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Long-Term Outcomes of Adolescent Outpatient Treatment for Substance Use Problems: Exploring the Co-occurrence of Mental Health and Substance Use Problems

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Abstract

Background: Adolescents with substance use problems (SUP) constitute a group expected to face increased mental health problems (MHP). SUP can exacerbate mental health issues while also serving as a coping mechanism. Understanding the interplay between psychological, substance-related, and social factors is crucial for shaping effective interventions for this demographic. This article presents a three-year follow-up study with adolescents who had outpatient treatment for SUP, focusing on MHP and psychiatric conditions.
Objective: This study aims to determine the prevalence of ongoing SUP and MHP in adolescents who received outpatient treatment at a specialized substance use clinic three years post-treatment initiation. Additionally, it seeks to explore psychosocial risk factors distinguishing adolescents with solely MHP from those with both MHP and persistent SUP (co-occurring problems) three years post-treatment initiation.
Method: The study utilizes a longitudinal design, combining structured interview data at intervention onset with national register data at one- and three-years post-treatment initiation. A total of 451 adolescents participated, with 29% females and a median age of 17 years. Descriptive statistics and gender distribution of outcome groups are presented, alongside logistic regressions to assess the predictive value of risk factors for psychiatric conditions, substance use, and co-occurring conditions.
Results: Nearly three-quarters of enrolled youth show no ongoing SUP, and one-third exhibit indications of MHP three years after treatment initiation. Risk factors diverge when distinguishing adolescents with MHP from those with co-occurring problems at the three-year mark post-treatment. School problems, depression, female gender, and low primary drug use increase the likelihood of solely exhibiting MHP.
Conclusions: Integrated outpatient clinics like Maria clinics could play a crucial role in early detection and management of both SUP and MHP. The findings offer hope, suggesting positive outcomes regarding substance use even for individuals with heavy risk loads or severe SUP.

Keywords: Adolescents, Substance use problems (SUP), Mental health problems (MHP), Co-occurring problems, Longitudinal study

Introduction

The prevalence of mental health issues among young people in Sweden surged between 1990 and 2010, nearly doubling compared to other Nordic countries. This increase is evident in self-reported mental difficulties, diagnosed mental disorders, and the prescription of psychotropic medications (1). The trend persists, with a reported 12% of young adults (aged 18–24) receiving psychiatric care or medication in 2017, with rates higher among women (15%) than men (10%) (2). Key contributors to this rise include depression, various anxiety disorders, and neuropsychiatric conditions like ADHD.

The rise in mental health issues among children and adolescents has been attributed to factors such as a less functional school system and changes in the

labor market, leading to increased stress and psychosomatic problems (3-4). Moreover, mental health challenges in youth are closely linked to widening socioeconomic disparities (5-6), which can result in conditions like depression, anxiety, and suicidal ideation (7). Additionally, societal norms emphasizing economic and social success can exacerbate stress-related health problems among upper secondary school students, further impacting their social position and well-being (8).

Problematic substance use, particularly alcohol, cannabis and other drugs, often accompanies mental health issues. Among upper secondary school students, 15% report drug use, primarily cannabis, with a smaller percentage using drugs regularly. In 2023, 3% of boys and 2% of girls had used cannabis more than 20 times (9). While the declining trend in youth alcohol consumption has somewhat plateaued, levels remain historically low, with 6% of Swedish adolescents being heavy consumers. In 2021, 1% of individuals aged 18-30 received specialized outpatient or inpatient care for alcohol or substance-related issues (10).

Adolescents facing substance use problems (SUP) typically experience heightened mental health challenges. While substance use can escalate the risk of mental health problems (MHP), it may also serve as a coping mechanism for psychological issues (e.g., 11). Understanding the intricate interplay between psychological, substance-related, and social factors is crucial for shaping effective prevention and treatment strategies for this target group. This article presents findings from a three-year follow-up study on adolescents who received outpatient care for substance use, with a specific focus on psychiatric conditions. This study is part of a longitudinal research project, with a previous one-year follow-up already published (12-13).

Research reviews indicate that adolescents with alcohol and drug problems often experience co-occurring psychiatric conditions, also known as concurrent disorders or comorbidity (14-16). The term "co-occurring conditions" may be more relevant as it suggests a complex or transient relationship between SUP and MHP. Establishing diagnoses for both issues can be challenging, especially in adolescents, as both conditions can be temporary (17). Hence, this article adopts the terms "co-occurring conditions" or "co-occurring issues."

