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Education and employment status among young adults three years after entering residential substance use treatment. A longitudinal data-linkage study

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ABSTRACT

Aims: This study aims to investigate three-year follow-up among young adults who entered residential substance use disorder (SUD) treatment with regard to outcomes related to education, work and mortality.

Methods: Participants who entered residential SUD treatment between 2011 and 2016 aged 16–29 years were included in the study. In this study, we used data from the electronic health records of the treatment facility of the participants and linked these with data from nationwide registries. The data included de-identified, person-level information on patient demographics, crime, treatment use and socioeconomic factors. The primary outcome was education and employment status, analyzed using logistic regression.

Results: At the follow-up, two-fifths of the sample were in education or employment, half were receiving welfare benefits and the annual income level was low. 3.6% of the sample had died. Those who were in education or work were less likely to have post-treatment convictions and to use residential SUD treatment services than those who were not.

Conclusion: Being in education or employment and not engaging in crime or severe substance use can create a life situation that helps to sustain recovery. There is a need to establish SUD treatment for young adults that includes education- and employment-focused interventions.

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Young adults; longitudinal research; education and employment; residential substance use treatment; crime

Introduction

Early onset substance use disorder (SUD), including harmful use and dependence, is associated with negative health outcomes leading to early morbidity, mortality and loss of productivity (Bista et al., 2021; Crouse et al., 2019; Larm et al., 2015; Laudet, 2012). Functional impairment is commonly present and often pervasive in young adults with SUD, especially regarding their academic and occupational functioning (Crouse et al., 2019; Green et al., 2016; Martinelli et al., 2020). Young adults are developmentally unique in terms of their combination of life stressors and recovery barriers, such as increased risk-taking and transition to independent living (Bergman et al., 2016). Due to the relapsing nature of SUDs, individuals often require multiple treatment episodes to overcome their SUD (DuPont et al., 2015; Martinelli et al., 2020; Simoneau et al., 2018). Additionally, co-occurring problems are an important source of heterogeneity in this population (Brunelle et al., 2013; Saladino et al., 2021) and is affected by complex interactions between personal and environmental factors, including genetic influences, family dysfunction and early adverse experiences (Elam & DiLalla, 2021; Jones et al., 2016; Saladino et al., 2021). Mental health problems (Andersson et al., 2021; Jandac & Stastna, 2023; Karsberg et al., 2023) and behavioral problems such as crime (Brunelle et al., 2013; Larm et al., 2015; Morse & MacMaster, 2014), are frequently reported in young adults with SUD.

In their review, de Andrade et al. (2019) found that young people who receive residential SUD treatment tend to achieve

positive outcomes (e.g., improved mental health, social and offending outcomes), particularly if they complete treatment and receive continuing care post-discharge. However, studies of outcomes later than one year after treatment entry are limited and have found mixed results (Bergman et al., 2016; Dahlberg et al., 2022; Hodgins et al., 2014; Kelly et al., 2012; Whitten et al., 2022). Variable sex differences in outcomes have also been found (Dahlberg et al., 2022). Existing research on follow-up outcomes after SUD treatment is mostly related to outcomes after outpatient treatment, short-term residential treatment, and older adult populations. We know less about long-term follow-up outcomes among young adults and the factors influencing these outcomes.

For young adults in recovery from SUD it is important to build recovery capital, broadly defined as the total resources a person has to acquire and sustain recovery. Education and work are essential to build such capital (Davidson et al., 2021). Follow-up studies on societal functioning after SUD treatment, however, are few and have mostly been done among older adult populations (Johannessen et al., 2019; Karsberg et al., 2023; Sahker et al., 2019). This study aimed to explore follow-up outcomes among young adults three years after entering residential SUD treatment. We wished to determine the pre- and post-treatment factors that predicted education and employment status three years after entering treatment. Understanding which factors distinguish young adults who are in education and employment from those who are not

will provide a basis for discussion of how intervention strategies can be tailored to this population.

Research questions:

- (1) What are the outcomes regarding education, employment, income, and mortality of young adults three years after entering residential SUD treatment?
- (2) What are the predictors of being in education and employment at three-year follow up? Which factors, substance use characteristics, treatment use or crime, are most important in predicting education and employment status adjusted for sex, age and dropout?

Materials and methods

Design and study sample

We conducted a cohort study using data from the electronic health records of residential SUD treatment facilities in Norway linked with data from a nationwide patient register (NPR) and from Statistics Norway (SSB). Data included de-identified, person-level information on patient demographics (e.g., sex, age), crime, treatment use and socioeconomic factors.

