Psychological Medicine

cambridge.org/psm

Labour market integration among young adults diagnosed with attention-deficit/hyperactivity disorder (ADHD) at working age

Lingjing Chen[1], Ellenor Mittendorfer-Rutz[1], Emma Björkenstam[1], Syed Rahman[1], Klas Gustafsson[1], Linnea Kjeldgård[1], Lisa Ekselius[2], Heidi Taipale[1,3,4], Antti Tanskanen[1,3] and Magnus Helgesson[1,5]

[1]Department of Clinical Neuroscience, Division of Insurance Medicine, Karolinska Institutet, SE-17177 Stockholm, Sweden; [2]Department of Neuroscience, Psychiatry, Uppsala University, Uppsala, Sweden; [3]Niuvanniemi Hospital, Kuopio, Finland; [4]School of Pharmacy, University of Eastern Finland, Kuopio, Finland and [5]Department of Public Health and Caring Sciences, Health Equity and Working Life, Uppsala University, SE-75237 Uppsala, Sweden

Original Article

Cite this article: Chen L *et al* (2024). Labour market integration among young adults diagnosed with attention-deficit/hyperactivity disorder (ADHD) at working age. *Psychological Medicine* **54**, 148–158. https://doi.org/10.1017/S003329172300096X

Received: 10 February 2022
Revised: 17 March 2023
Accepted: 27 March 2023
First published online: 26 April 2023

Keywords:
ADHD; attention-deficit/hyperactivity disorder; core-peripheral theory; labour market integration; sequence analysis

Corresponding author:
Magnus Helgesson,
E-mail: magnus.helgesson@ki.se

Abstract

The aims were to investigate patterns of labour market integration following an adult diagnosis of attention-deficit/hyperactivity disorder (ADHD) and its relation to sociodemographic factors and comorbid disorders.

Methods. Multiple Swedish nationwide registers were used to identify 8045 individuals, aged 20–29, with an incident diagnosis of ADHD 2006–2011. Labour market integration was conceptualized according to the core-peripheral model as a continuum from a strong (core) to a weak (peripheral) connection to the labour market. Sequence analyses categorized clusters of labour market integration, from 1 year before to 5 years after their ADHD diagnosis for individuals diagnosed with ADHD and a matched control group without ADHD. Multinomial logistic regression computed odds ratios (ORs) with 95% confidence intervals (CIs) between sociodemographic factors and comorbid disorders and the identified clusters.

Results. About one-fourth of the young adults diagnosed with ADHD belonged to clusters characterized by a transition to a mainly peripheral labour market position, which was approximately four-times higher compared to controls without ADHD. Foremost, those living in small cities/villages (OR 1.9; CI 1.5–2.2), those having comorbid autism-spectrum disorder (OR 13.7; CI 6.8–27.5) or schizophrenia/psychoses (OR 7.8; CI 3.8–15.9) were associated with a transition towards a peripheral labour market position throughout the study period. Those with a high educational level (OR 0.1; CI 0.1–0.1), and men (OR 0.7; CI 0.6–0.8) were less likely to have a peripheral labour market position.

Conclusions. Young adults diagnosed with ADHD are four-times more likely to be in the peripheral labour market position compared to those without ADHD. To increase labour market participation, special attention is warranted to those with low educational level, those living outside big cities and those with comorbid mental disorders.

Background

During the last two decades, an increasing number of individuals have received their first diagnosis of attention-deficit/hyperactivity disorder (ADHD) in young adult age, typically between 20 and 30 years of age (Edvinsson, 2017; Giacobini, Medin, Ahnemark, Russo, & Carlqvist, 2018; Rydell, Lundström, Gillberg, Lichtenstein, & Larsson, 2018). Young adulthood is a crucial time for establishment on the labour market and ADHD can have a considerable detrimental effect on workability and may result in hardship to obtain and retain a job (Helgesson et al., 2021; Helgesson, Tinghog, Niederkrotenthaler, Saboonchi, & Mittendorfer-Rutz, 2017; Hirvikoski, Lindström, Nordin, Jonsson, & Bölte, 2017; Johnson, 2001; Kupper et al., 2012). Studies on labour market integration among young adults with ADHD are scarce and existing studies are mostly performed on small samples and with a focus on reasons behind poor work performance, rather than assessing the rate of employment among individuals in this group (Kupper et al., 2012). Different concepts have been proposed to describe the varying degrees of labour market integration within a population (Gustafsson, Aronsson, Marklund, Wikman, & Floderus, 2014; Muñoz-Bullón & Malo, 2003). One of them, the 'core-peripheral' model, gives a theoretical framework of labour market integration as a continuum from attachment (core) to marginalization (peripheral) (Atkinson, 1984; Gustafsson et al., 2014). This model can in a dynamic way outline to which extent young adults with ADHD have a connection to the labour market and can be of great importance for the choice of potential measures taken by healthcare and other work-related stakeholders.

At the time of diagnosis of ADHD, a battery of measures aimed at facilitating everyday life and increasing the ability to work are supposed to be introduced and is therefore a suitable time point to assess labour market integration. In epidemiological research, sequence analysis is a novel approach aiming to analyse the dynamic transitions of an outcome of interest within a defined population (Kjeldgård, Stigson, Alexanderson, & Friberg, 2020; Murley et al., 2020). Sequence analysis along with the 'core-periphery' model is therefore well-suited to visualize and categorize different patterns of labour market integration as well as the development over time regarding labour market integration among young adults with ADHD. This study can therefore by its focus on employment give new insights into the transition of work participation among young adults with ADHD. Also, sociodemographic factors such as sex, age at diagnosis, family composition, type of living area, country of birth as well as comorbid disorders may affect the relationship between ADHD and later labour market integration (Aduen et al., 2018; Bjorkenstam, Pierce, Bjorkenstam, Dalman, & Kosidou, 2020; Chen, Lee, Yeh, & Lin, 2013; Cortese et al., 2018; Gershon & Gershon, 2002; Giacobini et al., 2018; Haukenes, Gjesdal, Rortveit, Riise, & Maeland, 2012; Helgesson et al., 2017; Kupper et al., 2012; Shaw et al., 2014; Virtanen, Liukkonen, Vahtera, Kivimäki, & Koskenvuo, 2003; Waenerlund, Gustafsson, Virtanen, & Hammarström, 2011; Zetterqvist, Asherson, Halldner, Långström, & Larsson, 2013). By also assessing these covariates, this study will contribute to an increased understanding of the dynamic processes of labour market integration among young adults diagnosed with ADHD.

The aims of the study were: (1) to investigate patterns of labour market integration before and following an incident diagnosis of adult ADHD and (2) to study the association between the patterns of labour market integration and sociodemographic factors and comorbid disorders.

Methods

Study population

Register data from *the National Patient Register* (*NPR*), held by the National Board of Health and Welfare, were used to identify young adults who were diagnosed with ADHD for the first time at the age of 20–29 from 1 January 2006 to 31 December 2011 (N = 11 026). The reason behind the choice of using an incident population diagnosed with ADHD was that we can thereby assess the outcome both before and after the diagnosis of ADHD. Hence, it allows us to study how a diagnosis, with associated interventions aimed to simplify everyday life and working life, may affect subsequent labour market integration.

ADHD was defined as having ICD-10 (International Classification of Diseases, the 10th edition) code F90 as the primary or secondary diagnosis from inpatient (from 1987) or specialized outpatient (from 2001) healthcare. The day of the first diagnosis of ADHD was chosen as the cohort entry date (CED) and all were residents in Sweden on 31 December two calendar years before CED. Those who had a record of prescribed ADHD medication in *the Prescribed Drug Register* (*PDR*), held by the National Board of Health and Welfare (from July 2005) for codes: N06BA01–N06BA13 and C02AC01–C02AC02 according to the Anatomic Therapeutic Chemical Classifications (ATC) before the CED (n = 2668) or emigrated (n = 133) or died (n = 180) during the follow-up period of 5 years were excluded. The final study population consisted of 8045 young adults. A control group of young adults without ADHD were matched on age, sex and educational level (n = 8018 due to missing data regarding the outcome for 27 individuals).