International reviews indicate that 50–90% of adolescents with alcohol and drug problems also experience significant mental health issues (15,18-19). Studies based on inpatient samples generally report higher prevalence levels of mental health issues compared to outpatient care (18,20-22). However, some studies suggest that many adolescents with alcohol and drug problems initially do not report mental health complaints or symptoms upon seeking healthcare services (23-25). Adolescents with SUP and co-occurring psychiatric conditions often exhibit more severe alcohol and drug use, with earlier onset and higher frequency of use (20,24,26-27). These extensive substance-related issues also lead to more severe social problems such as crime, family issues, and school problems (14).

Externalized conditions like Conduct Disorder (CD) and Attention Deficit Hyperactivity Disorder (ADHD) are common among adolescents with alcohol and drug problems, alongside prevalent internalized issues such as depression, sadness, and anxiety (18). Boys are often overrepresented in externalizing psychiatric problems, while girls are more likely to experience internalizing problems (21,28). Additionally, research suggests that adolescents with alcohol and drug problems commonly present with multiple co-occurring psychiatric diagnoses at the beginning of treatment (20,29-31).

Various theories exist regarding the causal relationship between mental health issues and SUP (32). Substance use can both increase the risk of mental health issues (33) and serve as a coping mechanism for existing MHP (21), creating a reciprocal relationship. While some researchers argue that MHP typically precede alcohol and drug problems (34-36), others find it challenging to determine which condition comes first (15,33). Some studies also suggest that shared risk factors such as difficult upbringing conditions, previous substance use, and negative peer associations may explain the co-occurrence (21,37-39).

A significant portion of adolescents undergo treatment for SUP, with varying outcomes. Follow-up studies analyzing factors predicting treatment outcomes and ongoing SUP and MHP have identified the following risk factors:

1. *Early onset of alcohol and drug use:* Initiating alcohol and drug use early significantly predicts continued SUP (40-41).
2. *Severity of SUP:* The severity of SUP is closely tied to treatment outcomes (42).
3. *School problems:* Academic issues, like incomplete grades and absenteeism, are significant risk factors (43).
4. *Peer influences:* Association with friends who use alcohol and drugs or lack of structured leisure activities are additional risk factors (43-45).
5. *Parental alcohol and drug problems:* Parents' SUP increase the risk of continued substance use in their children (46-47).
6. *Criminality:* Involvement in criminal activities can co-occur with continued substance use during follow-up (47-48).

7. *Gender and ethnicity:* Gender and ethnicity generally do not appear to correlate with treatment outcomes (42,44,46,49).

Studies on adolescents who have received treatment for alcohol and drug problems often assess outcomes after six or twelve months, with long-term follow-ups being rare (e.g.,41-42). Longitudinal studies with follow-up periods ranging from 1.5 to 8 years indicate that co-occurring conditions often persist, especially depression, ADHD, conduct disorder, and experiences of trauma (47-48,50-51). However, some studies suggest that co-occurring conditions may not impact outcomes, or this group may even have better outcomes compared to adolescents without MHP (46,51-52). Overall, follow-up studies align with research reviews indicating that 30–50% of adolescents relapse into substance use after treatment (43,53). However, the knowledge base on long-term follow-ups is relatively limited, with most studies from the USA, small samples, and low representation of females.

This study has a dual purpose. Firstly, to determine the prevalence of ongoing SUP and MHP in adolescents who received outpatient treatment at a specialized substance use clinic three years post-treatment initiation. Secondly, to explore psychosocial risk factors that distinguish adolescents with solely MHP from those with both MHP and persistent SUP (co-occurring problems) three years post-treatment initiation.

Method

The current study has been conducted within the framework of the ongoing research project, Treatment Research on Adolescents at the Maria clinics (TRAM). The project aims to examine the trajectories of adolescents concerning alcohol and drug use, mental health, and social situations, as well as how specific risk and protective factors influence outcomes for different groups following outpatient interventions (12,54). The project employs a longitudinal design, combining data from structured interviews with adolescents at the start of the intervention with data from national registers at one and three years of follow-up after the commencement of treatment. The research project has received approval from the Swedish ethical review authority, and the information obtained from national registers is anonymized (reference number 2015/160-31).

Participants

Data collection was conducted at Maria clinics in 12 Swedish cities. These clinics are specialized outpatient units for adolescents with alcohol and drug problems, operated in collaboration with social services and healthcare. They primarily serve individuals aged 15-21. The clinics provide various forms of individualized and/or manual-based treatment interventions. Additionally, medical and psychiatric interventions are offered through physicians and psychologists. The average intervention lasts for 4–6 months and the staff may include social workers, nurses, psychologists, and doctors (23). Specific details of the interventions that the participants have received during their treatment is not available. What we do know, from not yet published data derived from both survey and focus group interviews with the clinicians at the Maria clinics, is that they are working with multiple therapeutic methods and interventions. Such as, Motivational Interviewing (MI), Relapse Prevention (RP), Hashish withdrawal program (HAP)/Cannabis program for young people (CPU), Cognitive Behavioral Therapy (CBT), Functional family therapy (FFT), Adolescent Community Reinforcement Approach (ACRA).