The sample was former patients admitted long-term (3–12 months) to residential SUD treatment in the Fossumkollektivet Foundation between 2011 and 2016. Fossumkollektivet is a non-profit non-governmental organization, offering interdisciplinary specialized SUD treatment for young adults in Norway. The treatment program is inspired by 12-step program techniques and therapeutic communities.

The sample was distributed over six treatment admission cohorts depending on year of treatment entry (T_1). Inclusion criteria included age 16–29 years at T_1 and being admitted to residential SUD treatment during the study period. Exclusion criteria included declining participation. Among the 37 excluded, 16 declined to participate and the rest did not meet other inclusion criteria. Baseline characteristics of the 447 patients who fulfilled the inclusion criteria are shown in Table 1 and have been previously described more extensively in Bakken et al. (2023).

Data collection and measures

Socioeconomic factors, registration status and crime

Data on socioeconomic factors, death and crime were obtained from SSB (Figure 1). SSB is the national statistical institute of Norway and the main producer of official statistics on the economy, population, and society at national, regional, and local levels (Statistics Norway, 2023).

In the main analysis, the outcome variable of being in education and/or employment at T_2 (three-year follow-up) was coded as a binary variable (0 or 1). Being in education and/or work was coded as 1.

Treatment use

The participants' treatment use was measured using data from NPR. NPR contains health information about all persons who have received treatment from specialist health services in Norway and covers almost all inpatient and outpatient hospital care (Norwegian Directorate of Health, 2021). In this study, the unique combination of admission date, length of stay, type of visit and service (SUD or mental health service) is counted as one treatment episode. Total treatment use is the total number of treatment episodes in either service. Days in residential treatment are the total number of days (one or more episodes).

Statistical analysis

Data linkages and statistical analyses were conducted in STATA V.17. All tests were two-sided. Results with p -values below .05 were considered statistically significant.

Of the variables used in the main analyses, only the primary drug reported at T_1 had missing data (47%). Five predictors of non-response were identified and the data were assumed to be missing at random (Mostafa et al., 2021). Those who lacked data on the outcome variable were not included in the regression analyses, regardless of the cause of missing data (death or unknown, $n = 20$).

Logistic regression analyses were conducted to investigate potential predictors of being in education or employment at T_2 .

Table 1. Sample characteristics ($n = 447$).

Variables	n/N		Mean age (SD)	Age range (min-max)
Age	447/447	mean(SD)	20.58(3.23)	
Sex, females	447/447	n(%)	156(35)	20.08(3.03)
<i>Treatment stay characteristics at T_1</i>				
Involuntary admission	447/447	n(%)	141(31.54)	17.95(1.88)
Receiving assistance from the Child Welfare Services	447/447	n(%)	158(35.35)	17.41(0.70)
Length of stay in days	447/447	mean(SD)	222.34(155.03)	20.59(3.2)
Dropout of treatment within the first 90 days	447/447	n(%)	124(27.74)	21.63(3.01)
Reported primary drug	234/447			
Stimulants/opioids		n(%)	63(26.92)	21.00(3.06)
Cannabis		n(%)	131(55.98)	19.62(3.40)
Others*		n(%)	40(17.09)	21.30(3.17)
<i>Treatment use and crime history in the period $T_0 - T_1$</i>				
Previous use of SUD treatment (T_0-T_1)	447/447	n(%)	311(69.57)	21.63(3)
Previous use of OAT (T_0-T_1)	447/447	n(%)	20(4.47)	20.75(3.01)
Previous use of MH treatment (T_0-T_1)	447/447	n(%)	363(81.21)	20.63(3.22)
Previous concurrent use of SUD and MH treatment (T_0-T_1)	447/447	n(%)	217(48.55)	21.67(2.88)
Previous criminal convictions (T_0-T_1)	447/447	n(%)	180(40.27)	21.01(2.97)

Note. MH = mental health. OAT = Opioid assisted treatment. SUD = substance use disorder. *Others included: benzodiazepines, other addictive drugs, psychedelics (e.g., LSD), ecstasy and other synthetic drugs, GHB/GBL, and anabolic androgenic steroids.