Variables

Outcome measures

The outcome measure in this study, labour market integration, was categorized according to the 'core-peripheral' scale (Atkinson, 1984; Gustafsson et al., 2014). All information was obtained annually from *the Longitudinal Integration Database for Health Insurance and Labour Market Studies* (*LISA*), held by Statistics Sweden, 1 year before and 5 years after CED (2005–2016) and included the five following positions, from a strong (core) to a weak (peripheral) connection to the labour market:

- 'Core': income from work and where time with social benefits (i.e. disability pension, sickness absence, municipal support, parental leave, unemployment) or studies not exceeding 6 months during a year.
- 'Close to core': studying or on parental leave for more than 6 months during a year.
- 'Middle': more than 180 gross days of sickness absence or more than 180 days of unemployment during a year.
- 'Close to peripheral': municipal support or economic inactivity (which equals no registered income or social benefits in LISA) for more than 6 months during a year.
- 'Peripheral': more than 180 gross days of disability pension during a year.

Covariates

Information on covariates was linked from the following databases using the anonymized personal identity number (Ludvigsson et al., 2011): (1) *LISA* (Ludvigsson, Svedberg, Olen, Bruze, & Neovius, 2019): sex, age, educational level, family composition, type of living area and country of birth (all measured on 31 December in the year before CED). Those with missing data regarding educational level (229 individuals among those with ADHD and 203 in the control group) were included in the group with low educational level and those with missing data regarding country of birth were included in the group of those born outside Sweden (six individuals among those with ADHD and one in the control group); (2) *NPR* (Ludvigsson et al., 2011): inpatient healthcare and specialized outpatient healthcare on comorbid disorders measured during the year before CED: mental disorders included depression/bipolar disorder (ICD-10: F30–F34), anxiety/stress-related disorders (ICD-10: F40–F48), autism-spectrum disorder (ICD-10: F84), substance use disorder (ICD-10: F10–F19), behavioural/emotional disorders (ICD-10: F91–F98), intellectual disabilities/developmental disorders (ICD-10: F70–F83, F85–F89), schizophrenia/psychoses (ICD-10: F20–F29), other mental disorders (ICD-10: remaining codes starting with F). Somatic disorders included musculoskeletal disorders (ICD-10: M01–M99), accidents (ICD-10: S00–S99) and other somatic disorders (ICD-10: remaining codes except O.80 and Z00–99); (3) *the Cause of Death Register*, provided by the National Board of Health and Welfare (Brooke et al., 2017): date of death (during follow-up); and (4) *PDR* (2006–2016) (Wettermark et al., 2007): information of drug prescriptions for diabetes mellitus (ATC: A10, used for defining individuals with

https://doi.org/10.1017/S003329172300096X Published online by Cambridge University Press

Table 1. Distribution of sociodemographic and medical characteristics among all young adults with an incident diagnosis of attention-deficit/hyperactivity disorder (ADHD) and a matched control group without ADHD during 2006–2011

	ADHD	Controls
	N (%)	*N* (%)
Total	8045 (100)	8018 (100)
Sociodemographic factors		
Sex		
Men	4412 (54.8)	4402 (54.9)
Women	3633 (45.2)	3616 (45.1)
Age group		
19–24 years	4508 (56.0)	4495 (56.1)
25–29 years	3537 (44.0)	3523 (43.9)
Educational level		
Elementary (<10 years)	3878 (48.2)	3851 (48.0)
High school (10–12 years)	3512 (43.7)	3512 (43.8)
University/college (<12 years)	655 (8.1)	655 (8.2)
Country of birth		
Sweden	7376 (91.7)	7006 (87.4)
Outside Sweden	669 (8.3)	1012 (12.6)
Family situation[a]		
Married/in partnership without children	116 (1.4)	171 (2.1)
Married/in partnership with children	655 (8.1)	1238 (15.4)
Singles without children	6753 (83.9)	6302 (78.6)
Singles with children	521 (6.5)	307 (3.8)
Type of living area[b]		
Big cities	2477 (30.8)	2800 (34.9)
Medium-sized cities	3085 (38.3)	2932 (36.6)
Small cities/villages	2483 (30.9)	2286 (28.5)
Income from work during the year before diagnosis		
No	5528 (68.7)	5076 (63.3)
Yes	2517 (31.3)	2517 (31.4)
Comorbid disorders[c]		
Depression/bipolar disorder		
No	6559 (81.5)	7892 (98.4)
Yes	1486 (18.5)	126 (1.6)
Anxiety/stress-related disorders		
No	6069 (75.4)	7831 (97.7)
Yes	1976 (24.6)	187 (2.3)
Autism-spectrum disorder		
No	7816 (97.2)	7978 (99.5)
Yes	229 (2.8)	40 (0.5)
Substance abuse		
No	6742 (83.8)	7878 (98.3)
Yes	1303 (16.2)	140 (1.8)
Behavioural/emotional disorders		
No	7906 (98.3)	8016 (99.9)
Yes	139 (1.7)	2 (0.1)
Intellectual disabilities/developmental disorders		
No	7935 (98.6)	7992 (99.7)
Yes	110 (1.4)	26 (0.3)
Schizophrenia/psychoses		
No	7852 (97.6)	7983 (99.6)
Yes	193 (2.4)	35 (0.4)
Other mental disorders		
No	7043 (87.5)	7934 (99.0)
Yes	1002 (12.5)	84 (1.0)
Musculoskeletal disorders		
No	7654 (95.1)	7789 (97.1)
Yes	391 (4.9)	229 (2.9)
Accidents		
No	7086 (88.1)	7525 (93.9)
Yes	959 (11.9)	493 (6.1)
Other somatic disorders		
No	4985 (62.0)	6129 (76.4)
Yes	3060 (38.0)	1889 (23.6)

[a]With or without children living at home.
[b]Type of living area: big cities – Stockholm, Gothenburg and Malmö; medium-sized cities – cities with more than 90 000 inhabitants within 30 km distance from the centre of the city; small cities/villages – remaining areas of living.
[c]All comorbid disorders were measured during the 1 year before the cohort entry date, which was the first diagnosis of ADHD in adult age, for depression and bipolar disorder [international classification of diseases, version 10 (ICD-10): F30–F34], anxiety and stress-related disorders (ICD-10: F40–F48), autism-spectrum disorder (ICD-10: F84), substance abuse (ICD-10: F10–F19 and ATC: N07B), behavioural and emotional disorders (ICD-10: F91–F98), intellectual disabilities/developmental disorders (ICD-10: F70–F83, F85–F89), schizophrenia/psychoses (ICD-10: F20–F29), other mental disorders (all the other codes left starting with F). Somatic disorders included musculoskeletal disorders (ICD-10: M01–M99), accidents (ICD-10: S00–S99) and other somatic disorders (all other ICD-10 codes except the above-mentioned, O.80 and Z00–99) measured year before CED.

diabetes as a comorbid disorder as most patients are treated in primary care, and no information is available in national registers) and drugs used in addictive disorders (ATC: N07B, used for defining individuals with comorbid substance use disorder), measured during the year before CED.

Statistical analyses

Descriptive analyses were performed to illustrate the distributions of sociodemographic covariates and comorbidities in the study population. Sequences of annual labour market integration were estimated during the 7 years (from 1 calendar year before to 5 calendar years after the year of the diagnosis Y_0 (Y_{-1} to Y_5), during the period 2005–2016) with sequence analysis using TraMineR in

https://doi.org/10.1017/S003329172300096X Published online by Cambridge University Press

R (Gabadinho, Ritschard, Muller, & Studer, 2011). First, the distance between sequences was calculated using optimal matching with transition matrix costs. Then, cluster analysis was performed to group similar sequences to identify clusters of labour market integration patterns. Hierarchical cluster analysis with Ward's linkage algorithm and the dissimilarity measures were used (Gabadinho et al., 2011). Thereafter, a sequence index plot of the population was constructed to visualize the heterogeneity in the individual sequences; the sequences were sorted by the state assigned in Y_5, i.e. the last year of the follow-up period. In addition, a density plot was constructed, illustrating the accumulation of each labour market position every year for all the clusters.

Multinomial logistic regression was used to analyse the association between sociodemographic factors, comorbid disorders and different clusters of labour market integration. Crude and mutually adjusted odds ratios (ORs), including their 95% confidence intervals (CIs) and Nagelkerke's R^2 values were calculated for these associations. All statistical analyses were performed by R (version 3.5.0).

