




Risk Factors for Suicide Reattempt among Adolescents and Young Adults: The Role of Psychiatric Disorders

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Abstract

Suicidal behaviour among young people is a serious public health concern. Each suicide attempt is related to further suicide attempts and completed suicide. This study aims to explore risk factors associated with repeated suicide attempt among adolescents and young adults. The cohort included 510 patients aged 12–29 years residing in Piedmont Region in North-Western Italy, who had been admitted to hospital or emergency department with a diagnosis of suicide attempt between 2010 and 2020. Cox regression models were used to evaluate potential risk factors for repeated suicide attempt. During the 11-years follow-up, 20.6% of adolescents and young adults repeated suicide attempt, 24.8% of females and 12.3% of males. Nearly 90% of youth who attempted suicide had a diagnosis of psychiatric disorder. After adjustment, younger age of onset of suicidal behaviour, and diagnosis of schizophrenia, bipolar disorder, depressive disorder, anorexia nervosa and personality disorder were significantly associated with repeated suicide attempt. The early identification of patients at higher risk of repetition of suicidal behaviour is of crucial importance. Better understanding of risk factors and effective treatment of mental disorders could help suicide prevention to reduce the burden of the problem among young people. Special attention should be paid during the initial months following discharge from hospital or emergency department, when suicide reattempt risk is very high.

Keywords Repeated suicide attempt · Adolescents · Young adults · Psychiatric disorders · Italy

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Introduction

Suicidal behaviour among young people is a serious public health concern. A first suicide attempt is related to further suicide attempts and completed suicide, that is currently the fourth leading cause of death in young people aged 15–29 years worldwide [1–3]. In 2020, the suicide rate among youth aged 15–19 years was 3.98 per 100,000 across 27 European countries [4]. Adolescence and young adulthood are a critical time for the onset of suicidal behaviour, particularly the ages between 12 and 16 years [5, 6]. Furthermore, young people who attempt suicide are at increased risk for later mental and physical health problems, but also for violence, loneliness and lack of life satisfaction [2]. Although some studies reported stable or declining trends of suicide deaths in European countries until 2016 [7, 8], the rate of attempted suicides has increased over time among adolescents and youth in Europe and USA [9–11]. The prevalence of suicide attempts among adolescents varies between 2% and 23% across studies, and that of reattempts between 4% and 39% [1, 2, 5, 6, 11–24]. The risk of repetition is highest within the first year following the first attempt episode [1, 6, 25].

Repeated suicide attempt is related to several factors among young people. First of all, a history of suicide attempt is a recognized independent predictor of repetition [1, 21, 24]. Among sociodemographic characteristics, female gender and low socioeconomic status were shown to be correlated with repeated suicide attempts [14, 19]. In terms of family environment, not living with both parents, poor family functioning and low parental support were associated with attempts [14, 19, 26]. Moreover, the risk of suicidal recurrence increased with substance use, sexual risk taking, weight problems, sedentary behaviour, and sleep problems, and was higher among patients with history of sexual abuse, physical assault, aggression, violence, and bullying victimization [12, 14, 19, 27, 28]. Finally, depressed mood, hopelessness, loneliness and not having close friends were also shown to be correlated with reattempts [12, 19, 25, 28].

Mental health problems that can emerge during this developmental period may indeed exacerbate vulnerability to suicidal behaviour. The risk of suicide reattempt is higher among youth with psychiatric disorders such as psychotic disorders, personality disorders, mood disorders, depressive disorder, drug and alcohol abuse and anxiety disorder [20, 23, 25, 28, 29]. The risk is higher in the presence of more than one disorder [25]. Timely and accurate identification and treatment of co-occurring mental health disorders is therefore important to limit the risk of suicidal behaviour among young people, especially when other risk factors are present.

Moreover, most young people who attempt suicide do not repeat it, therefore risk factors associated with repetition may differ from risk factors associated with the first unique episode of suicide attempt. Consequently, the identification of specific factors for repetition of the suicide attempt can be of high importance for practitioners, whilst there is a paucity of recent studies on this topic.