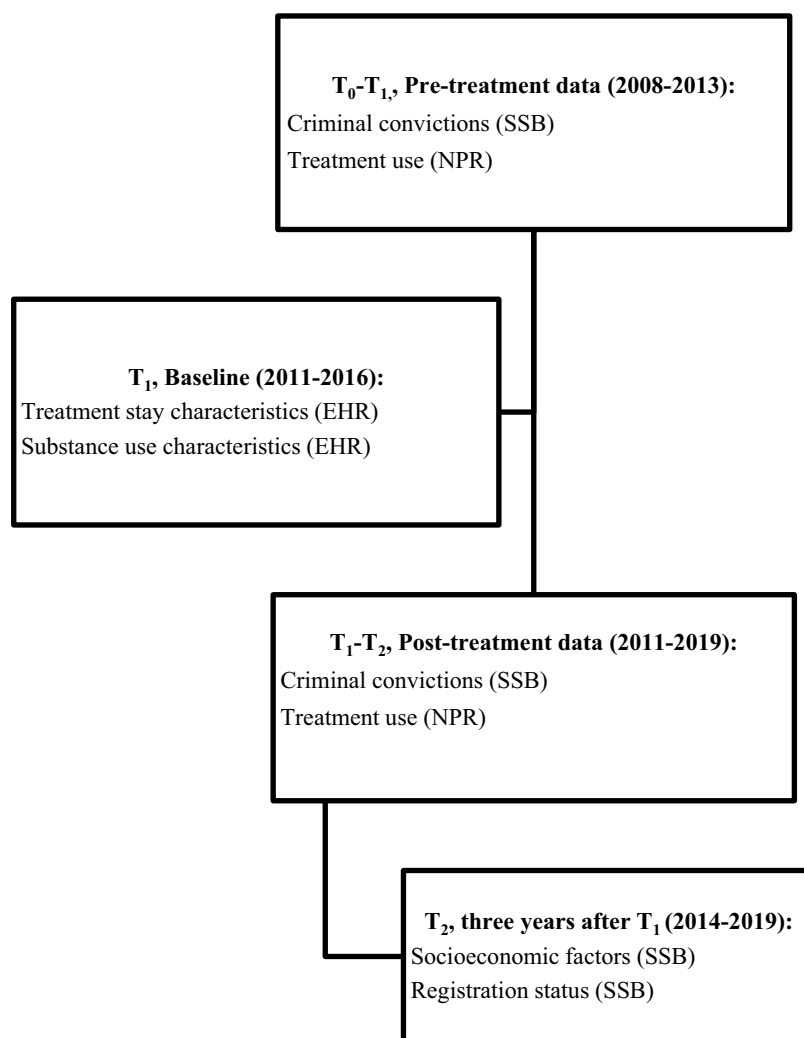


Figure 1. Flow diagram of data collection. *Note.* EHR = Electronic health records. NPR = National patient registry. SSB = Statistics Norway. Treatment use = Quantifications of the use of specialized SUD and mental health treatment.

Prior to the regression analyses, we used multiple imputations to deal with missing data on the primary drug. We used STATA 17's "mi impute mlogit" command, which generated 200 imputed data sets. STATA's "mi estimate" command was used when conducting the analyses. Treatment stay characteristics at T_1 (length of treatment stay, legal basis, and facility unit) and having received SUD and mental health treatment concurrently were identified as our auxiliary variables. The imputation process included the variables that appeared in subsequent regression analyses as well as auxiliary variables (Graham, 2009). Finally, we checked that the Monte Carlo error was acceptable according to the guidelines of White et al. (2011). In order to understand the effect of missing data on our findings, analyses were conducted pre- and post-imputation. We found no meaningful differences in the results, and therefore only present imputed results.

Ethics

The study protocol was approved by the Regional Committee for Medical and Health Research Ethics (REK) in Norway (#2018/2197). All procedures were

performed in accordance with the 1964 Helsinki Declaration and its later amendments. The Health Research Act includes an exemption clause whereby REK may waive the requirement for consent when researchers wish to use health information collected by health services. REK granted exemption for this project but made it subject to a disclosure requirement pursuant to the Personal Data Act, cf. Article 13 of the Personal Data Regulations. Hence, a letter was distributed to former residents of the facility describing the nature of the study and asking them to contact the research team if they did not want to participate. Those who did not contact the research team to withdraw (via SMS, e-mail, or mail) were deemed eligible to participate.

Results

Status regarding education, work, income, and mortality at three-year follow-up

At the three-year follow up, two-fifths (38.1%) were in education and employed (Table 2). Almost all (90.2%) had low

educational attainment. The mean annual income was low, which was in line with the finding that more than half of the sample (55.5%) were receiving social assistance. 3.6% of the sample had died during the follow-up period.

Predictors of education and employment status

The bivariate analyses in Table 3 suggest differences between those who were in education or employment at T₂ and those who were not with respect to post-treatment offending and use of residential SUD treatment in the third year after T₁.