Results

Among young adults with an incident diagnosis of ADHD in adult age, 55% were men and 45% were women (Table 1). A majority (56%) was diagnosed at the age of 19–24 and the vast majority had either elementary school (48%, <10 years of education) or high school (44%, 10–12 years of education) as the highest attained educational level. About 31% had some amount of work income during the calendar year before the diagnosis of ADHD. The most frequent comorbid mental disorders, occurring the year before the incident ADHD, were anxiety/stress-related disorders (25%), followed by depression/bipolar disorder (19%) and substance use (16%). About 3% had a comorbid autism-spectrum disorder and 2% had comorbid schizophrenia/psychoses. The prevalence of most mental disorders seems to be around 10 times lower in the control group of young adults without ADHD.

Identified clusters

Using the sequence analysis (cluster analysis) and based on values from measures of cluster partition quality,[†1] eight clusters of outcome distribution in the direction from the 'core' to the 'peripheral' labour market position from 1 year before to 5 years after ADHD diagnosis were chosen for both young adults diagnosed with ADHD [Fig. 1, online Supplementary Fig. S1 (controls)]. The clusters found in the control group were similar to the clusters in the group that was diagnosed with ADHD. The differences in comparison to the control group were, however, that individuals diagnosed with ADHD had a peripheral labour market position to a much higher extent, 24% compared to 6% and a less extent had a 'core' labour market position, 17% compared to 54%. The sequence index plot made up of all individual sequences sorted on the position in the last period revealed a great heterogeneity among the individual sequences of labour market position among individuals diagnosed with ADHD [Fig. 2, online Supplementary Fig. S2 (controls)]. It is evident that young adults diagnosed with ADHD to a much lower extent had a 'core' labour market position compared to the control group. The distributions of characteristics, along with the adjusted associations between these characteristics and the distribution of the clusters compared to the reference cluster (cluster 1) for those diagnosed with ADHD are presented in Table 2 and in the results section (associations for the control group are presented as online Supplementary Table S2). The Nagelkerke's R^2 value for the model with all the included variables among those diagnosed with ADHD was 0.264, meaning that 26% of the variance was explained by the included covariates[2] (Table 2). The educational level seemed to explain much of the variance among young adults diagnosed with ADHD.

Individuals in cluster 1 (17%, reference cluster) had mainly a 'core' position in the labour market throughout the study period (Fig. 1). Individuals in cluster 1 were more likely to be men, had attained college/university educational level, were born in Sweden, were living in a single household without children and few had mental comorbidities at baseline (Table 1).

Individuals in both clusters 2 (8%) and 4 (11%) had a gradually increased 'core' position after the diagnosis of ADHD. In cluster 2, about 70% of the individuals had a 'core' position, while only about 40% in cluster 4 had a 'core' position at the end of the study period (Table 2). Individuals in cluster 4 had also to a high extent 'middle' position. Individuals in cluster 2 were less likely to be married/in partnership, were aged 25–29 or were men, while individuals in cluster 4 were more likely to be singles with children. Individuals in both clusters 2 and 4 were less likely to have attained high school or university/college education.

Individuals in cluster 3 (5%) had mainly a 'close to core' position during the first part of the follow-up period, and an increasingly 'middle' or 'close to peripheral' position towards the end of the study period. Individuals in cluster 3 were less likely to be men, aged 25–29 or had high school or university/college education but more likely to be living in medium-sized cities.

Individuals in cluster 5 (11%) had a 'middle', but increasingly 'close to peripheral' position towards the end of the study period. Individuals in cluster 5 were more likely to be men, living in medium-sized cities or small cities/villages or had a comorbid diagnosis of schizophrenia but less likely to have high school or university/college education.

Individuals in cluster 6 (17%) had mainly a 'close to peripheral' position, with increasing 'middle' and 'peripheral' positions towards the end of the study period. Individuals in cluster 6 were more likely to be men, living in medium-sized cities or small cities/villages, having substance use disorder but less likely to have attained high school or university/college education.

Most individuals in clusters 7 (6%) and 8 (24%) had a 'middle' to 'peripheral' position. In cluster 7, about half of the individuals remained in a 'middle' position throughout the study period, while most individuals in cluster 8 had a 'peripheral' position during most of the study period. Individuals in both clusters 7 and 8 were more likely to have a comorbid autism-spectrum disorder or schizophrenia/psychoses, living in medium-sized cities or small cities/villages but less likely to have attained high school or university/college education or being married/in partnership.

Discussion

Main findings

By using sequence analysis, eight clusters of labour market integration were found and revealed a considerable heterogeneity of labour market integration during 5 years following a first diagnosis in specialized health care of ADHD in adult age. Labour

[†]The notes appear after the main text.

https://doi.org/10.1017/S003329172300096X Published online by Cambridge University Press

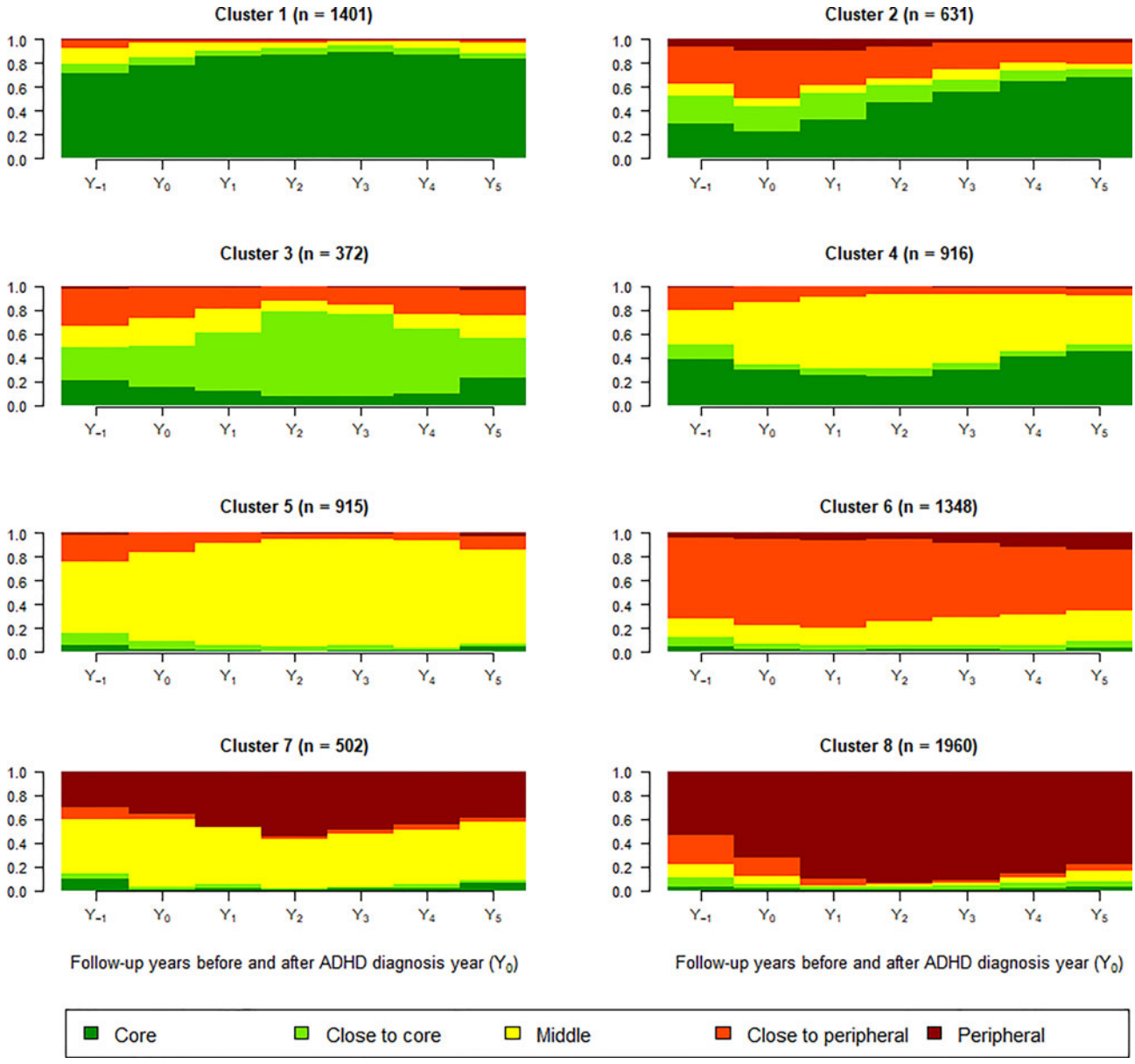

Figure 1. Clusters of labour market integration among all young adults diagnosed with attention-deficit/hyperactivity disorder (ADHD) in adult age during 2006–2011 ($N = 8045$).

market integration was in this study defined according to the core-peripheral model as a continuum from a strong (core) to a weak (peripheral) connection to the labour market. A mainly 'core' labour market position was found in just about one-sixth (17%) of those diagnosed with ADHD, whereas about one-fourth (24%) belonged to a cluster with a transition to a 'peripheral' labour market position. In the control group, more than half (54%) had a 'core' labour market position, while only 6% had a 'peripheral' labour market position. One-fourth of those diagnosed with ADHD belonged to clusters with increasing 'middle' and 'close to peripheral' labour market positions. It was foremost educational level that explained different clusters and individuals with elementary school as the highest attained educational level were more likely to belong to a cluster with a transition towards a mainly 'peripheral' labour market position. Also, those living outside of big cities, women and those with comorbid autism-spectrum disorders, substance use or schizophrenia/psychoses were more likely to belong to a cluster with a transition towards a 'peripheral' labour market position.