Out of the adolescents aged 15 and above who initiated intervention at Maria clinics in 2016, 946 were invited to participate in the study, of which 469 chose to take part. For 14 individuals, no registry data were available due to incomplete personal identification numbers or migration from Sweden, while four adolescents had died (two from overdose and two from suicide) during the follow-up period. In total, 451 adolescents participated in the three-year follow-up reported in this study.

Attrition Analysis

The conducted attrition analysis is based on a comparison between the adolescents who participated in the study (451 individuals) and those who declined participation (477 individuals). The study's sample consisted of 29% females, while the proportion of females in the dropout group was 22%. The median age was 17 in both groups. Concerning the primary drug of use, both groups reported similar usage patterns. For adolescents who participated in the study, the proportions were 77% for cannabis, 14% for alcohol, and 9% for other drugs. In the dropout group, the figures were 79% for cannabis, 13% for alcohol, and 8% for other drugs. However, there were significant differences in other substance-related variables, where the participating adolescents generally had more severe SUP compared to the dropout group, including a higher frequency of substance use (49 vs. 41%), a higher degree of polydrug use (38 vs. 26%), and a larger proportion with previous substance use treatment (31 vs. 20%). This result differs from earlier follow-up studies, in which, on the contrary, groups that opted not to participate often had more serious problems (55). It is likely that the differences

TABLE 1. The four outcome groups at three- year follow-up in relation to the situation at the start of treatment contact.

Descriptives	*Total*	*SUP/ no MHP*	*No SUP/ MHP*	*SUP/MHP*	*no SUP/ no MHP*
	N=451	n=69	n=90	n=58	n=234
	%	%	%	%	%
Sex					
Girls	29	7	40	38	30
Boys	71	93	60	62	70
Age (mean)	17	17	17	17	17
Living with parents	72	84	74	60	71
Low level of education for parents (primary school)	4	10	2	-	4
Reading and writing difficulties	19	28	18	29	14
Upper secondary school eligibility	68	52	74	67	71
Lack of employment	18	17	20	19	18
Serious conflicts with parents	36	29	36	35	39
Arrested for crime	61	78	48	60	62
Hazardous Alcohol Consumption (AUDIT)	48	36	50	50	50
Primary drug					
Alcohol	14	6	18	14	15
Cannabis	77	86	71	81	75
Other drugs	9	9	11	5	10
Primairy drug use requency 2-3 days/week or more	49	55	38	57	49
Polydrug use	38	33	37	47	38
Anxiety or worry	49	38	63	57	46
Concentration problems	58	52	67	69	55
Suicide thoughts	8	7	8	9	8
Eating disorder	8	6	9	9	8
Self-harm behavior	7	1	4	12	8
Medication for Mental Health Problems	21	9	39	40	13

Note. SUP=Substance use problems and MHP=Mental health problems

can be partially explained by the somewhat larger proportion of girls – who generally have higher psychosocial loads – in the study group (see 23).

Measures

When the outpatient intervention commenced, the initial data collection began through admission interviews using UngDOK, which has been found to have satisfactory reliability and validity (56). The purpose of the interview method is to map problems, needs, and the current situation to create a basis for assessment, planning, and implementation of the intervention. The interview consists of a total of 75 questions covering the following life areas: housing and livelihood, occupation, alcohol and drugs, treatment history, criminality, upbringing environment, exposure to violence, family and relationships, as well as physical and mental health. These UngDOK-interviews were then used as baseline data in the present study. The ten risk and protective factors used in present study are a construction of the questions in the interview form UngDOK are: *1) Lack of occupation;* means that the young person is unemployed and does not have daily employment, *2) Problems at school;* problems that have led to deficiencies in attendance, performance and well-being, *3) Placement in foster care/residential home;* The young person has previously been subject to community care, *4) Problems in childhood environment;* The family/close relatives have had financial problems, substance use problems, mental illness and/or violence problems, *5) Early age at onset of drug and alcohol use;* 12 years or younger for alcohol and 13 years or younger for other drugs, *6) Association with criminal or drug-abusing peers;* a main interaction with other young people who have problems, crime and/or drug use, *7) Exposed to violence/abuse;* earlier in life exposed to violence/abuse of a physical, psychological or sexual nature, *8) Depression;* problem with depression in the last 30 days, *9) Aggressive behavior*; serious problem with aggressiveness in the last 30 days and, *10) Traumatic events:* The adolescent has been through a serious event, accident, violence or disaster that it is still affected through e.g., nightmares, vigilance, avoiding things related to the event.