The results from the multivariable analysis (Table 3) suggest that post-treatment offending ($p = .000$) and residential SUD treatment use ($p = .007$) remain significant when all predictors are considered simultaneously. This indicates that those outside education and employment at T₂ were more likely to have greater offending and higher residential SUD treatment use in the follow-up period.

Discussion

This multi-source linked data set enabled us to follow young adults entering residential SUD treatment over six years (three years pre-treatment and three years post-treatment). At the three-year follow-up (T₂), 3.6% had died. Most of these were

males. Two-fifths (38.1%) were in education, employment or both. Mean annual income was low and almost all (90.2%) had low educational attainment. The number of post-treatment convictions and the number of residential SUD treatment episodes in the third year after T₁ predicted educational and employment status at T₂.

Previous research indicates that people with SUD are more likely to die from accidental deaths such as overdoses and non-intentional injuries and from suicide than the general population (Bista et al., 2021; Hjorthøj et al., 2022). This may also be the case for the present sample. The findings of this study suggest that the participants were in different recovery stages at T₂. This is in line with previous research revealing that those in later stages of recovery are less likely to be involved in crime and to have severe substance use, and more likely to be in education or employment (Martinelli et al., 2020). There may also have been differences in resources for overcoming SUD and possibly in accumulation of risk factors between those who were in education and work and those who were not at T₂ (Skogens & von Greiff, 2020; Wangensteen & Hystad, 2022). Being in education or working at T₂ may indicate a greater mean increase of skills and resources than in those outside education and employment. Nevertheless, it is generally difficult for young people to enter the job market, especially for those without higher education or any work experience. Here, young adults with SUD are at a greater

Table 2. Status at three-year follow-up after entering residential SUD treatment ($n = 447$).

Variables	n/N		Mean age (SD)	Age range (min-max)
Registered as dead	447/447	$n(\%)$	16(3.58)	24.25(2.32)
In employment (only)	427/431*	$n(\%)$	76(17.63)	24.67(3.31)
In education (only)	427/431*	$n(\%)$	53(12.3)	23.34(3.09)
In education and employment	427/431*	$n(\%)$	35(8.12)	22.43(2.81)
Educational attainment, lower secondary school or lower	427/431*	$n(\%)$	397(90.23)	23.59(3.23)
Annual income, NOK	425/431*	$mean(SD)$	207562(113099.8)	23.59(3.23)
Receiving welfare benefits:	406/431*			
Social assistance		$n(\%)$	236(55.53)	23.59(3.23)
Health-related rehabilitation		$n(\%)$	153(35.50)	23.59(3.23)

Note. Current value of 10 NOK in EUR is 0.89 EUR. *N is minus those who have died.

Table 3. Logistic regression models comparing educational and employment status at three-year follow-up of young adults who had entered SUD treatment ($n = 427$).

Variable	Bivariate models		Multivariable regression model	
	Odds ratio (95% CI)	p -value	Odds ratio (95% CI)	p -value
Primary drug T ₁				
*Others	Ref.		Ref.	
Stimulants/Opioids	1.13 (0.51;2.48)	.765	1.18 (0.44;3.14)	.739
Cannabis	1.08 (0.52;2.24)	.964	0.86 (0.36;2.06)	.730
OAT ever, yes	0.56 (0.27;1.15)	.113	1.00 (0.38;2.61)	.992
#Total treatment T ₀ -T ₁	1.00 (0.99;1.00)	.039	1.00 (0.99;1.00)	.418
#Total treatment T ₁ -T ₂	0.99 (0.99;1.00)	.000	1.00 (0.99;1.00)	.337
#Days in residential treatment T ₀ -T ₁	1.00 (1.00;1.00)	.681	1.00 (1.00;1.00)	.511
#Days in residential treatment T ₁ -T ₂	1.00 (0.99;1.00)	.000	1.00 (0.99;1.00)	.013
#Convictions T ₀ -T ₁	0.99 (0.97;1.01)	.458	1.01 (0.98;1.03)	.675
#Convictions T ₁ -T ₂	0.88 (0.83;0.93)	.000	0.87 (0.82;0.93)	.000
#Outpatient SUD treatment T ₂	0.98 (0.96;0.99)	.005	1.00 (0.98;1.02)	.805
#Residential SUD treatment T ₂	0.57 (0.43;0.75)	.000	0.69 (0.52;0.90)	.007
Sex, male	1.06 (0.71;1.60)	.774	1.14 (0.69;1.90)	.589
Age	1.03 (0.97;1.09)	.340	0.99 (0.92;1.06)	.789
Dropout T ₁ , yes	0.67 (0.42;1.05)	.078	0.92 (0.54;1.58)	.771