Identified clusters

About one-fourth of the individuals diagnosed with ADHD were found to have a transition to a mainly 'peripheral' position in the labour market. This is a rather high proportion and in addition, one-fourth had a 'middle' or 'close to a peripheral' position across the study period. Only about one-sixth of individuals diagnosed with ADHD belonged to a cluster with a 'core' position on the labour market, indicating a favourable labour market integration, throughout the study period. Compared with young adults of the same age without ADHD, where 54% had a strong connection to the labour market, this is a concerningly low share. This shows

https://doi.org/10.1017/S003329172300096X Published online by Cambridge University Press

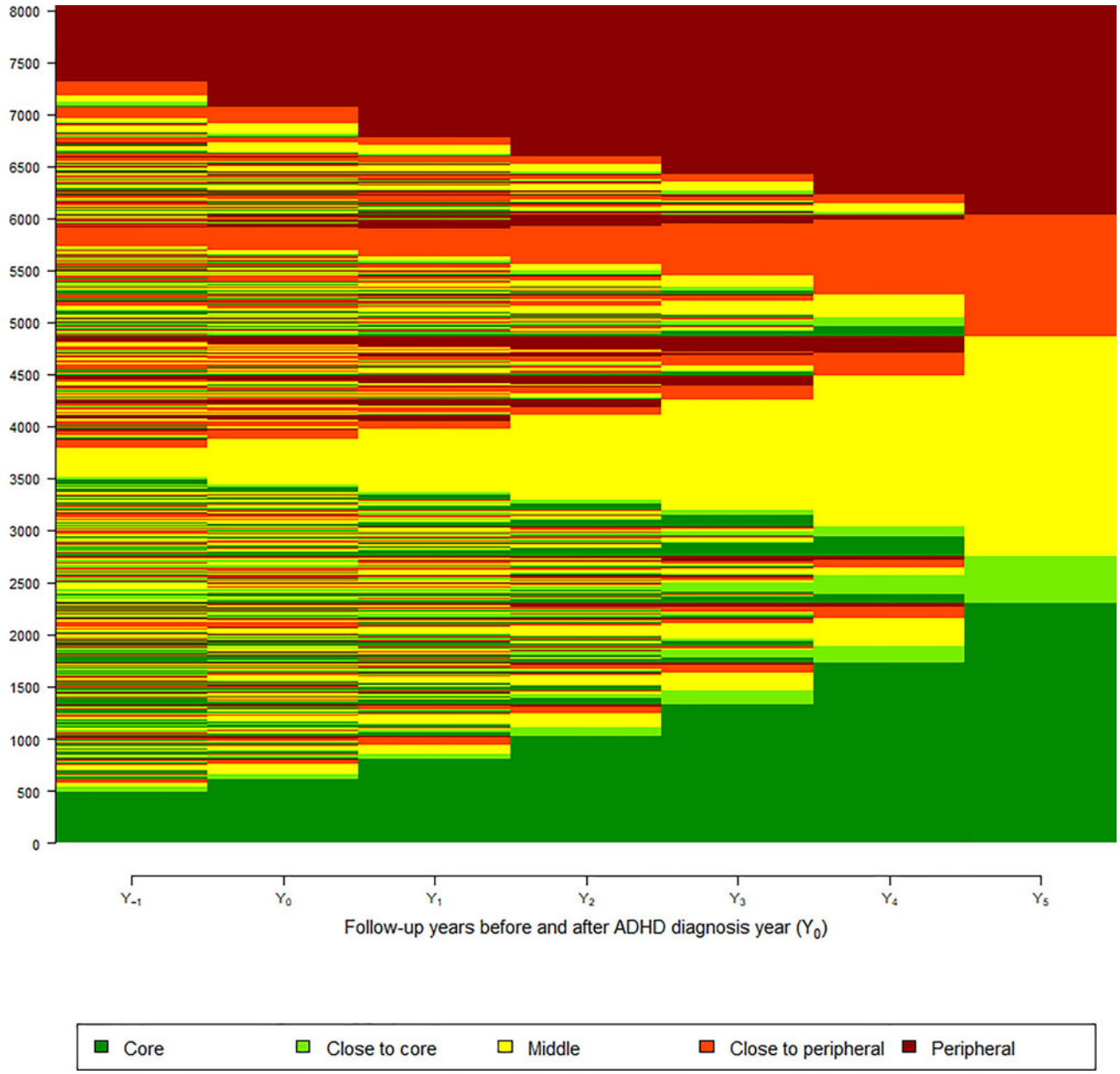

Figure 2. Sequence index plot of labour market integration, 1 year before until 5 years after an incident diagnosis of attention-deficit/hyperactivity disorder (ADHD), in all young adults, aged 19–29, diagnosed with ADHD in adult age during 2006–2011 ($N = 8045$).

that young adults diagnosed with ADHD for the first time in young adulthood are in a very vulnerable position in the labour market. This tendency of low occupational attainment among adults with ADHD has also been shown by other studies (Helgesson et al., 2017, 2021; Kupper et al., 2012), mostly in individuals diagnosed with ADHD during childhood or adolescence. The present study can add that there seems to be a dynamic process towards a 'peripheral' labour market position also among those who are diagnosed with ADHD in adult age. The time of the diagnosis of ADHD seems therefore not to be a turning point; the weak link to the labour market tends to worsen for many after the diagnosis instead.

Of the included covariates, educational level had by far the greatest explaining value of the distribution of the clusters. Those with attained college/university education were most likely to have a 'core' labour market position, while those with only elementary school as the highest attained education had a high probability of belonging to the 'peripheral' labour market. This is, however, not a new finding (Chen et al., 2021; Helgesson et al., 2021), while the magnitude of the explanatory value of educational attainment was far much higher among young adults with ADHD compared to studies with young adults of the same age with depression, anxiety- or stress disorders (Helgesson et al., 2018). Also, a very high proportion (48%) of those diagnosed with ADHD had only elementary school education as the highest attained education at baseline. In a study of individuals of the same age diagnosed with depression, anxiety- or stress disorders, only about 26% had just elementary school as the highest attained education (Helgesson et al., 2018). As at least upper secondary education is required for most jobs in Sweden, the high

https://doi.org/10.1017/S003329172300096X Published online by Cambridge University Press

Table 2. Distribution and adjusted odds ratio (OR) for different factors in each of the eight clusters of labour market marginalization status/year from 1 year before to 5 years after a diagnosis of ADHD (Y_{-1} to Y_{+5}) among 8045 individuals aged 20–29 years (cluster 1 is reference)

