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RESEARCH REPORT

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Employment trajectories among those treated for alcohol use disorder: A register-based cohort study

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Abstract

Background and Aims: Employment during and following treatment for alcohol use disorder (AUD) is important for the individual's health and well-being and for reducing the societal costs associated with benefit payments. Nonetheless, this is an under-researched topic. This study aimed to identify trajectories of labour force participation among people enrolled in AUD treatment and describe the characteristics of those following contrasting pathways.

Design: Using trajectory analysis, we modelled employment trajectory groups among AUD patients during the year of treatment entry and the 4 subsequent years, applying Norwegian longitudinal register data.

Setting: Norway.

Participants: Patients who entered treatment with AUD as the primary diagnosis during 2009 and 2010 (9000 patients, age 20–61 years).

Measurements: The outcome variable 'labour force attachment' was measured as being in full-time employment, partly employed, on temporary welfare benefits or on permanent disability pension. Predictors were age, gender, education and comorbid mental health and drug use disorders.

Findings: We distinguished six employment trajectories among AUD patients: 15.8% were on permanent disability pension throughout, 8.7% exited the labour force on permanent disability pension during the observation period, 32.1% had a medium attachment throughout follow-up, and 9.2% had a decreasing attachment; 23.3% had a high labour force attachment throughout, and 10.9% experienced increasing attachment. High attachment throughout was negatively associated with being female ($P < 0.001$), having lower educational attainment ($P < 0.001$), and having comorbid mental health ($P < 0.001$) and drug use disorders ($P < 0.001$).

Conclusions: Norwegian patients treated for alcohol use disorder in 2009 and 2010 followed six employment trajectories during the 5 years following treatment entry and had lower labour force participation than the general population. Nearly a quarter had a high labour force attachment throughout treatment, which was positively associated with being male, having higher educational attainment and having fewer comorbid mental health and drug use disorders.

KEYWORDS
Alcohol use disorder, comorbidities, employment, Norway, register data, socio-demographics, trajectories

INTRODUCTION

Alcohol use is associated with negative consequences for individuals who drink heavily, for people in the individuals' immediate surroundings and for society as a whole [1–3]. It has been estimated that lost productivity is the greatest contributor of the economic burden of alcohol use [3–6]. Most of these estimates are based on data from general population surveys. In survey research on alcohol use, the problems of under-reporting and selection bias are well known. Heavy drinkers are typically under-represented, and alcohol use is under-reported by survey respondents [7]. Relatedly, the estimates of productivity loss are often limited to the costs of absence and impaired work performance [3–5]. However, for individuals with an alcohol use disorder (AUD), alcohol use not only influences work performance but also reduces the probability of obtaining employment and increases the risk of exiting the labour force [8, 9], which represents a burden to the benefits system. Therefore, the costs related to alcohol use may be more far-reaching, both for society and for the individual, if we also take into account the heaviest drinkers [6, 10]. At the individual level, employment aids recovery from AUD [11, 12]. Hence, by increasing labour force participation among individuals with an AUD, there is a potential to decrease the financial burden of alcohol use and to enhance the health and functioning of these individuals. However, because there has been little research into employment during and following AUD treatment, it is unclear whether these patients are employable.

A number of studies have demonstrated that there is an association between alcohol consumption and labour force outcomes [13–15] and that AUDs are more prevalent among people outside the labour force [16]. Recent registry studies find an association between being diagnosed with AUD and subsequent unfavourable labour force outcomes [17–19], but also between unemployment and later AUD [19, 20]. This study using registry data of all patients who entered AUD treatment in Norway during 2009 and 2010 fills a gap in the literature. It focuses not only on whether patients were employed at a given time, but considers employment trajectories during the 5-year period following treatment entry. Finally, because labour force participation may vary with socio-demographic and health characteristics [21, 22], we examine the association between gender, age, education, comorbid mental health- and substance use disorders and employment trajectory membership.

The aims of this study were to identify pathways of labour force participation among AUD patients during the 5-year period following treatment entry, and to estimate the association between socio-demographic and health characteristics and employment trajectory membership.

METHOD

Data

The study is based on data from Norwegian administrative registers. Since 1960, every resident in Norway has been given a unique personal identification number. This number enables individual record linkages between registers. The Norwegian Patient Register (NPR) provided data on all patients who entered treatment with AUD as the primary diagnosis during 2009 and 2010 in the specialist health sector. AUD is diagnosed in accordance with the International Classification of Diseases (ICD)-10 framework (ICD-10 code F10). Data on comorbid mental health and drug use disorder diagnoses, for which the patient had received treatment in the specialist health sector during the first 4 years of follow-up, were also extracted from NPR. These data were merged with registers containing information on labour earnings, permanent disability pensions and temporary welfare benefits, demographic information and the highest level of completed education. The study was approved by the Regional Committee for Medical and Health Research Ethics in 2014.