Note. CI = Confidence interval; OAT = Opioid assisted treatment; SUD = Substance use disorder. *Others included: benzodiazepines, other addictive drugs, psychedelics (e.g., LSD), ecstasy and other synthetic drugs, GHB/GBL, and anabolic androgenic steroids.

disadvantage than their peers. Surprisingly, no pre-treatment characteristics emerged as significant predictors of educational and employment status at T₂. There could have been unmeasured factors (e.g., parental socioeconomic status, social networks, cognitive impairments) that affected this relationship. However, individuals in residential SUD treatment have extensive treatment needs related to severity and complexity of symptoms (Andersson et al., 2021; Johannessen et al., 2019). Similarities in pre-treatment characteristics found in the current study might be due to the residential setting and admission criteria.

Young offenders with high treatment use find themselves at the margins of important societal institutions that are crucial for an untroubled transition to adulthood. Greater offending may indicate a feeling of misrecognition in society and precarious life circumstances, which may discourage the person from pursuing higher education or stable employment. Yet genetic predisposition may also increase the risk of SUD later in life via antisocial behavior such as offending (Elam & DiLalla, 2021). As in previous studies (Larm et al., 2015; Martinelli et al., 2020; Saladino et al., 2021), our results also suggest that the combination of SUD and crime complicates the process of overcoming SUD and that higher crime rates are associated with more unstable employment and receiving welfare benefits (Cucciare et al., 2019).

Implications of the study

Formal education and employment are often the top goals of persons recovering from SUD and of society. In this study, fewer than half were in education and/or working at three-year follow-up. This finding may serve as an indicator of this young cohort's recovery capital and is consistent with previous findings (Karsberg et al., 2023; Laudet, 2012). To improve educational attainment and employment rates, SUD treatment should include education- and employment-focused interventions, such as individual placement and support (Davidson et al., 2021; Drake & Wallach, 2020; Rognli et al., 2021). However, there is scant evidence on SUD treatment that includes support for education and employment (Davidson et al., 2021). Similarly, we find little literature on social skills training in SUD treatment (Limberger & Andretta, 2018). More studies exploring the effects of such interventions are needed.

Findings suggest that this group experiences challenges in many areas of life for a long time. People with SUD have developed their own individual strategies to overcome the obstacles and risks that they face, which often includes seeking out criminal and substance using networks for social support in order cope with life. Research supports the clinical need to establish recovery-oriented systems of care rather than acute, unrelated, and episodic interventions (Davidson et al., 2021; Trane et al., 2021). Experiences and requirements in treatment, educational and employment settings must align with the individual's capacities and needs to be of benefit (Davidson et al., 2021; DuPont et al., 2015).

Limitations

This study had some limitations. Firstly, the data used in this study was not complete. Although multiple imputation is viewed as

a powerful technique to handle missing data, it is not without limitations (van Ginkel et al., 2020). One limitation is that it assumes data to be missing at random. We identified five predictors of non-response, which potentially improves the plausibility of the missing at random assumption (Mostafa et al., 2021). Secondly, we did not obtain information about diagnosis, which could have enhanced the description of this patient cohort. Third, only a single point in time measure of education and employment status was used as an outcome variable. We do not know for certain if this status persisted, but it may be an indicator of the cohort's risk of permanent exclusion from the labor market and economic disadvantage. Additional research is also needed to explore whether the predictors of education and employment status remain significant into older adulthood. Although we are confident that offending and continued use of residential SUD treatment do in fact differentiate individuals who follow different pathways of education and work, it seems likely that other variables not included in the present analysis also play a part.

Conclusions

Young adults entering residential SUD treatment have extensive treatment needs. At the three-year follow-up, low educational attainment, high numbers of individuals receiving welfare benefits and indications of high mortality rates were found. Two-fifths of the sample were in education and/or employment. Being in education or work and not engaging in crime and severe substance use can create a life situation that helps to sustain recovery. There is a clinical need to establish SUD treatment for young adults that includes education- and employment-focused interventions.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Regine Bakken: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Visualization, Writing- Original draft preparation. Lars Lien: Supervision, Conceptualization, Methodology, Writing- Reviewing and Editing. Halvor Fauske: Supervision, Conceptualization, Methodology, Writing- Reviewing and Editing. Anne Signe Landheim: Project administration, Supervision, Conceptualization, Methodology, Investigation, Writing- Reviewing and Editing.

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