In our cohort study conducted on patients admitted to hospital or emergency department (ED) for suicide attempt, one third of the sample was of young age [30]. Due to worrisome rate of suicidal behaviour among youth in our study, the identification of factors associated with repetition of suicide attempt appear to be important to allow prevention actions and avoid negative outcomes in the subgroups at higher risk. Based on these considerations, the present study was conducted to explore risk factors for repetition of suicide attempt among

adolescents and young adults admitted to hospital or ED for suicide attempt in Piedmont region, North-West Italy, between 2010 and 2020.

Methods

Study Sample

The cohort included 510 youth aged 12–29 years residing in Piedmont, a region of 4.4 million inhabitants in North-Western Italy, who were admitted to hospital or ED for a suicide attempt between 1st January 2010 and 31st December 2020.

Suicide attempt was defined according to the International Classification of Diseases, 9th Revision (ICD-9), as recorded at hospital or ED discharge: suicide and self-inflicted injury (E950-E959), injury undetermined whether accidentally or intentionally inflicted (E980-E989), and suicidal ideation (V62.84).

All patients who had at least one episode of suicide attempt during the study period were included in the cohort. In case of more than one episode of suicide attempt, the first episode that occurred during the study period was used to define the patients' date of entry into the cohort. In order to allow record-linkage of administrative and health data, only individuals who resided in Piedmont at the time of ED or hospital discharge were considered. Patients were followed until death, emigration, or the end of the study. Follow-up began on the date of discharge from the hospital or ED. All patients were followed up longitudinally for up to 11 years, i.e., follow-up ended on 31st December 2020.

Data Collection

Information on the study patients was collected by linking administrative and health data from the Piedmont Longitudinal Study. Linkage of the data archives was performed using an anonymous identification code under the frame of the National Statistical Act, which legitimates the use and linkage of data for scientific purposes without the need of an Ethical Committee approval.

The following data sources were used: 2011 Population Census of the Piedmont Region and the NHS Regional Population Registry for socio-demographic characteristics; hospital discharges and ED databases for health-related conditions and diagnoses; the Pharmaceutical Prescription Register for drugs purchased at pharmacies under medical prescription. Information on life status (dead/alive) was extracted from the NHS Regional Population Registry available for 2010–2020 years.

Measures

The following socio-demographic characteristics have been extracted: gender, date of birth, age at the index episode of suicide attempt, citizenship, country of birth, deprivation index at the census area, type of family household and crowded household. Area deprivation index was based on five conditions describing social and material deprivation measured at the census section level: % of population with low education, % of unemployed, % of population living in rented houses, in crowded households, and in single-parent families. The area

deprivation index was then categorized in quintiles (1st=lowest to 5th=highest deprivation) [31].

Psychiatric disorders were coded according to the International Classification of Diseases, 9th Revision (ICD-9): schizophrenia [schizophrenic disorders (295-295.95), other non-organic psychosis (297-298.9)]; bipolar disorders (296.0-296.16, 296.4-296.81, 296.89); anorexia nervosa (307.1); personality disorders (301-301.9); depressive disorders (296.2-296.36, 300.4, 311); drug and alcohol dependence (291-292.9, 303-305.93); anxiety disorders (300.0-300.3, 300.5-300.9); adjustment disorders [adjustment reaction (309.0-309.9), acute reaction to stress (308-308.9)]. A mutually exclusive categorisation of psychiatric diagnosis was used applying the following hierarchy: schizophrenia, bipolar disorders, anorexia nervosa, personality disorders, depressive disorders, drug and alcohol dependence, anxiety disorders, adjustment disorders and none.

The following physical illnesses were studied, according to the International Classification of Diseases, 9th Revision (ICD-9): HIV (042); malignant neoplasm (140-208.91); pain (307.8-307.89); neurological disorders (332-332.1, 333-336.9, 340, 345-345.91, 346-346.91, 350-359.9); diabetes mellitus (250-250.93); cardiovascular diseases (401-405.99, 410-414.9, 430-438.9); chronic obstructive pulmonary disease (490-496); dorsopathies (720-724.9); intracranial injury (850-854.19) and skull fracture (800-804.99). Additionally, a variable of any physical illness was created summing up all the diagnoses and analysed as dichotomous (yes/no).