Sample

AUD patients who entered treatment in 2009 and 2010 were followed up in the registers from the year of treatment entry and the subsequent 4 years (i.e. until the end of 2013 or 2014). Of the 12 455 patients, we excluded 7 patients lacking demographic information, 149 patients age under 20 and 2592 patients who turned 62 during follow-up and might be eligible for early retirement pension. Unfortunately, our dataset did not contain information about old age or early retirement. Furthermore, patients who neither received wages nor welfare benefits during 1 or more years (n = 411), who died during the year they entered treatment (n = 106) or emigrated during follow-up (n = 190), were excluded. The analytic sample consisted of 9000 patients.

Variables

The attachment to the labour force variable consists of four categories: (i) having been granted permanent disability benefits (coded 0), (ii) being on temporary benefits such as unemployment benefits, rehabilitation benefits, work assessment allowance and social assistance (coded 1), (iii) being partly employed (coded 2), or (iv) being full-time employed (coded 3). Employment was measured using gross labour earning. Those who earned at least the threshold amount in the

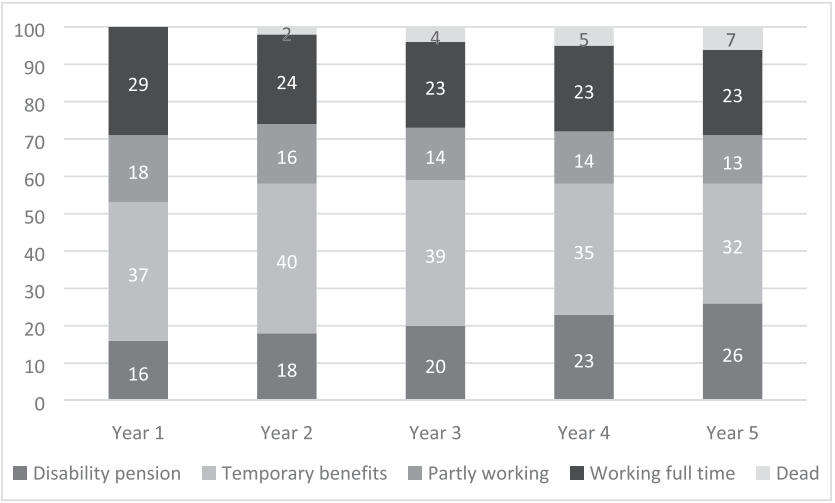

FIGURE 1 Proportion of AUD patients in each employment category by year since treatment entry (year 1 = year of treatment entry)

Norwegian Social Insurance Scheme were coded as partly employed, whereas those who earned at least four times the threshold amount were coded as being in full-time employment. The explanatory variables were gender, age, education, having a comorbid mental health and/or drug use disorder, as well as two measures of severity; having been sectioned (i.e. involuntarily admitted to treatment) and having been in inpatient treatment. Education distinguishes those with a university degree, completed high school, and compulsory education and missing education. Drug use disorder (ICD-10 codes F11–F16 and F18–F19) is a dummy variable indicating whether the patient had been diagnosed with such a disorder at any time during the first 4 years of follow-up. We also distinguish between the most prevalent drug use disorders: cannabis use disorder (F12), opioid use disorder (F11), sedative, hypnotic or anxiolytic use disorder (F13), hallucinogen use disorder (F16) and multiple drug use disorder (F19). Comorbid mental health disorders are dummy variables indicating whether a patient had received treatment for a given disorder during the first 4 years of follow-up. We distinguish between schizophrenia spectrum disorders (ICD-10 codes F20–F29), mood disorders (F30–F39), neurotic disorders (F40–F48), personality disorders (F60–F69) and behavioural and emotional disorders with onset usually occurring in childhood and adolescence such as attention deficit disorder (F90–F98). Inpatient treatment and sectioned are dichotomous variables denoting whether the patient has, respectively, received treatment as an inpatient or been sectioned during the treatment entry year.

