman M, *et al.* Mental disorders and long-term labour market outcomes: nationwide cohort study of 2 055 720 individuals. *Acta Psychiatr Scand* 2019;140:371–81.
- 32 Ek E, Sovio U, Remes J, *et al.* Social predictors of unsuccessful entrance into the labour market—A socialization process perspective. *Journal of Vocational Behavior* 2005;66:471–86.
- 33 Butterworth P, Leach LS. Early onset of distress disorders and high-school dropout: prospective evidence from a national cohort of Australian adolescents. *Am J Epidemiol* 2018;187:1192–8.
- 34 Bruffaerts R, Mortier P, Kiekens G, *et al.* Mental health problems in college freshmen: prevalence and academic functioning. *J Affect Disord* 2018;225:97–103.
- 35 Eaton WW, Shao H, Nestadt G, *et al.* Population-based study of first onset and chronicity in major depressive disorder. *Arch Gen Psychiatry* 2008;65:513–20.
- 36 van Beukering IE, Smits SJC, Janssens KME, *et al.* In what ways does health related stigma affect sustainable employment and well-being at work? A systematic review. *J Occup Rehabil* 2022;32:365–79.
- 37 Salomon JA, Haagsma JA, Davis A, *et al.* Disability weights for the global burden of disease 2013 study. *Lancet Glob Health* 2015;3:e712–23.
- 38 Breslau J, Cefalu M, Wong EC, *et al.* Racial/Ethnic differences in perception of need for mental health treatment in a US national sample. *Soc Psychiatry Psychiatr Epidemiol* 2017;52:929–37.
- 39 Chiu M, Amartey A, Wang X, *et al.* Ethnic differences in mental health status and service utilization: a population-based study in Ontario, Canada. *Can J Psychiatry* 2018;63:481–91.
- 40 Grimmsmann T, Himmel W. The 10-year trend in drug prescriptions for attention-deficit/hyperactivity disorder (ADHD) in Germany. *Eur J Clin Pharmacol* 2021;77:107–15.
- 41 Conrad P, Bergey MR. The impending globalization of ADHD: notes on the expansion and growth of a medicalized disorder. *Soc Sci Med* 2014;122:31–43.
- 42 Langner I, Haug U, Scholle O, *et al.* Potential explanations for increasing methylphenidate use in children and adolescents with attention-deficit/hyperactivity disorder in Germany from 2004 to 2013. *J Clin Psychopharmacol* 2019;39:39–45.