The measures used to analyze treatment outcomes are based on experiences from previous studies (see, e.g., 57) and aim to provide a reliable picture of the adolescents' development. Information indicating continued issues with alcohol and drug use was gathered from several national registers. The

occurrence of substance use disorder diagnosis in outpatient and inpatient care within somatic care, psychiatric care, and addiction care (diagnosis code according to ICD 10) was obtained from the National Patient Register of the Swedish National Board of Health and Welfare. Information about medication for SUP was found in the National Board of Health and Welfare's Prescription Drug Register. The occurrence of involuntary care for SUP was retrieved from the National Board of Health and Welfare's Compulsory Care Register. Substance use-related criminality, such as drug offenses or driving under the influence, was found in the Conviction Register through the Swedish National Council for Crime Prevention. Indications of psychiatric conditions, both outpatient and inpatient psychiatric care, were obtained (through diagnosis code according to ICD 10) from the National Patient Register of the Swedish National Board of Health and Welfare, as well as the prescription of medication for psychiatric issues in the Prescription Drug Register. In addition, to examine outcomes for specific groups, four different categories were created: 1) No indication of substance use problems or mental health problems (no SUP/no MHP), 2) Sole indication of Substance Use Problems (SUP/no MHP), 3) Sole indication of Psychiatric Condition (no SUP/MHP), or 4) Co-occurring condition (SUP/MHP) (see Table 1).

Statistical analyses

Given that an individual could have appeared in the included registers for SUP and/or MHP, four outcome groups were formed in a first step based on relevant background data. Descriptive statistics and gender distribution of the four outcome groups: SUP and MHP three years after initiated treatment are presented descriptively with percentage distribution (see Table 1). Logistic regressions were conducted to separately describe the predictive value of the risk factors, with indications of psychiatric conditions, substance use, and co-occurring conditions as outcomes. Odds ratios were reported for each independent variable, along with Nagelkerke's pseudo R2 as a measure of explained variance. This was done with and without control for gender, age, and drug use frequency (of the primary drug). Furthermore, logistic regression analysis was conducted in a similar manner to examine the effect of cumulative risk burden at treatment initiation. To reduce the risk of false-positive results (i.e., type 1 error), p-values at 5% should be interpreted with caution. SPSS 26 was used for all statistical analyses.

Results

Initially, the variables included in each outcome measure are presented, i.e., the different indications of SUP and MHP derived from the various registry data for the respective adolescents at year three (Table 2).

In summary, at year three, indications of MHP are present for a total of 33% of the adolescents, with 44% for females and 28% for males. Regarding SUP, a total of 28% show indications of continued problems. Among females, 20% have indications of SUP, while the corresponding figure for males is 31%. The analyzes show significant differences between the sexes with females more often than males found in registers for psychiatric outpatient treatment and medical treatment for a psychiatric condition. Overall, females show indication of MHP to a higher extent than males do.

Table 3 provides an overview of the percentage distribution of psychiatric diagnoses according to ICD-10 at the three-year follow-up after initiated treatment. The psychiatric conditions are only present among one third of adolescents with indication of MHP described earlier.

TABLE 2. Descriptives of outcome indicators: Mental Health Problems (MHP) and Substance Use Problems (SUP) three years after initiated treatment.

	Total N=451	*Girls* n=131	*Boys* n=320		
	%	%	%	Chi-2	*p-value*
Indication of mental health problems (MHP)	33	44	28	10.47	0.00**
Outpatient treatment, psychiatry	22	30	18	7.60	0.00**
In-patient treatment, psychiatry	5	6	4	0.56	0.45
Medical treatment, mental illness	29	41	24	12.74	0.00**
Indications of Substance use problems (SUP)	28	20	31	5.48	0.02*
Outpatient substance use care	16	17	15	0.30	0.59
Inpatient substance use care	7	5	7	0.55	0.46
Medication for alcohol or drug use problems	1	1	1	0.02	0.88
Compulsory care	2	2	2	0.22	0.64
Substance use–related criminality	15	5	19	13.92	0.00**

*Note. * p < 0.05, ** p < 0.01*

These adolescents have at least one psychiatric diagnosis and/or have been prescribed medication based on a psychiatric diagnosis, encompassing all forms of mental health issues except substance use disorders. The "evaluation/observation" category includes two adolescent groups: one with assessment observation diagnosis and another initially diagnosed with evaluation but later with neurodevelopmental

TABLE 3. Categories of psychiatric diagnoses according to ICD-10 during follow-up three years after initiated treatment for the outcome groups. Percentage distribution.