Analyses

To identify employment trajectories, we used group-based trajectory modelling. These models identify groups with statistically similar trajectories and estimate the probability that each individual in the sample is a member of a given trajectory group [23]. In addition, mortality, which was allowed to vary across trajectories and over time, was included in the model (see Haviland *et al.*) [24]. The parameters of the model are estimated using maximum likelihood. For a technical description of trajectory-based modelling, see Nagin [23]. The analyses were conducted using the user-written 'traj' program in STATA [25].

To determine the number of trajectories and their functional form, we iteratively tested different model specifications regarding the number of trajectory groups and the order of polynomials of time. Following model estimation, each individual is assigned group membership. This has usually been done based on the group with the highest posterior probability. This approach has been criticised for not taking into account the uncertainty regarding group membership and a number of methods to adjust for this uncertainty has been proposed [26, 27]. However, if the model is well-fitting including such adjustment will yield almost identical results [23]. Below we present measures of model fit and the test results obtained in our study. Finally, multinomial logit regression was used to examine the association between baseline socio-demographic and health characteristics and employment trajectory membership. This study is not preregistered, and should be considered exploratory.

RESULTS

Descriptive statistics

Figure 1 shows the proportion of the sample by labour force status in each of the 5 years. The proportion on disability pension increased from 16% to 26%, whereas the proportion on temporary benefits peaked at 40% in year 2. The share in full-time employment declined from 29% to 23%.

Trajectory groups

Increasing the number of trajectory groups stepwise from two to six led to improvements in the Bayesian Information Criterion (BIC). Adding a seventh group further improved the BIC. However, adding additional

groups might lead to an improvement in the BIC value, although the additional groups are not meaningfully distinguishable from the already defined trajectory groups [23]. In this instance, the seventh group did not add a distinctive feature. In accordance with Nagin [23] and in the interest of parsimony and interpretability, a model with six groups was therefore selected. For information on model fit with increasing number of groups (see Supporting information Table S1). We labelled the groups: (i) 'Disability pension', (ii) 'Exit', (iii) 'Medium attachment', (iv) 'Decreasing attachment', (v) 'Increasing attachment', and (vi) 'High attachment'. Next, we tested different functional forms (linear, quadratic, and cubic). All trajectories had a quadratic shape except the 'Disability pension' group with only an intercept.

We performed a number of tests of model fit. The average posterior probability (APP) for each group are indicators of model fit. Nagin [23] recommends that APP should be at least 0.7 for all groups. The APP of belonging to the assigned group was 0.99, 0.99, 0.97, 0.92, 0.94 and 0.98 for each of the six groups, respectively. Another measure of model fit is the odds of correct classification (OCC). A larger OCC indicates a better group assignment accuracy [23]. Nagin [23] recommends that the OCC should be higher than 5 for each trajectory group. As can be seen in Table 1, the OCCs are above 5 for all trajectory groups. A further test of model fit is comparing the estimated proportion in each group to the proportion of the population assigned to that group based on their highest posterior probability. Table 1 shows that there is a high degree of resemblance in the group sizes. To assess the risk of classification errors, one can use the entropy measure for class separation (see Bakk *et al.*) [27]. The entropy in our case was 0.88. An entropy above 0.8 indicates that the group measurement error is negligible [28]. Given the high degree of model fit, we assign group membership based on each individual's highest posterior probability.

The labour force attachment in each of the trajectory groups is presented in Figure 2. The 'Disability pension' group (15.8%) consisted of patients who were on disability pension throughout the observation period. The 'Exit' group (8.7%) started out with a medium attachment to the labour force and were granted disability pension during follow-up. The 'Medium attachment' group (32.1%) were mainly partly employed or on temporary welfare benefits throughout the observation period. The 'Decreasing attachment' group (9.2%) went from a relatively high degree of labour force participation, with the majority working full-time at the time of treatment entry, to being mainly on temporary welfare benefits at the end of follow-up. The 'Increasing attachment' group (10.9%) had an increasing labour force attachment throughout the observation period. Finally, the 'High attachment' group (23.3%) had a high and relatively stable labour force attachment with the majority being in full-time employment throughout the observation period.

Baseline characteristics of the six groups

Table 2 shows baseline socio-demographic characteristics of the whole sample and for each of the six trajectories. Men made up 70% of the sample. Two-thirds of patients were age 40 and above. Half of the patients had completed only compulsory education. A quarter had a comorbid drug use disorder, and 46% had a comorbid mental health disorder, with mood disorders (26%) and neurotic disorders (22%) being the most prevalent. A total of 43% received inpatient treatment and 5% were sectioned during the year of treatment entry.