	Cluster 1[a]	Cluster 2		Cluster 3		Cluster 4		Cluster 5		Cluster 6		Cluster 7		Cluster 8		
	n (%)	*n* (%)	OR[1] (95% CI)	*n* (%)	OR[1] (95% CI)	*n* (%)	OR[1] (95% CI)	*n* (%)	OR[1] (95% CI)	*n* (%)	OR[1] (95% CI)	*n* (%)	OR[1] (95% CI)	*n* (%)	OR[1] (95% CI)	R^2 (diff.)[b]
Total	1401 (17.4)	631 (7.8)		372 (4.6)		916 (11.4)		915 (11.4)		1348 (16.8)		502 (6.2)		1960 (24.4)		0.264
Sociodemographic factors																
Sex																
Women	641 (45.8)	326 (51.7)	ref.	245 (65.9)	ref.	403 (44.0)	ref.	307 (33.6)	ref.	452 (33.5)	ref.	250 (49.8)	ref.	1009 (51.5)	ref.	0.248 (0.016)
Men	760 (54.2)	305 (48.3)	0.8 (0.6–0.9)	127 (34.1)	0.5 (0.4–0.6)	513 (56.0)	1.1 (0.9–1.3)	608 (66.4)	1.6 (1.3–1.9)	896 (66.5)	1.4 (1.2–1.7)	252 (50.2)	0.9 (0.7–1.1)	951 (48.5)	0.7 (0.6–0.8)	
Age group																
19–24 years	703 (50.2)	409 (64.8)	ref.	261 (70.2)	ref.	484 (52.8)	ref.	470 (51.4)	ref.	754 (55.9)	ref.	216 (43.0)	ref.	1211 (61.8)	ref.	0.253 (0.011)
25–29 years	698 (49.8)	222 (35.2)	0.6 (0.5–0.7)	111 (29.8)	0.4 (0.3–0.6)	432 (47.2)	1.0 (0.8–1.1)	445 (48.6)	1.1 (0.9–1.3)	594 (44.1)	1.0 (0.8–1.2)	286 (57.0)	1.6 (1.3–2.0)	749 (38.2)	0.8 (0.7–1.0)	
Educational level																
Elementary (<10 years)	327 (23.3)	254 (40.3)	ref.	136 (36.6)	ref.	356 (38.9)	ref.	421 (46.0)	ref.	922 (68.4)	ref.	240 (47.8)	ref.	1222 (62.3)	ref.	0.178 (0.086)
High school (10–12 years)	849 (60.6)	284 (45.0)	0.4 (0.3–0.5)	173 (46.5)	0.5 (0.4–0.6)	482 (52.6)	0.5 (0.4–0.6)	456 (49.8)	0.4 (0.3–0.5)	385 (28.6)	0.2 (0.1–0.2)	223 (44.4)	0.3 (0.3–0.4)	660 (33.7)	0.2 (0.2–0.2)	
University/college (<12 years)	225 (16.1)	93 (14.7)	0.5 (0.4–0.7)	63 (16.9)	0.7 (0.5–1.0)	78 (8.5)	0.3 (0.2–0.5)	38 (4.2)	0.1 (0.1–0.2)	41 (3.0)	0.1 (0.1–0.1)	39 (7.8)	0.2 (0.1–0.3)	78 (4.0)	0.1 (0.1–0.1)	
Country of Birth																
Sweden	1319 (94.1)	574 (91.0)	ref.	352 (94.6)	ref.	848 (92.6)	ref.	843 (92.1)	ref.	1231 (91.3)	ref.	460 (91.6)	ref.	1749 (89.2)	ref.	0.260 (0.004)
Outside Sweden	82 (5.9)	57 (9.0)	1.7 (1.2–2.5)	20 (5.4)	1 (0.6–1.7)	68 (7.4)	1.5 (1.0–2.0)	72 (7.9)	1.6 (1.1–2.2)	117 (8.7)	1.8 (1.3–2.4)	42 (8.4)	1.7 (1.1–2.5)	211 (10.8)	2.2 (1.7–3.0)	
Family composition[c]																
Married/in partnership without children	25 (1.8)	<8	0.3 (0.1–1.0)	8 (2.2)	1.1 (0.5–2.5)	16 (1.7)	1 (0.5–1.9)	10 (1.1)	0.6 (0.3–1.3)	<8	0.3 (0.1–0.8)	10 (2.0)	0.9 (0.4–2.0)	36 (1.8)	0.9 (0.5–1.6)	0.251 (0.013)
Married/in partnership with children	175 (12.5)	41 (6.5)	0.5 (0.4–0.7)	29 (7.8)	0.7 (0.4–1.0)	108 (11.8)	0.9 (0.7–1.2)	89 (9.7)	0.7 (0.5–0.9)	86 (6.4)	0.5 (0.3–0.6)	46 (9.2)	0.5 (0.4–0.8)	81 (4.1)	0.3 (0.2–0.4)	
Singles without children	1127 (80.4)	550 (87.2)	ref.	303 (81.5)	ref.	721 (78.7)	ref.	756 (82.6)	ref.	1165 (86.4)	ref.	398 (79.3)	ref.	1733 (88.4)	ref.	
Singles with children	74 (5.3)	36 (5.7)	0.9 (0.6–1.4)	32 (8.6)	1.3 (0.8–2.1)	71 (7.8)	1.4 (1.0–2.0)	60 (6.6)	1.3 (0.9–1.9)	90 (6.7)	1.3 (0.9–1.8)	48 (9.6)	1.3 (0.8–1.9)	110 (5.6)	0.7 (0.5–1.0)	
Type of living area[d]																
Big cities	569 (40.6)	254 (40.3)	ref.	136 (36.6)	ref.	272 (29.7)	ref.	199 (21.7)	ref.	353 (26.2)	ref.	130 (25.9)	ref.	564 (28.8)	ref.	0.249 (0.015)
Medium-sized cities	480 (34.3)	222 (35.2)	1.1 (0.9–1.4)	157 (42.2)	1.4 (1.1–1.8)	349 (38.1)	1.6 (1.3–1.9)	360 (39.3)	2.2 (1.8–2.8)	557 (41.3)	2.0 (1.7–2.5)	199 (39.6)	2.0 (1.6–2.6)	761 (38.8)	1.8 (1.5–2.2)	
Small cities/villages	352 (25.1)	155 (24.6)	1.0 (0.8–1.3)	79 (21.2)	1.0 (0.7–1.3)	295 (32.2)	1.7 (1.4–2.1)	356 (38.9)	2.7 (2.2–3.4)	438 (32.5)	1.9 (1.6–2.3)	173 (34.5)	2.2 (1.7–2.9)	635 (32.4)	1.9 (1.5–2.2)	
Comorbid disorders[e]																
Depression/bipolar disorder																
No	1188 (84.8)	513 (81.3)	ref.	308 (82.8)	ref.	719 (78.5)	ref.	756 (82.6)	ref.	1134 (84.1)	ref.	360 (71.7)	ref.	1581 (80.7)	ref.	0.261 (0.003)
Yes	213 (15.2)	118 (18.7)	1.2 (1.0–1.6)	64 (17.2)	1.0 (0.7–1.4)	197 (21.5)	1.4 (1.1–1.8)	159 (17.4)	1.2 (1–1.5)	214 (15.9)	1.1 (0.9–1.4)	142 (28.3)	1.8 (1.4–2.4)	379 (19.3)	1.2 (0.9–1.4)	
Anxiety/stress-related disorders																
No	1148 (81.9)	497 (78.8)	ref.	283 (76.1)	ref.	665 (72.6)	ref.	699 (76.4)	ref.	1037 (76.9)	ref.	326 (64.9)	ref.	1414 (72.1)	ref.	0.260 (0.004)
Yes	253 (18.1)	134 (21.2)	1.2 (0.9–1.5)	89 (23.9)	1.3 (1.0–1.7)	251 (27.4)	1.6 (1.3–1.9)	216 (23.6)	1.4 (1.1–1.8)	311 (23.1)	1.3 (1.1–1.6)	176 (35.1)	1.9 (1.5–2.5)	546 (27.9)	1.5 (1.2–1.8)	