	Total N=451	SUP/no MHP n=69	no SUP/MHP n=90	SUP/MHP n=58	no SUP/no MHP n=234		
	%	%	%	%	%	Chi-2	*p* - value
Diagnostic category						463.514	<0.001
Assesment/observation	4	0	*12*	*10*	*0*		
Anxiety/depression	14	*0*	*43*	*40*	*0*		
Neurodevelopmental disorders	12	*0*	*39*	*35*	*0*		
Psychosis/bipolar etc	2	0	6	*16*	*0*		
No diagnosis	67	*100*	*0*	*0*	*100*		

Note. Percentages in italics are those with adjusted residuals that exceed +/- 2. SUP=Indication of Substance Use Problems. MHP=Indication of Mental Health Problems, SUP/MHP=Indication of coocurring Mental Health Problems and Substance Use Problems. NI=No Indication.

TABLE 4. Bivariate association and logistic regression analysis of risk factors in relation to the outcome group Mental Health Problems (MHP) and Substance Use Problems (SUP) three years after initiated treatment. Odds ratio and confidence interval are reported (N=451).

Psychosocial risk factors	*no SUP/MHP*			*SUP/MHP*		
	Bivariate association	*Model 1*	*Model 2*	*Bivariate association*	*Model 3*	*Model 4*
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
1. Lack of occupation	1.16 (0.65-2.08)	0.92 (0.50-1.69)	1.11 (0.58-2.16)	1.06 (.52-2.15)	.90 (.43-1.91)	.97 (.44-2.12)
2. Problems at school	2.75 (1.41-5.39)**	2.51 (1.24-5.04)*	2.53 (1.24-5.16)*	1.15 (.60-2.22)	.94 (.47-1.91)	.91 (.45-1.85)
3. Placement in foster care/residential home	0.82 (0.45-1.50)	0.68 (0.36-1.26)	0.70 (0.37-1.32)	2.17 (1.19-3.98)*	2.02 (1.07-3.80)*	2.00 (1.06-3.76)*
4. Problems in childhood environment	1.29 (0.80-2.08)	1.00 (0.58-1.71)	1.08 (0.62-1.88)	1.74 (.96-3.18)	1.48 (.76-2.86)	1.47 (.76-2.85)
5. Early drug debut	1.36 (0.80-2.32)	1.34 (0.76-2.35)	1.18 (0.66-2.10)	1.40 (.75-2.62)	1.17 (.61-2.26)	1.17 (.60-2.27)
6. Delinquent peers	1.09 (0.62-1.93)	0.98 (0.55-1.78)	1.24 (0.67-2.31)	.93 (.46-1.88)	.84 (.41-1.73)	.82 (.39-1.72)
7. Exposure to violence	1.43 (0.88-2,33)	1.11 (0.64-1.91)	1.09 (0.62-1.93)	1.48 (.82-2.67)	1.18 (.62-2.28)	1.16 (.59-2.25)
8. Depression	1.99 (1.24-3.19)**	1.81 (1.07-3.07)*	2.00 (1.14-3.50)*	1.30 (.73-2.29)	1.05 (.55-1.99)	1.01 (.52-1.96)
9. Violent behavior	1.19 (0.69-2.05)	0.84 (0.47-1.51)	0.79 (0.43-1.44)	1.42 (.76-2.66)	1.40 (.71-2.76)	1.43 (.73-2.82)
10. Traumatic events	1.40 (0.87-2.25)	1.07 (0.63-1.82)	1.01 (0.58-1.74)	1.27 (.72-2.24)	.96 (.51-1.81)	.93 (.49-1.77)
Covariates						
Sex			1.72 (1.03-2.90)*			1.46 (0.80-2.69)
Age			1.00 (0.90-1.11)			0.97 (0.85-1.10)
Primary drug use frequency at intake			0.44 (0.26-0.75)**			1.43 (0.78-2.62)