The 'Disability benefit' group were the oldest group, with an average age of 48.8. They were the most poorly educated group with 73% having completed only compulsory education. This group had a high prevalence of schizophrenia spectrum disorders (8%), sedative, hypnotic or anxiolytic use disorder (18%), the highest percentage of patients having received inpatient care (62%) and a high percentage having been sectioned (9%). This group also had the highest cumulative mortality rate, 12% died during follow-up.

The 'Exit' group, were older (average age 46.9) than the overall sample. A high proportion had only completed compulsory education (62%) and this group had a high level of comorbid mental health disorders (53%).

The 'Medium attachment' group had the highest level of comorbid mental health disorders (56%). They also had a high prevalence of comorbid drug disorders (35%), with the highest prevalence of cannabis use disorder (14%), hallucinogen use disorder (9%) and multiple drug use disorder (14%).

The 'Decreasing attachment' group were among the most highly educated groups, with more than half having completed at least high school. They had a high prevalence of mood disorders (31%).

The 'Increasing attachment' group were the youngest with an average age of 39.5 and had a high proportion of women (37%).

The 'High attachment' group had a low proportion of women (22%). They were the most highly educated, with almost a third having

TABLE 1 Diagnostics of model performance

Trajectory group	*Proportion in group*	*Proportion classified in group*	*APP*	*OCC*
(1) 'Disability pension'	15.8	15.8	0.99	8021
(2) 'Exit'	8.7	8.7	0.99	1635
(3) 'Medium attachment'	32.1	32.7	0.97	68
(4) 'Decreasing attachment'	9.2	8.9	0.92	112
(5) 'Increasing attachment'	10.9	10.7	0.94	122
(6) 'High attachment'	23.3	23.3	0.98	177

Note: APP = average posterior probability, OCC = odds of correct classification.

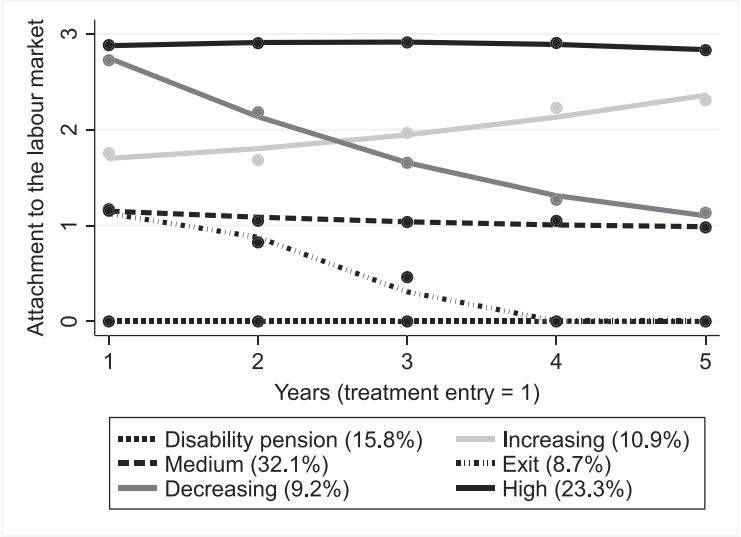

FIGURE 2 Attachment to the labour market by trajectory group during the year of AUD treatment entry and the four subsequent years. Attachment to the labour force: disability pension (coded 0), temporary benefits (coded 1), partly employed (coded 2) and full-time employed (coded 3). The dots represent the observed labour force attachment in a given trajectory group at a given time. The lines represent the estimated labour force attachment in a given trajectory group at a given time

attained a university degree. They had the lowest level of comorbid mental health (29%) and drug use disorders (10%), inpatient treatment (24%) and sectioning (2%).

Table 3 shows treatment use and AUD treatment during the first 4 years of follow-up. A total of 46% of patients are still in substance use or mental health treatment in the fourth year of follow-up. A total of 59% of those in the 'Medium attachment' group and 56% in the 'Decreasing attachment' group, but only 30% of those in the 'High attachment' group, were still receiving treatment.

Nearly a third of patients still received treatment with AUD as the main diagnosis in the fourth year. This was the case for 39% of those in the 'Medium attachment' group and 40% in the 'Decreasing attachment' group, but only around a quarter of those in the 'Increasing attachment' and 'High attachment' groups. Supporting information Table S2 shows the use of inpatient and outpatient care.

Multinomial logit regression analyses

Table 4 presents results from multinomial logit models predicting membership of other groups compared to the 'Medium attachment' group.