Autism-spectrum disorder																
No	1392 (99.4)	628 (99.5)	ref.	367 (98.7)	ref.	908 (99.1)	ref.	900 (98.4)	ref.	1334 (99.0)	ref.	484 (96.4)	ref.	1803 (92.0)	ref.	0.246 (0.018)
Yes	9 (0.6)	<8	-[f]	<8	-	8 (0.9)	1.4 (0.5–3.6)	15 (1.6)	2.6 (1.1–5.9)	14 (1.0)	2 (0.8–4.6)	18 (3.6)	5.6 (2.5–12.9)	157 (8.0)	13.7 (6.8–27.5)	
Substance use																
No	1251 (89.3)	549 (87.0)	ref.	327 (87.9)	ref.	770 (84.1)	ref.	779 (85.1)	ref.	960 (71.2)	ref.	430 (85.7)	ref.	1676 (85.5)	ref.	0.252 (0.012)
Yes	150 (10.7)	82 (13.0)	1.2 (0.9–1.6)	45 (12.1)	1.2 (0.8–1.7)	146 (15.9)	1.3 (1.0–1.6)	136 (14.9)	1.1 (0.9–1.5)	388 (28.8)	2.5 (2.0–3.2)	72 (14.3)	1 (0.7–1.3)	284 (14.5)	1 (0.8–1.2)	
Behavioural/emotional disorders																
No	1390 (99.2)	624 (98.9)	ref.	366 (98.4)	ref.	905 (98.8)	ref.	897 (98.0)	ref.	1336 (99.1)	ref.	490 (97.6)	ref.	1898 (96.8)	ref.	0.263 (0.001)
Yes	11 (0.8)	<8	-	<8	-	11 (1.2)	1.3 (0.6–3.1)	18 (2.0)	2.1 (1.0–4.6)	12 (0.9)	0.9 (0.4–2.2)	12 (2.4)	2.3 (1–5.4)	62 (3.2)	2.3 (1.1–4.6)	
Intellectual disabilities/developmental disorders																
No	1394 (99.5)	631 (100.0)	ref.	371 (99.7)	ref.	911 (99.5)	ref.	910 (99.5)	ref.	1339 (99.3)	ref.	499 (99.4)	ref.	1880 (95.9)	ref.	0.257 (0.007)
Yes	7 (0.5)	<8	-	<8	-	<8	-	<8	-	9 (0.7)	0.7 (0.3–2.0)	<8	-	80 (4.1)	3.7 (1.7–8.4)	
Schizophrenia/psychoses																
No	1392 (99.4)	626 (99.2)	ref.	369 (99.2)	ref.	907 (99.0)	ref.	899 (98.3)	ref.	1323 (98.1)	ref.	490 (97.6)	ref.	1846 (94.2)	ref.	0.255 (0.009)
Yes	9 (0.6)	<8	-	<8	-	9 (1.0)	1.4 (0.5–3.5)	16 (1.7)	2.5 (1.1–5.7)	25 (1.9)	2.1 (0.9–4.6)	12 (2.4)	3.3 (1.4–8.0)	114 (5.8)	7.8 (3.8–15.9)	
Other mental disorders																
No	1283 (91.6)	565 (89.5)	ref.	330 (88.7)	ref.	819 (89.4)	ref.	824 (90.1)	ref.	1200 (89.0)	ref.	408 (81.3)	ref.	1614 (82.3)	ref.	0.258 (0.006)
Yes	118 (8.4)	66 (10.5)	1.2 (0.8–1.6)	42 (11.3)	1.2 (0.8–1.7)	97 (10.6)	1.1 (0.8–1.5)	91 (9.9)	1.2 (0.9–1.7)	148 (11.0)	1.4 (1.0–1.8)	94 (18.7)	2.0 (1.4–2.7)	346 (17.7)	2.1 (1.7–2.7)	
Musculoskeletal disorders																
No	1350 (96.4)	597 (94.6)	ref.	355 (95.4)	ref.	866 (94.5)	ref.	868 (94.9)	ref.	1294 (96.0)	ref.	469 (93.4)	ref.	1855 (94.6)	ref.	0.263 (0.001)
Yes	51 (3.6)	34 (5.4)	1.6 (1.0–2.6)	17 (4.6)	1.4 (0.8–2.5)	50 (5.5)	1.4 (0.9–2.1)	47 (5.1)	1.5 (1.0–2.2)	54 (4.0)	1.2 (0.8–1.8)	33 (6.6)	1.7 (1.1–2.7)	105 (5.4)	1.5 (1.1–2.2)	
Accidents																
No	1243 (88.7)	568 (90.0)	ref.	345 (92.7)	ref.	780 (85.2)	ref.	800 (87.4)	ref.	1145 (84.9)	ref.	448 (89.2)	ref.	1757 (89.6)	ref.	0.261 (0.003)
Yes	158 (11.3)	63 (10.0)	0.8 (0.6–1.0)	27 (7.3)	0.6 (0.4–0.9)	136 (14.8)	1.1 (0.9–1.5)	115 (12.6)	0.9 (0.7–1.2)	203 (15.1)	0.9 (0.7–1.2)	54 (10.8)	0.7 (0.5–1.0)	203 (10.4)	0.7 (0.5–0.9)	
Other somatic disorders																
No	915 (65.3)	400 (63.4)	ref.	222 (59.7)	ref.	548 (59.8)	ref.	584 (63.8)	ref.	849 (63.0)	ref.	292 (58.2)	ref.	1175 (59.9)	ref.	0.263 (0.001)
Yes	486 (34.7)	231 (36.6)	1 (0.8–1.3)	150 (40.3)	1.1 (0.9–1.4)	368 (40.2)	1.2 (1.0–1.4)	331 (36.2)	1.1 (0.9–1.3)	499 (37.0)	1 (0.9–1.2)	210 (41.8)	1.1 (0.9–1.4)	785 (40.1)	1.1 (1.0–1.3)	

[a]Cluster 1 was the reference cluster.
[b]Nagelkerke R^2 and the difference between R^2 for the full model (0.264) and R^2 in a model where the covariate was excluded from the analysis.
[c]With or without children living at home.
[d]Type of living area: big cities – Stockholm, Gothenburg and Malmö; medium-sized cities – cities with more than 90 000 inhabitants within 30 km distance from the centre of the city; small cities/villages – remaining areas of living.
[e]All comorbid disorders were measured 1 year before the cohort entry date, which was the first diagnosis of ADHD in adult age, for depression and bipolar disorder [international classification of diseases, version 10 (ICD-10): F30–F34], anxiety and stress-related disorders (ICD-10: F40–F48), autism-spectrum disorder (ICD-10: F84), substance abuse (ICD-10: F10–F19 and ATC: N07B), behavioural and emotional disorders (ICD-10: F91–F98), intellectual disabilities/developmental disorders (ICD-10: F70–F83, F85–F89), schizophrenia/psychoses (ICD-10: F20–F29), other mental disorders (all the other codes left starting with F). Somatic disorders included musculoskeletal disorders (ICD-10: M01–M99), accidents (ICD-10: S00–S99) and other somatic disorders (all other ICD-10 codes except the above-mentioned, O.80 and Z00–99) measured 1 year before CED.
[f]Due to ethical reasons, estimates are shown only when there are 8 or more individuals in a group.

with only elementary school education among young adults with ADHD might therefore explain the high rate of individuals in a 'peripheral' labour market position. It is much more likely that the severity of ADHD has made it hard to attain a higher educational level.

In other studies, the difference between work disability and unemployment between men and women diagnosed with ADHD has been shown to be rather small (Chen et al., 2021; Helgesson et al., 2021). In this study, sex had a higher explanatory value. Specifically, men had lower odds of belonging to a 'peripheral' labour market position but higher odds of belonging to a 'close to peripheral' or a 'middle' labour market position, i.e. clusters with a high probability for economic inactivity, municipal support or both unemployment and sickness absence. With a more dynamic measure of labour market integration, there seem to be more obvious differences between men and women. This novel information can be vital for the creation of gender-based treatment strategies.

Individuals with comorbid mental disorders, especially autism-spectrum disorders and schizophrenia/psychoses, had a high probability to have a transition towards a 'peripheral' labour market position. Comorbidity with other mental disorders, both depression, anxiety, and bipolar disorders as well as autism-spectrum disorders or schizophrenia/psychoses, are reported to be very common among adults with ADHD (Bjorkenstam et al., 2020; Katzman, Bilkey, Chokka, Fallu, & Klassen, 2017). Symptoms of many comorbid mental disorders may overlap the symptoms of ADHD, and this can create challenges both for diagnostics and treatment strategies (Katzman et al., 2017). In general, when ADHD coexists with other psychiatric pathologies, the more severe disorder should be treated first according to evidence-based guidelines and the authors of a review on the treatment of ADHD and comorbid mental disorders concludes that: '*Early and optimal treatment of ADHD has the potential to change the trajectory of psychiatric morbidity later in life and to substantially improve functional outcomes across the spectrum of psychiatric comorbidities*' (Katzman et al., 2017). It is hence important to have a strategy to treat both the symptoms of ADHD and the comorbid disorder(s) to prevent a weak connection to the labour market (Katzman et al., 2017). Among individuals diagnosed with ADHD and simultaneous comorbid mental disorders, it is important to give those with remaining work ability a chance to stay in the labour market, either in the regular or a sheltered labour market. Many with ADHD have the motivation to work, and with the right prerequisites, they can be as productive as others (Robbins, 2017).