*Note. * p < 0.05; ** p < 0.01. Note. Model 1 and Model 3 includes risk factors 1-10 and Model 2 and Model 4 includes risk factors 1-10 but also sex, age and primary drug use frequency at intake. Model 1: χ2 [10] = 18.73, p = 0.04, Nagelkerke's quasi R2 = 0.06. Model 2: χ2 [13] = 32.31, p = 0.00, Nagelkerke's quasi R2 = 0.11. Modell 3: χ2 [10] = 10.12, p = 0.43, Nagelkerke's quasi R2 = 0.04. Modell 4: χ2 [13] = 13.32, p = 0.42, Nagelkerke's quasi R2 = 0.05.*

disorder (NDD), mostly ADHD. "Psychosis/bipolar disorder" typically covers severe psychiatric diagnoses. The no SUP/MHP group has slightly higher prevalence of evaluation/observation, anxiety/depression, and NDD, while SUP/MHP group has significantly more diagnoses related to psychosis/bipolar disorder. Analysis shows overrepresentation of severe mental illness like psychosis/bipolar disorder in the co-occurring conditions group (SUP/MHP).

Risk Factors Predicting Psychiatric Conditions

Table 4 presents specific risk factors predicting psychiatric conditions at the third-year follow-up for the outcome groups MHP and SUP/MHP. The outcome group MHP consists of adolescents who only have indications of MHP at the third-year follow-up (i.e., indications of SUP are not present). Conducted analyses showed that the risk factors school problems and depression had significant predictive values in both Model 1 without control variables and in Model 2 with included control variables. The two control variables, gender (female) and low frequency of use for the primary drug (i.e., one day per week or less) at the start of treatment, also had significant values in Model 2. These mentioned models are significant but have a relatively low proportion of explained variance in the model.

The outcome group SUP/MHP consists of the specific group of adolescents who, at the three-year follow-up, have indications of both SUP and co-occurring MHP conditions. From the conducted analyses, it appears that placement in foster care or an institution, as an individual risk factor, has a predictive effect in Model 3 without control variables and in Model 4, which included control variables. The control variables did not show any significant effect in these analyses.

Cumulative risk

A high cumulative risk indicates that an adolescent has an accumulation of risk factors, while a lower cumulative risk means that the youth has only a few risk factors. In the following conducted analyses, the cumulative effect is tested in relation to the same outcome groups as in the previous analyses of individual risk factors, see Table 5.

The results also revealed a significant and substantial cumulative effect for the MHP group (indication of MHP) in Model 5 without control variables and in Model 6 with control variables. Furthermore, the analysis showed that the control variables gender (female) and low frequency of use for the primary drug had significant values. Model 6 is significant, but it also has a relatively low value in terms of explained variance. For the outcome group with a co-occurring condition (SUP/MHP) at the three-year follow-up, a significant cumulative effect was found in Model 7 for adolescents with 6-10 risk factors when the treatment contact began. In Model 8, where the control variables were added, there is no significant effect for the cumulative risk groups. The control variables also did not show any significant values.

Discussion

Young people dealing with SUP represent a subgroup that is expected to experience a heightened level of MHP. This intersection of SUP and MHP underscores the complexity and urgency of addressing the health of this group of young people. Therefore, the study goals included a) acquiring

TABLE 5. Odds ratios and confidence intervals for the association between adolescent cumulative risk in relation to the outcome group Mental Health Problems (MHP) and Substance Use Problems (SUP) three years after initiated treatment (N=451).

Cumulative risk	*no SUP/MHP* OR (95 % CI)	*SUP/MHP* OR (95 % CI)
	Model 5	*Model 7*
0-2 risk factors (31%) Ref	1	1
3-5 risk factors (49%)	1.85 (1.03-3.34)*	1.69 (0.84-3.43)
6-10 risk factors (21%)	2.53 (1.29-4.97)**	2.25 (1.01-5.00)*
	Model 6	*Model 8*
0-2 risk factors (31%) Ref	1	1
3-5 risk factors (49%)	1.93 (1.05-3.55)*	1.61 (0.78-3.30)
6-10 risk factors (21%)	2.74 (1.33-5.64)**	2.09 (0.89-4.90)
Covariates		
Sex	1.78 (1.08-2.93)*	1.45 (0.81-2.60)
Age	1.02 (0.92-1.12)	0.95 (0.85-1.07)
Primary drug use frequency at intake	0.47 (0.28-0.78)**	1.09 (0.92-1.29)

*Note. *p < 0.05, **p < 0.01. Model 5 and 7 includes the level of cummulative risk, Model 6 and Model 8 includes both the level of cumulative risk but also includes sex, age and primary drug use frequency at intake. Model 5: χ2 [2] = 7.98, p = 0.02, Nagelkerke's quasi R2 = 0.03. Model 6: χ2 [5] = 21.39, p = 0.00, Nagelkerke's quasi R2 = 0.07. Model 7: χ2 [2] = 4.24, p = 0.12, Nagelkerke's quasi R2 = 0.02. Model 8:(χ2 [5] = 7.09, p = 0.21, Nagelkerke's quasi R2 = 0.03.*

knowledge about the prevalence of ongoing SUP and MHP in adolescents who have undergone outpatient treatment at a specialized substance use clinic, three years post-treatment initiation, and b) investigating psychosocial risk factors that distinguish adolescents with solely MHP from those with both mental health and persistent SUP (co-occurring problems) three years post-treatment initiation.