Relative to the reference category (the 'Medium attachment' group), the following associations were observed: being in the 'Disability pension' group was positively associated with being older and having completed only compulsory education. Having a schizophrenia spectrum disorder, personality disorder or a sedative, hypnotic or anxiolytic use disorder were positively associated with being on disability benefits. Having been sectioned or having received inpatient treatment was also positively associated with being in the 'Disability pension' group.

Being female was negatively and older age positively associated with being in the 'Exit' group. Among the measures of comorbidities, having a schizophrenia spectrum disorder, a personality disorder and having been sectioned positively predicted permanently leaving the labour force.

Being female, having completed only compulsory or high school education and having been an inpatient were negatively associated with being in the 'Decreasing attachment' group, whereas being age 30 and above was positively associated with being in this group.

Being age 30 and above and having less than university education were negative predictors of increasing labour force participation. Comorbid mental health disorders (except mood disorders), drug use disorders (except hallucinogen use disorders) and having been in inpatient treatment were all negatively associated with being in the 'Increasing attachment' group.

Being female and having completed less than university education were negatively associated with being in the 'High attachment group'. All comorbid mental health disorders and drug use disorders, as well as having received inpatient treatment were also negative predictors of having a high labour force attachment throughout.

DISCUSSION

This study, using longitudinal register data, examined labour force attachment during the 5 years following treatment entry among those who entered AUD treatment in Norway in 2009 or 2010. Using group-based trajectory modelling, we found that a relatively large proportion of AUD patients were on permanent disability pension (15.8%) or had a medium level of labour force attachment (32.1%) throughout the observation period. However, nearly a quarter of the patients had a high degree of labour force participation throughout the five-year period. A third of the patients were in trajectory groups with changing labour force attachment, either by exiting the labour force on disability pension (8.7%), increasing attachment (10.9%) or decreasing attachment (9.2%). Employment trajectories were associated with gender, age and education, as well as comorbidities.

In the first year of observation, 52% of AUD patients were on temporary or permanent welfare benefits. In comparison, 11% of the Norwegian population age 18 to 67 received temporary or permanent disability payments in 2009, and unemployment was <3% of the

TABLE 2 Descriptive statistics of socio-demographic and health characteristics of the whole sample and each employment trajectory group