We considered two groups of medications from the Anatomical Therapeutic Chemical (ATC) Classification System: antipsychotics (N05A) and antidepressants (N06A). A variable of lifetime prescription of any antipsychotic and antidepressant drug was created and analysed as dichotomous (yes/no).

The hospital admission for a second suicide attempt during the follow-up period was used to create the dichotomous outcome variable of repeated suicide attempt (yes/no).

Statistical Analysis

The outcome under study was the first repeated suicide attempt within the 11 years of follow-up.

Descriptive statistics was used to describe socio-demographic characteristics and health status of the study population.

Cox regression models were built to identify potential risk factors for repeated suicide attempt. For each patient in the cohort, person-years have been calculated starting from the year of the index episode of attempted suicide to the year of first-time repeated suicide attempt, death or the end of follow-up. Gender, age, citizenship, country of birth, area deprivation index at the census level, type of family household, crowded household, psychiatric disorders, antidepressants, antipsychotics and physical illnesses were evaluated as factors associated with repeated suicide attempt in unadjusted Cox regression models. For regression analysis purposes, the variable psychiatric diagnosis was recategorized by merging the diagnoses “drug and alcohol dependence”, “anxiety disorders”, “adjustment disorders” and “none” into a unique category as a reference level.

The statistically significant variables were then selected to build a multivariate regression model (gender, age, psychiatric disorders and antipsychotics). Proportional hazard assumption was assessed through Schoenfeld residuals and Kaplan-Meier analysis. The propor-

tional hazard assumption was satisfied for all variables. Collinearity between variables was also checked.

All the analyses were performed by using STATA 17 statistical software [32].

Results

Descriptive Statistics

Socio-demographic and clinical characteristics of the study sample are shown in Table 1. A total of 510 adolescents and young adults were admitted to hospital or ED for a suicide attempt during the study period, 339 (66.5%) females and 171 (33.5%) males. The mean age was 18.3 (\pm 4.8) years, males being older than females (20.6 vs. 17.2, $p < 0.001$). About 57% of patients were 12–17 years old at the time of the index episode. Male patients were over-represented in 18–29 age group, whereas females prevailed in 12–17 age group. About 70% of sample were Italian citizens, 81% were born in Italy (82.3% of females vs. 79.5% of males, $p = 0.047$), 54% lived in families who owned a house, 62% lived in not-crowded households.

About 87% of patients had a record of psychiatric disorder. Schizophrenia (23.1%), personality disorder (22.0%) and depressive disorder (13.9%) were the most prevalent diagnoses. A greater proportion of males was diagnosed with schizophrenia (27.5% vs. 20.9%) and drug and alcohol dependence (7.0% vs. 5.0%), whereas anorexia nervosa (7.1% vs. 0), depressive disorder (15.0% vs. 11.7%) and anxiety disorder (8.6% vs. 4.7%) were more prevalent among females ($p = 0.005$). About 41% and 47% of patients had a prescription of antipsychotics and antidepressants, respectively. About 37% of patients had a diagnosis of any physical illness. Neurological disorders were more prevalent among females (7.7% vs. 2.9%, $p = 0.034$), whereas skull fracture among male patients (10.5% vs. 2.7%, $p < 0.001$).

During the observation period, 20.6% of patients repeated suicide attempt (12.3% of males vs. 24.8% of females, $p = 0.001$), 6.9% ($n = 35$) repeated suicide attempt more than once (3.5% of males vs. 8.6% of females, $p = 0.004$), and 1.2% died (2.9% of males vs. 0.3% of females, $p = 0.009$). All repeated suicide attempts occurred within the 3 years following the index episode and no reattempts occurred afterwards. About 91% of hospital or ED readmissions for suicide attempt occurred within the first year. About 57% occurred in the 3 months following the index admission, and 20% in the time interval between 4th and 6th month following the index attempt.