A high proportion of individuals belonged to clusters with a mainly 'middle' labour market position, indicating long periods of either unemployment or sickness absence. As many of those individuals will be granted disability pension (Helgesson et al., 2018), it is very important to address these groups at an early stage, to prevent a permanent exclusion from the labour market among them. Individuals that are living outside big cities are more likely to be in these clusters. The labour market has in Sweden been harsh outside of the big cities during the last decades, and unemployment has been higher among individuals living in small towns or rural areas (Helgesson et al., 2018). Support from municipalities, authorities and health care might therefore be especially needed among those who are living in medium-sized towns and small towns/villages.

A group of young adults who have received increased attention during the last decades are called 'NEET', an acronym for 'Not in Education, Employment or Training' (OECD, 2020; Sellström, Bremberg, & O'campo, 2010). An increasing group of young adults with ADHD and other neuropsychiatric disorders have been reported to withdraw from social activities and work and several projects are targeting this group of young adults (Husu & Välimäki, 2017). About one-sixth of the study population in this study have a 'close to peripheral' labour market position and is a cluster that resembles 'NEET'. Individuals in this cluster may hence require more support than their peers, and sometimes be targeted by outreach efforts (Husu & Välimäki, 2017; Umeda et al., 2019). Comorbidity with foremost substance use disorders seems to be of importance for belonging to this cluster. This group might be self-medicating for ADHD and may also need treatment for addiction (Van de Glind et al., 2020). Here, different stakeholders as employers, the social insurance administration and the healthcare sector can play an even more active role in customizing a working life according to the individual needs of those diagnosed with ADHD.

Strengths and limitations

The major strength of this study was the use of large population-based longitudinal register data linked from five nationwide Swedish registers. The population-based register data made the sequence analysis more powerful, allowing robust clusters and categorizations. Further, many different covariates, both sociodemographic factors and several disorders are known to be comorbid to ADHD, were analysed for their impact on work attachment, providing more information for work rehabilitation programmes in young adults with ADHD diagnosis. Still, some limitations need to be mentioned. The diagnosis of ADHD was based on data from specialized health care and individuals who had previously received ADHD-related medication were excluded. As ADHD is a disorder with typical onset in childhood and due to the lack of retrospective data in childhood and full coverage of the outpatient care register (with 70–75% of coverage in 2001–2004, later the coverage increased to 97%) (National Board of Health and Welfare, 2020), some individuals with an earlier date of a first diagnosis might have been missed. Similarly, the onset of the disorder might have occurred long before the date of the first diagnosis, but the lack of data on disease onset prevented us from including such information, which is also true for information on symptom severity. Moreover, the information on sickness absence was restricted to spells over 14 days. Still, sickness absence related to an ADHD diagnosis can be anticipated to be considerably longer than 14 days. Finally, as there were very few individuals in some of the strata when introducing diagnoses, it was not possible to include information on that in the matching process. However, the influence of comorbid disorders regarding cluster affiliation has been taken care of in all estimates shown for both individuals with ADHD and the matched control group.

Conclusions

Many young adults with ADHD have challenges regarding labour market integration after the first diagnosis of ADHD at an adult age. This gives an alarming picture of sustainable labour market participation for those diagnosed with ADHD during young adulthood. Those with low educational level, those living outside big cities and those with comorbid severe mental disorders may require extra support to be able to participate in the labour market.

https://doi.org/10.1017/S003329172300096X Published online by Cambridge University Press

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S003329172300096X

Data. These data cannot be made publicly available due to privacy regulations. According to the General Data Protection Regulation, the Swedish law SFS 2018:218, the Swedish Data Protection Act, the Swedish Ethical Review Act and the Public Access to Information and Secrecy Act, these types of sensitive data can only be made available for specific purposes, including research, that meets the criteria for access to this type of sensitive and confidential data as determined by a legal review. Readers may contact Professor Kristina Alexanderson (kristina.alexanderson@ki.se) regarding the data.

Acknowledgements. This work was funded by AFA Insurance Agency (AFA Försäkring), Sweden (grant number180295).

Financial support. This work was supported by AFA Insurance Agency (grant number180295).

Competing interests. None.

Ethical standards. This study was performed in line with the principles of the Declaration of Helsinki. Ethics approval was obtained from the Regional Ethical Review Board of Stockholm, Sweden.

Notes

1. The number of clusters were chosen based on the cluster quality measures stated in Supplementary Table S1 (for 5–10 clusters). Point Biserial Correlation (PBG), Hubert's Gamma (HG), Hubert's Somers' D (HGSD), Average Silhouette Width (ASW) and Average Silhouette Width (weighted) (ASW(w)) range between −1 and 1, a good partition maximizes this measure. Pseudo R^2, and Pseudo R^2 range between 0 and 1 and a good partition maximizes this value, whereas HC range between 0 and 1 and a good partition minimize this measure. CH and CHsq range between 0 and $+\infty$ with a good partition maximizing this measure. For all measures, a good partition maximizes the measures, except from Hubert's C (HC) that is preferred to be low. With this in mind and when looking at the plots for the different numbers of clusters, eight clusters were chosen as the optimal numbers of clusters, with no measures at their best but neither at their worst.
2. The variables which explained most of the variance (R^2 difference between full model and R^2 of the model where the mentioned covariate was excluded from the analysis regarding the different clusters) were in decreasing order: educational level (0.086), autism-spectrum disorder (0.018), sex (0.016), type of living area (0.015), family composition (0.013), substance use disorders (0.012), age at diagnosis (0.011) and schizophrenia/psychoses (0.009).

References

Aduen, P. A., Kofler, M. J., Sarver, D. E., Wells, E. L., Soto, E. F., & Cox, D. J. (2018). ADHD, depression, and motor vehicle crashes: A prospective cohort study of continuously-monitored, real-world driving. *Journal of Psychiatric Research*, *101*, 42–49. doi: 10.1016/j.jpsychires.2018.02.026

Atkinson, J. (1984). Manpower strategies for flexible organisations. *Personnel Management*, *16*(8), 28–31.

Bjorkenstam, E., Pierce, M., Bjorkenstam, C., Dalman, C., & Kosidou, K. (2020). Attention deficit/hyperactivity disorder and risk for non-affective psychotic disorder: The role of ADHD medication and comorbidity, and sibling comparison. *Schizophrenia Research*, *218*, 124–130. doi:10.1016/j.schres.2020.01.021.

Brooke, H. L., Talbäck, M., Hörnblad, J., Johansson, L. A., Ludvigsson, J. F., Druid, H., … Ljung, R. (2017). The Swedish cause of death register. *European Journal of Epidemiology*, *32*(9), 765–773. doi: 10.1007/s10654-017-0316-1

Chen, H.-J., Lee, Y.-J., Yeh, G. C., & Lin, H.-C. (2013). Association of attention-deficit/hyperactivity disorder with diabetes: A population-based study. *Pediatric Research*, *73*, 492. doi: 10.1038/pr.2013.5

Chen, L., Mittendorfer-Rutz, E., Björkenstam, E., Rahman, S., Gustafsson, K., Taipale, H., … Helgesson, M. (2021). Risk factors for disability pension among young adults diagnosed with attention-deficit hyperactivity disorder (ADHD) in adulthood. *Journal of Attention Disorders*, *26*(5), 723–734. doi:10.1177/10870547211025605.

Cortese, S., Sun, S., Zhang, J., Sharma, E., Chang, Z., Kuja-Halkola, R., … Faraone, S. (2018). Association between attention deficit hyperactivity disorder and asthma: A systematic review and meta-analysis and a Swedish population-based study. *The Lancet Psychiatry*, *5*(9), 717–726. https://doi.org/10.1016/S2215-0366(18)30224-4

Edvinsson, D. (2017). Attention deficit/hyperactivity disorder in adults – prevalence, psychiatric comorbidities and long-term outcome. (PhD). Thesis PhD, Uppsala University, Uppsala.