	All	*Disability benefits*	*Exit*	*Medium attachment*	*Decreasing attachment*	*Increasing attachment*	*High attachment*
Group size	9000	1424	780	2941	798	964	2093
Gender							
Men	70 (69–71)	65 (62–67)	73 (70–76)	67 (66–69)	73 (70–76)	63 (60–66)	78 (76–80)
Women	30 (29–31)	35 (33–38)	27 (24–30)	33 (31–34)	27 (24–30)	37 (34–40)	22 (20–24)
Age groups							
20–29 y	12 (12–13)	2 (1–3)	5 (3–6)	18 (17–20)	10 (8–12)	24 (21–27)	10 (8–11)
30–39 y	19 (18–19)	8 (7–10)	12 (10–15)	21 (19–23)	20 (18–23)	23 (21–26)	21 (20–23)
40–49 y	36 (35–37)	35 (33–38)	39 (36–42)	39 (36–42)	37 (34–41)	30 (27–33)	38 (36–40)
50–57 y	33 (32–34)	55 (52–57)	44 (41–48)	24 (22–25)	33 (30–36)	23 (21–26)	31 (29–33)
Mean age	43.4 (43.2–43.6)	48.8 (48.4–49.1)	46.9 (46.3–47.5)	40.9 (40.5–41.3)	43.7 (43.1–44.4)	39.5 (38.8–40.2)	43.5 (43.2–43.9)
Education							
Compulsory	54 (53–56)	73 (71–75)	62 (59–65)	62 (61–64)	47 (44–51)	53 (50–56)	31 (29–33)
High school	29 (28–30)	17 (16–20)	27 (24–30)	26 (24–28)	33 (30–37)	30 (28–33)	39 (37–41)
University	15 (14–15)	7 (5–8)	9 (8–12)	9 (8–10)	18 (15–20)	15 (13–17)	29 (27–31)
Missing	2 (2–2)	3 (2–4)	2 (1–3)	2 (2–3)	2 (1–3)	2 (1–3)	1 (1–2)
Mental disorder	46 (45–47)	48 (45–50)	53 (50–57)	56 (54–57)	49 (46–53)	42 (39–45)	29 (27–31)
Drug use disorder	25 (24–26)	30 (27–32)	28 (25–31)	35 (34–37)	22 (19–25)	21 (19–24)	10 (9–12)
Mental disorders							
Schizophrenia spectrum disorder	3 (3–4)	8 (7–10)	5 (4–7)	3 (3–4)	2 (1–4)	1 (1–2)	1 (0–1)
Mood disorder	26 (25–27)	23 (21–25)	30 (27–33)	29 (28–31)	31 (28–35)	26 (24–29)	18 (17–20)
Neurotic disorder	22 (22–23)	21 (19–24)	28 (25–32)	28 (27–30)	25 (22–28)	20 (17–22)	13 (11–14)
Personality disorder	9 (8–9)	11 (9–12)	13 (11–15)	12 (11–13)	8 (6–10)	7 (5–9)	3 (2–4)
Behavioural and emotional disorder	5 (5–5)	4 (3–5)	6 (4–8)	8 (7–9)	4 (3–5)	5 (3–6)	2 (1–3)
Drug use disorders							
Cannabis use disorder	8 (8–9)	7 (5–8)	8 (6–10)	14 (13–15)	8 (6–10)	8 (6–9)	3 (3–4)
Opioid use disorder	4 (3–4)	5 (4–6)	5 (4–7)	6 (5–7)	3 (2–5)	2 (1–3)	1 (0–1)
Sedative, hypnotic or anxiolytic use disorder	12 (11–12)	18 (16–20)	15 (13–18)	15 (14–17)	9 (8–12)	7 (5–9)	4 (3–4)
Hallucinogen use disorder	5 (5–6)	4 (3–5)	5 (3–6)	9 (8–11)	5 (4–7)	6 (4–7)	2 (1–2)
Multiple drug use disorder	9 (9–10)	10 (9–12)	11 (9–13)	14 (13–16)	8 (6–10)	7 (5–9)	3 (2–4)
Sectioned	5 (4–5)	9 (7–10)	6 (5–8)	5 (4–5)	4 (3–5)	4 (3–5)	2 (2–3)
Inpatient	43 (42–44)	62 (60–65)	52 (49–56)	49 (47–51)	40 (37–43)	35 (32–38)	24 (22–26)
Cumulative mortality rate	7 (6–7)	12 (10–14)	6 (5–8)	8 (7–9)	5 (4–7)	5 (4–7)	4 (4–5)

TABLE 3 Treatment for AUD, drug use and mental health disorders during the first 4 years of follow-up, as well as treatment with AUD as the main diagnosis

	All	*Disability benefits*	*Exit*	*Medium attachment*	*Decreasing attachment*	*Increasing attachment*	*High attachment*
Treatment							
Year 1	100	100	100	100	100	100	100
Year 2	69 (68–70)	67 (64–69)	72 (69–75)	76 (74–78)	74 (71–77)	65 (62–68)	60 (58–62)
Year 3	53 (52–55)	53 (51–56)	55 (52–59)	65 (63–67)	64 (60–67)	43 (40–46)	37 (35–39)
Year 4	46 (45–48)	48 (45–51)	42 (39–46)	59 (58–61)	56 (52–59)	36 (33–39)	30 (28–32)
AUD treatment							
Year 1	100	100	100	100	100	100	100
Year 2	57 (56–58)	50 (48–53)	56 (52–59)	61 (59–63)	63 (60–67)	53 (50–57)	54 (52–56)
Year 3	39 (38–40)	35 (33–38)	38 (34–41)	46 (44–48)	48 (45–52)	30 (27–33)	31 (29–33)
Year 4	31 (30–32)	30 (28–33)	27 (24–30)	39 (37–40)	40 (36–43)	23 (21–26)	23 (21–25)

Note: AUD = alcohol use disorder.

workforce [29, 30]. There might be several explanations for the low labour force participation among AUD patients. Employers might be less willing to hire people with alcohol problems. AUD is associated with interpersonal difficulties [31] and has been linked to poorer social skills [32]. One reason employers provide for being sceptical of hiring people with mental illness are concerns about social and emotional skills [33]. Chronic excessive alcohol consumption might lead to changes in brain functioning that negatively affect cognitive abilities [34]. Cognitive abilities have been linked to labour force outcomes [35]. Studies have found that those with severe alcohol problems have higher levels of conflict with supervisors and co-workers [36] and higher occurrence of impaired work performance [37]. However, when deciding whether to employ someone with an AUD, employers are likely not only to consider objective performance-related criteria. People with mental illnesses often face stigma and AUD is among the most stigmatised disorders [38]. Persons suffering from AUD are seen as being among the least valuable to employers [39] and as being unreliable and posing a safety risk [40].