Our results show that the most commonly occurring mental health diagnoses among young people, based on both self-reported information and registry data, are anxiety, depression, and ADHD. This ranking aligns largely with other studies (e.g., 18). Nearly three-quarters of youth enrolled show no ongoing SUP and one-third of youth showed indications of MHP three years after initiating treatment. Indeed, studies suggest that it is more the rule than the exception for young people with alcohol and drug problems to also exhibit co-occurring psychosocial problems (11,14-15,18, 58). Other studies suggest that mental health issues may persist even when substance use is reduced (59-61). In addition, MHP, including outpatient care and prescriptions for psychiatric conditions were significantly more common among young women than young men. One explanation for the prevalence of MHP after substance use treatment is that Maria clinics, which rely on close collaboration between social services and healthcare, also facilitate possible contact with psychiatric care. Despite national guidelines emphasizing integrated treatment for co-occurring conditions (62), this still appears too infrequently (63-64). Another explanation is that the youth themselves seek psychiatric care to obtain adequate help and support, maybe due to less stigmatization linked to MHP and therapy. A third hypothesis is that it is easier to receive help for MHP when SUP have been addressed (e.g., 13). Our understanding from the results is also that MHP seem to linger a lot longer than SUP which indicate that treatment for MHP is a longer lasting and time-consuming project.

Predictive risk factors for adolescent mental health and substance use problems

The findings of the present study indicate that the risk factors diverge when distinguishing adolescents with MHP from those with both MHP and SUP three years post-treatment. Indeed, experience of school problems and depression, as well as being female and reporting low frequency of use for the primary drug increased the likelihood of exhibiting MHP even when SUP are not evident (i.e., no SUP/MHP group). The association between school problems, SUP, and MHP is well-known in previous research (65-68). Self-reported depression is prevalent across the entire study group and serves as a risk factor that can impact the outcome of continued mental health issues. Depression often has a protracted course of illness and may involve long-term treatment with antidepressant medications (69). This is noteworthy, as previous longitudinal studies have shown that youth with depression are at an increased risk of both suicide and poor labor market integration later in life (70). As the prevalence of mental health issues is generally higher for women than men in Sweden (2,71) it is not surprising that also gender seems to be a significant risk factor for MHP three years after outpatient treatment. Furthermore, the results show that less severe SUP (primary drug use frequency at treatment start) are also linked to the MHP group and continued MHP. This could be discussed considering the self-medication hypothesis (72), which suggests individuals may use substances like alcohol or drugs to alleviate symptoms of mental illness or emotional distress. Interestingly, the only predictive risk factor for co-occurring MHP and SUP three years after outpatient treatment (i.e., SUP/MHP group) was placement in foster care or in an institution. Placement in residential care indicates a significant degree of severity concerning basic care deficiencies and social vulnerability. Children and young placed in residential care are at considerably greater risk of experiencing both mental and social problems later in life (57).

The cumulative effect predicting MHP at the three-year follow-up was evident for the no SUP/MHP group. Six or more risk factors, out of 10 in total, were linked to almost a three-time risk of MHP over time. These results support the cumulative risk assumption with higher psychosocial risk load at treatment start predicts more or continued MHP. This was especially evident for females and, interestingly, higher primary drug use frequency at intake seems to reduce the risk of MHP over time. How this quite surprisingly finding could be explained might relate to the heterogeneity of the group and complexity when SUP, and MHP are studied parallel. The primary drug use frequency might be more linked to a severe SUP and substance dependency solely. More research is indeed needed.

Furthermore, regarding the cumulative effect and co-occurring problems, a corresponding effect is not found for the SUP/MHP group. The lack of cumulative effect on SUP only has been found previously in the project in (73) and even though prior studies on the target population have indicated a cumulative effect for risk factors on continued SUP before (23,74). The weak predictive effect could have various possible explanations, such as the prediction strength diminishing over time or other risk factors not captured during treatment admission being more critical than those analyzed. It may also be that the

predictive effect gradually diminishes due to what is known as regression to the mean—in other words, some young individuals might be in the early stages of SUP when treatment begins, while others with more extensive SUP may make greater progress over time (42).