Gabadinho, A., Ritschard, G., Muller, N. S., & Studer, M. (2011). Analyzing and visualizing state sequences in R with TraMineR. *Journal of Statistical Software*, *40*(4), 1–37. Retrieved from http://www.jstatsoft.org/v40/i04

Gershon, J., & Gershon, J. (2002). A meta-analytic review of gender differences in ADHD. *Journal of Attention Disorders*, *5*(3), 143–154. doi: 10.1177/108705470200500302

Giacobini, M., Medin, E., Ahnemark, E., Russo, L. J., & Carlqvist, P. (2018). Prevalence, patient characteristics, and pharmacological treatment of children, adolescents, and adults diagnosed with ADHD in Sweden. *Journal of Attention Disorders*, *22*(1), 3–13. doi: 10.1177/1087054714554617

Gustafsson, K., Aronsson, G., Marklund, S., Wikman, A., & Floderus, B. (2014). Peripheral labour market position and risk of disability pension: A prospective population-based study. *BMJ Open*, *4*(8), e005230. doi: 10.1136/bmjopen-2014-005230

Haukenes, I., Gjesdal, S., Rortveit, G., Riise, T., & Maeland, J. G. (2012). Women's higher likelihood of disability pension: The role of health, family and work. A 5–7 years follow-up of the Hordaland Health Study. *BMC Public Health*, *12*, 720. doi: 10.1186/1471-2458-12-720

Helgesson, M., Björkenstam, E., Rahman, S., Gustafsson, K., Taipale, H., Tanskanen, A., … Mittendorfer-Rutz, E. (2021). Labour market marginalisation in young adults diagnosed with attention-deficit hyperactivity disorder (ADHD): A population-based longitudinal cohort study in Sweden. *Psychological Medicine*, *53*(4), 1224–1232. doi:10.1017/S0033291721002701.

Helgesson, M., Tinghog, P., Niederkrotenthaler, T., Saboonchi, F., & Mittendorfer-Rutz, E. (2017). Labour-market marginalisation after mental disorders among young natives and immigrants living in Sweden. *BMC Public Health*, *17*(1), 593. doi: 10.1186/s12889-017-4504-4

Helgesson, M., Tinghog, P., Wang, M., Rahman, S., Saboonchi, F., & Mittendorfer-Rutz, E. (2018). Trajectories of work disability and unemployment among young adults with common mental disorders. *BMC Public Health*, *18*(1), 1228. doi: 10.1186/s12889-018-6141-y

Hirvikoski, T., Lindström, T., Nordin, V., Jonsson, U., & Bölte, S. (2017). *Föräldraskapsinsatser för föräldrar med ADHD: Kartläggning av aktuellt kunskapsläge som grund för utformning av anpassad insats* (Vol. *2017*, p. 3). Kalmar, Sweden: Linnéuniversitetet.

Husu, H.-M., & Välimäki, V. (2017). Staying inside: Social withdrawal of the young, Finnish 'Hikikomori'. *Journal of Youth Studies*, *20*(5), 605–621.

Johnson, M. K. (2001). Job values in the young adult transition: Change and stability with age. *Social Psychology Quarterly*, *64*(4), 297–317. doi: 10.2307/3090156

Katzman, M. A., Bilkey, T. S., Chokka, P. R., Fallu, A., & Klassen, L. J. (2017). Adult ADHD and comorbid disorders: Clinical implications of a dimensional approach. *BMC Psychiatry*, *17*(1), 302. doi: 10.1186/s12888-017-1463-3

Kjeldgård, L., Stigson, H., Alexanderson, K., & Friberg, E. (2020). Sequence analysis of sickness absence and disability pension in the year before and the three years following a bicycle crash; a nationwide longitudinal cohort study of 6353 injured individuals. *BMC Public Health*, *20*(1), 1710. doi: 10.1186/s12889-020-09788-x

Kupper, T., Haavik, J., Drexler, H., Ramos-Quiroga, J. A., Wermelskirchen, D., Prutz, C., & Schauble, B. (2012). The negative impact of attention-deficit/hyperactivity disorder on occupational health in adults and adolescents. *International Archives of Occupational and Environmental Health*, *85*(8), 837–847. doi: 10.1007/s00420-012-0794-0

Ludvigsson, J. F., Andersson, E., Ekbom, A., Feychting, M., Kim, J.-L., Reuterwall, C., … Olausson, P. O. (2011). External review and validation

of the Swedish national inpatient register. *BMC Public health*, *11*, 450. doi:10.1186/1471-2458-11-450.

Ludvigsson, J. F., Svedberg, P., Olen, O., Bruze, G., & Neovius, M. (2019). The longitudinal integrated database for health insurance and labour market studies (LISA) and its use in medical research. *European Journal of Epidemiology*, *34*(4), 423–437. doi: 10.1007/s10654-019-00511-8

Muñoz-Bullón, F., & Malo, M. A. (2003). Employment status mobility from a life-cycle perspective: A sequence analysis of work-histories in the BHPS. *Demographic Research*, *9*(7), 119–162. Retrieved from https://www.demographic-research.org/volumes/vol9/7/

Murley, C., Tinghög, P., Karampampa, K., Hillert, J., Alexanderson, K., & Friberg, E. (2020). Types of working-life sequences among people recently diagnosed with multiple sclerosis in Sweden: A nationwide register-based cohort study. *BMJ Open*, *10*(12), e039228. doi: 10.1136/bmjopen-2020-039228

National Board of Health and Welfare. (2020). Bortfall och kvalitet i patientregistret (Loss and quality in the patient register, in Swedish). Retrieved from https://www.socialstyrelsen.se/statistik-och-data/register/alla-register/patientregistret/bortfall-och-kvalitet/

OECD. (2020). Youth not in employment, education or training (NEET). Retrieved from https://data.oecd.org/youthinac/youth-not-in-employment-education-or-training-neet.htm

Robbins, R. (2017). The untapped potential of the ADHD employee in the workplace. *Cogent Business & Management*, *4*(1), 1271384. doi: 10.1080/23311975.2016.1271384

Rydell, M., Lundström, S., Gillberg, C., Lichtenstein, P., & Larsson, H. (2018). Has the attention deficit hyperactivity disorder phenotype become more common in children between 2004 and 2014? Trends over 10 years from a Swedish general population sample. *Journal of Child Psychology and Psychiatry*, *59*(8), 863–871. doi: 10.1111/jcpp.12882

Sellström, E., Bremberg, S., & O'campo, P. (2010). Yearly incidence of mental disorders in economically inactive young adults. *European Journal of Public Health*, *21*(6), 812–814. doi: 10.1093/eurpub/ckq190

Shaw, W. S., Kristman, V. L., Williams-Whitt, K., Soklaridis, S., Huang, Y. H., Côté, P., & Loisel, P. (2014). The Job Accommodation Scale (JAS): Psychometric evaluation of a new measure of employer support for temporary job modifications. *Journal of Occupational Rehabilitation*, *24*(4), 755–765. doi: 10.1007/s10926-014-9508-7

Umeda, M., Shimoda, H., Miyamoto, K., Ishikawa, H., Tachimori, H., Takeshima, T., & Kawakami, N. (2019). Comorbidity and sociodemographic characteristics of adult autism spectrum disorder and attention deficit hyperactivity disorder: Epidemiological investigation in the World Mental Health Japan 2nd Survey. *International Journal of Developmental Disabilities*, *67*(1), 58–66. doi: 10.1080/20473869.2019.1576409

Van de Glind, G., Brynte, C., Skutle, A., Kaye, S., Konstenius, M., Levin, F., … Franck, J. (2020). The International Collaboration on ADHD and Substance Abuse (ICASA): Mission, results, and future activities. *European Addiction Research*, *26*(4-5), 173–178. doi: 10.1159/000508870

Virtanen, P., Liukkonen, V., Vahtera, J., Kivimäki, M., & Koskenvuo, M. (2003). Health inequalities in the workforce: The labour market core-periphery structure. *International Journal of Epidemiology*, *32*(6), 1015–1021. doi: 10.1093/ije/dyg319

Waenerlund, A. K., Gustafsson, P. E., Virtanen, P., & Hammarström, A. (2011). Is the core-periphery labour market structure related to perceived health? Findings of the Northern Swedish Cohort. *BMC Public Health*, *11*, 956. doi: 10.1186/1471-2458-11-956

Wettermark, B., Hammar, N., Fored, C. M., Leimanis, A., Otterblad Olausson, P., Bergman, U., … Rosén, M. (2007). The new Swedish Prescribed Drug Register – opportunities for pharmacoepidemiological research and experience from the first six months. *Pharmacoepidemiology and Drug Safety*, *16*(7), 726–735. doi: 10.1002/pds.1294

Zetterqvist, J., Asherson, P., Halldner, L., Långström, N., & Larsson, H. (2013). Stimulant and non-stimulant attention deficit/hyperactivity disorder drug use: Total population study of trends and discontinuation patterns 2006–2009. *Acta Psychiatrica Scandinavica*, *128*(1), 70–77. doi: 10.1111/acps.12004

https://doi.org/10.1017/S003329172300096X Published online by Cambridge University Press