Female patients were under-represented among those with high labour force attachment. One possible pathway between gender and employment might be through AUD treatment outcomes. However, a review of the literature concluded that treatment completion and outcomes did not vary by gender [41]. Female AUD patients are, however, more likely to develop physical disorders and impaired brain functioning as a result of their drinking [42]. In addition, Baldwin *et al.* [43] suggest that women who have had serious alcohol problems are subject to more prejudice from employers.

Older age was negatively associated with increasing labour force participation. Whether younger or older age is associated with better treatment outcomes is ambiguous [11, 44, 45]. However, older AUD patients are likely to have a longer history of alcohol misuse with conceivably greater consequences for cognitive functioning [46]. Older patients might also have had spells of unemployment or temporary welfare payments, which might make it harder to find stable employment [47].

Having completed only compulsory education or high school was negatively associated with having high labour force attachment. Education is generally a positive predictor of favourable AUD treatment outcomes such as lower risk of relapse [11, 48]. Employer accommodation is a strong predictor of whether individuals with an illness stay active in the labour force [49] and the more highly educated are more likely to receive such accommodation [50]. Our findings on the association between socio-demographic characteristics and employment are in line with earlier research on employment among people with mental illnesses and in substance use treatment [22, 51–53].

Mental health and drug use comorbidities were negatively associated with high labour force attachment. These disorders are likely to have a direct negative impact on labour force participation [17, 54, 55], and employers might find accommodating employees with such complex problems particularly difficult. For example, sickness absence tends to be higher among individuals who have both an AUD and a comorbid mental disorder [56, 57] and cognitive impairment might be more severe in this patient group [58].

TABLE 4 Multinomial logistic regression models of associations between socio-demographic and health characteristics and trajectory group membership

	Disability benefits			*Exit*			*Decreasing attachment*	
	ROR	*95% CI*	*P values*	*ROR*	*95% CI*	*P values*	*ROR*	*95% CI*
Gender								
Men	1			1			1	
Women	1.18	1.02–1.36	0.029	0.72	0.60–0.87	0.001	0.69	0.58–0.83
Age groups								
20–29	1			1			1	
30–39	4.58	2.92–7.18	<0.001	2.53	1.68–3.82	<0.001	1.41	1.04–1.91
40–49	12.54	8.20–19.17	<0.001	4.97	3.38–7.29	<0.001	1.42	1.07–1.90
50–57	32.54	21.15–50.06	<0.001	9.11	6.16–13.50	<0.001	1.83	1.36–2.48
Education								
Compulsory or missing	2.09	1.61–2.70	<0.001	1.15	0.87–1.53	0.335	0.43	0.34–0.55
High school	1.20	0.90–1.59	0.219	1.16	0.86–1.58	0.333	0.70	0.55–0.91
University	1			1			1	
Mental disorders								
Schizophrenia spectrum disorder	5.69	4.07–7.95	<0.001	2.81	1.88–4.21	<0.001	0.87	0.52–1.48
Mood disorder	0.69	0.59–0.81	<0.001	0.99	0.82–1.19	0.900	1.20	1.00–1.44
Neurotic disorder	0.81	0.68–0.96	0.014	1.13	0.93–1.36	0.216	0.98	0.81–1.19
Personality disorder	1.36	1.07–1.72	0.011	1.43	1.11–1.85	0.006	0.77	0.58–1.04
Behavioural and emotional disorder	1.00	0.72–1.39	0.990	1.15	0.81–1.64	0.425	0.70	0.47–1.04
Drug use disorders								
Cannabis use disorder	0.64	0.49–0.84	0.001	0.72	0.53–0.99	0.041	0.76	0.56–1.02
Opioid use disorder	1.28	0.92–1.77	0.148	1.27	0.86–1.86	0.228	0.91	0.59–1.42
Sedative, hypnotic or anxiolytic use disorder	1.40	1.15–1.71	0.001	1.15	0.90–1.46	0.267	0.76	0.57–1.00
Hallucinogen use disorder	0.83	0.59–1.17	0.284	0.72	0.48–1.07	0.102	0.88	0.61–1.29
Multiple drug use disorder	1.01	0.78–1.30	0.959	1.06	0.79–1.41	0.698	0.77	0.56–1.05
Sectioned	2.08	1.55–2.79	<0.001	1.57	1.09–2.27	0.016	1.16	0.76–1.78
Inpatient	1.58	1.37–1.83	<0.001	1.03	0.87–1.22	0.748	0.74	0.62–0.87

Percentages (mean) and 95% CI. Percentages and 95% CI. Relative odds ratios (ROR), P values and 95% CI (reference category = 'Medium attachment' group).