The rate of repeated suicide attempt was particularly high between 12 and 16 years of age (28–35.2%), with the peak at age of 16, and declined afterwards into the early 20s and through 20s (Fig. 1). The rates of reattempt among females are at highest between 14 and 16 years of age, whereas among males between 12 and 13 years. In terms of psychiatric diagnosis, 42.3% of suicide repetitions were observed among patients with bipolar disorder (52.9% of females and 22.2% of males), and 33.3% for anorexia nervosa (only females) (Fig. 2). Rates of 25% were found for depressive disorders (23.5% of females and 30% of males), personality disorder (30.7% of females and 13.5% of males) and schizophrenia (33.8% of females and 12.8% of males), whereas 16% for adjustment disorder (only females) and 10.8% for anxiety disorders (6.9% of females and 25% of males).

Table 1 Characteristics of adolescents and young adults admitted to hospital or emergency department for suicide attempt, Piedmont Region 2010–2020, by gender

Characteristics	Overall (N=510)		Males (N=171)		Females (N=339)		p-value
	N	%	N	%	N	%	
Age (years)							
Mean ± SD	18.3 ± 4.8		20.6 ± 5.0		17.2 ± 4.3		<0.001
Age (years)							
12–14	122	23.9	22	12.9	100	29.5	<0.001
15–17	172	33.7	36	21.1	136	40.1	
18–20	58	11.4	27	15.8	31	9.1	
21–29	158	31.0	86	50.3	72	21.2	
Citizenship							
Italian	367	72.0	123	71.9	244	72.0	0.605
Foreign	65	12.7	19	11.1	46	13.6	
Missing	78	15.3	29	17.0	49	14.4	
Country of birth							
Italy	415	81.4	136	79.5	279	82.3	0.047
Abroad	92	18.0	32	18.7	60	17.7	
Missing	3	0.6	3	1.8	0	0.0	
Area deprivation index							
1 quintile (lowest deprivation)	81	15.9	27	15.8	54	15.9	0.502
2 quintile	87	17.1	35	20.5	52	15.3	
3 quintile	101	19.8	28	16.4	73	21.5	
4 quintile	90	17.7	29	17.0	61	18.0	
5 quintile (highest deprivation)	72	14.1	22	12.9	50	14.8	
Missing	79	15.5	30	17.5	49	14.5	
Type of family household							
Ownership	278	54.5	90	52.6	188	55.5	0.610
Rent	122	23.9	42	24.6	80	23.6	
Other	30	5.9	8	4.7	22	6.5	
Missing	80	15.7	31	18.1	49	14.4	
Crowded household							
No	316	62.0	102	59.6	214	63.1	0.574
Yes	119	23.3	40	23.4	79	23.3	
Missing	75	14.7	29	17.0	46	13.6	
Psychiatric disorders diagnosis							
Schizophrenia	118	23.1	47	27.5	71	20.9	0.005
Bipolar disorder	26	5.1	9	5.3	17	5.0	
Anorexia nervosa	24	4.7	0	0.0	24	7.1	
Personality disorder	112	22.0	37	21.6	75	22.1	
Depressive disorder	71	13.9	20	11.7	51	15.0	
Drug and alcohol dependence	29	5.7	12	7.0	17	5.0	
Anxiety disorder	37	7.3	8	4.7	29	8.6	
Adjustment disorder	25	4.9	8	4.7	17	5.0	
None	68	13.3	30	17.5	38	11.2	
Antipsychotics							
No	298	58.4	102	59.6	196	57.8	0.692
Yes	212	41.6	69	40.4	143	42.2	
Antidepressants							

Table 1 (continued)