Strengths and limitations

The attrition analyses show that our study group has a larger proportion of girls and a somewhat larger psychosocial burden and serious SUP (23). This is quite uncommon as participants with more serious problems tend to opt out (55). The positive results should be interpreted with some caution since the current registries do not capture adolescents who may "fly under the radar" and possibly continue their problematic substance use without having any contact with the relevant clinics, healthcare, or the legal system. On the other hand, this type of information also includes a degree of overestimation, as occasional visits to, for example, outpatient care may indicate ongoing SUP or MHP, even if the youth seek care for a temporary setback or crisis where certain support has been resumed. Registry data can thus be an indication of both the need for new care for a psychiatric condition and the need for ongoing care, such as follow-up support and/or medication. In this context, the indication can be seen as both positive and negative.

The current study is part of a research project on outpatient treatment of adolescents with SUP in a naturalistic context, where longitudinal follow-up has occurred over three years. Combining data from structured interviews at baseline and multiple registry sources at follow-up provides reliable data and can be an innovative methodology to address the attrition issues that are otherwise common. However, a limitation of registry follow-up is that certain key variables are not found in registries, such as frequencies of continued drug use, something that is difficult to capture in longitudinal studies in general (41). However, a strength is that the adolescents represent Maria clinics from several different cities, contributing to increased generalizability concerning adolescents in Swedish outpatient care.

Clinical Significance

We see implications of the study for practice and research concerning both preventive efforts and treatment content. As evident from the study's results, Maria clinics appear to address a significant portion of adolescents' needs for assistance and support with their SUP. However, for a relatively large group, MHP persist. Since females are overrepresented among adolescents with ongoing MHP, and generally bear a greater burden of psychosocial risk factors than men, they are likely to need multidimensional and more extensive treatment interventions that span a longer period (cf. 22,75). It is particularly important to consider challenging upbringing conditions, traumas, and the MHP that many of them carry (75-77). Adolescents with experience of foster care or institutional care should receive extra attention since their social network is expected to be vulnerable, and the MHP are generally more widespread and complex in this group (57).

Adolescents with co-occurring conditions are at risk of being "passed around" between different healthcare providers without receiving relevant help for their problems (18). This group is particularly highlighted regarding deficiencies in coordination between social services, school health, and healthcare (63). Integrated treatment generally has strong scientific support for addressing this co-occurring issue (14,17,62). However, this type of treatment is offered to an insufficient extent in Sweden (68). The Maria clinics are an example of a facility that can offer integrated treatment. However, there is a need for more facilities of this kind (64,78).

Given that a large proportion of the female patients at the Maria clinics have faced difficulties in school and have been subjects of previous contacts with child and adolescent psychiatry due to MHP, it should also be possible to address and identify SUP in these arenas to offer more relevant support at an earlier stage. Early interventions through student health services, as well as social and educational support in schools to enhance the well-being of children and adolescents and prevent serious mental health issues, are crucial for positive development (79).

It is also crucial that the adolescents are provided with opportunities for social inclusion and support for meaningful engagement in activities during their leisure time, in addition to assistance in addressing both SUP and MHP. This becomes evident since the majority of the youth in present study have or have had issues with school. The transition to adult roles and opportunities for further education or employment, along with changes in social belonging, is also associated with reduced MHP and SUP (19).

Conclusions

The study indicates that while nearly three-quarters of youth enrolled show no ongoing SUP three years after starting treatment, around one-third still face persistent mental health challenges or co-occurring MHP and SUP. It's crucial to address the competency needs of health care providers at Maria clinics, as much of the clinical work extends beyond SUP only, requiring integrated treatment for co-occurring conditions and close collaboration with social, healthcare, and psychiatric services. Youths seeking outpatient care at Maria clinics represent a

diverse group with varied needs. Gender disparities are evident, with females showing more risk factors at treatment initiation and a higher prevalence of psychiatric issues at the three-year follow-up compared to males. Despite greater psychosocial burden, females tend to exhibit better outcomes regarding SUP. Future studies could benefit from incorporating sex-differentiated risk factors, as certain risk factors appear to be gender-specific, or at least associated with biological sex. The cumulative effect of MHP appears more prevalent than that of co-occurring SUP and MHP, while the cumulative effect of SUP diminishes over a three-year period. Integrated outpatient clinics like Maria clinics could play a crucial role in early detection and management of both SUP and MHP. The analysis suggests some hope, indicating that even individuals with heavy risk loads or severe SUP may experience positive outcomes regarding substance use.

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Conflict of interest
The authors declare no conflict of interest.

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