TABLE 4 (Continued)

	Decreasing attachment	*Increasing attachment*			*High attachment*		
	P values	*ROR*	*95% CI*	*P values*	*ROR*	*95% CI*	*P values*
Gender							
Men		1			1		
Women	<0.001	1.16	0.99–1.36	0.073	0.53	0.46–0.61	<0.001
Age groups							
20–29		1			1		
30–39	0.027	0.61	0.48–0.76	<0.001	1.01	0.80–1.27	0.918
40–49	0.018	0.39	0.32–0.49	<0.001	0.90	0.72–1.11	0.325
50–57	<0.001	0.43	0.34–0.55	<0.001	0.97	0.77–1.21	0.779
Education							
Compulsory or missing	<0.001	0.51	0.41–0.65	<0.001	0.16	0.14–0.20	<0.001
High school	0.006	0.72	0.56–0.92	0.010	0.46	0.38–0.56	<0.001
University		1			1		
Mental disorders							
Schizophrenia spectrum disorder	0.612	0.30	0.15–0.58	<0.001	0.25	0.13–0.47	<0.001
Mood disorder	0.049	1.00	0.84–1.19	0.959	0.71	0.61–0.83	<0.001
Neurotic disorder	0.858	0.68	0.56–0.83	<0.001	0.60	0.51–0.71	<0.001
Personality disorder	0.085	0.57	0.43–0.77	<0.001	0.38	0.29–0.52	<0.001
Behavioural and emotional disorder	0.077	0.68	0.48–0.96	0.029	0.51	0.35–0.73	<0.001
Drug use disorders							
Cannabis use disorder	0.071	0.64	0.48–0.85	0.002	0.40	0.30–0.53	<0.001
Opioid use disorder	0.689	0.39	0.22–0.68	0.001	0.28	0.16–0.51	<0.001
Sedative, hypnotic or anxiolytic use disorder	0.052	0.62	0.46–0.82	0.001	0.46	0.35–0.60	<0.001
Hallucinogen use disorder	0.516	0.92	0.66–1.29	0.629	0.53	0.36–0.79	<0.001
Multiple drug use disorder	0.103	0.63	0.47–0.85	0.003	0.48	0.35–0.65	<0.001
Sectioned	0.496	1.10	0.73–1.64	0.653	1.18	0.80–1.74	0.393
Inpatient	<0.001	0.71	0.60–0.83	<0.001	0.46	0.40–0.52	<0.001

Percentages (mean) and 95% CI. Percentages and 95% CI. Relative odds ratios (ROR), P values and 95% CI (reference category = 'Medium attachment' group).

Strengths and limitations

The main strength of this study is that it is based on high quality register data, with little loss to follow-up and no problems with recall bias or non-response. However, our data have certain limitations. Because the Norwegian Patient Register has individual-based records going back to 2009, we have no knowledge of whether the treatment entry in 2009 or 2010 was the patient's first AUD treatment. Neither do we have information about how long the patient has had an alcohol problem. Moreover, because the data only contain information about diagnoses for which the patient has received treatment in the specialist health sector during follow-up, we have no information about comorbidities for which the patient received medication or treatment from their general practitioner. Labour force participation was measured annually. This is a simplification as many patients in AUD treatment are likely to go in and out of employment interrupted by spells of unemployment or welfare benefits receipt.

CONCLUSION

AUD patients in Norway have considerably lower labour force participation than the general population. However, among the six employment trajectories identified, nearly one quarter of patients were in the trajectory group with a high labour force attachment throughout the observation period. On the other end of the spectrum, nearly a quarter of patients were either on or were granted permanent disability pension during follow-up. Being female, having lower educational attainment, and comorbid mental health and drug use disorders were negatively associated with having high labour force attachment.

DECLARATION OF INTERESTS

None.

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AUTHOR CONTRIBUTIONS

Solveig Christiansen: Data curation-Lead, Formal analysis-Lead, Methodology-Lead, Visualization-Lead, Writing-original draft-Lead, Writing-review & editing-Equal. **Inger Synnøve Moan**: Writing-original draft-Supporting, Writing-review & editing-Equal.

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