Characteristics	Overall (N=510)		Males (N=171)		Females (N=339)		p-value
	N	%	N	%	N	%	
No	270	52.9	97	56.7	173	51.0	0.224
Yes	240	47.1	74	43.3	166	49.0	
Physical illnesses							
No	319	62.6	103	60.2	216	63.7	0.443
Yes	191	37.4	68	39.8	123	36.3	
Malignant neoplasms (yes vs. no)	5	1.0	2	1.2	3	0.9	0.758
HIV (yes vs. no)	1	0.2	1	0.6	0	0.0	0.159
Pain (yes vs. no)	59	11.6	24	14.0	35	10.3	0.216
Neurological disorders (yes vs. no)	31	6.1	5	2.9	26	7.7	0.034
Diabetes Mellitus (yes vs. no)	8	1.6	5	2.9	3	0.9	0.080
Cardiovascular diseases (yes vs. no)	24	4.7	12	7.0	12	3.5	0.080
Chronic obstructive pulmonary disease (yes vs. no)	17	3.3	9	5.3	8	2.4	0.085
Dorsopathies (yes vs. no)	71	13.9	23	13.5	48	14.2	0.827
Intracranial injury (yes vs. no)	38	7.5	14	8.2	24	7.1	0.653
Skull fracture (yes vs. no)	27	5.3	18	10.5	9	2.7	<0.001

SD=Standard Deviation

Fig. 1 Rates of repeated suicide attempt among adolescents and young adults admitted to hospital or emergency department, 2010–2020, by age

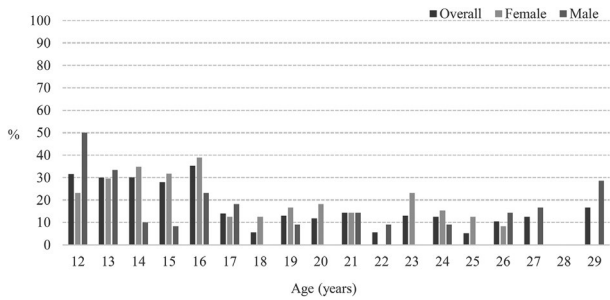
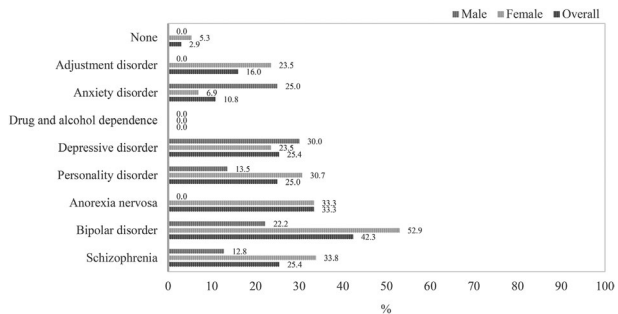


Fig. 2 Rates of repeated suicide attempt among adolescents and young adults admitted to hospital or emergency department, 2010–2020, by psychiatric diagnosis



Cox Regression Models

In unadjusted Cox regression models, female gender, younger age, a diagnosis of schizophrenia, bipolar disorder, depressive disorder, anorexia nervosa, personality disorders, and antipsychotics prescription were significantly associated with the risk of repeated suicide attempt (Table 2).

In multivariate regression model, the age 18–29 years was associated with about 70% lower risk of repeated suicide attempt compared to age 12–14 years (Table 3). Gender lost significance. Psychiatric disorders were associated with repeated suicide attempt, and the risk was highest for youth diagnosed with bipolar disorders (HR 7.10, 95%CI 2.91–17.33), followed by personality disorders (HR 5.11, 95%CI 2.38–10.97). The diagnosis of anorexia nervosa (HR 4.32, 95%CI 1.61–11.56), depressive disorder (HR 4.02, 95%CI 1.83–8.80) and schizophrenia (HR 3.88, 95%CI 1.76–8.56) were associated with about four times increased risk of repetition. Antipsychotics prescription lost its significance.

Discussion

We conducted a cohort study by linking health and administrative data of the Piedmont Region and following prospectively 510 adolescents and young adults admitted to hospital or ED for suicide attempt between 2010 and 2020. To our knowledge, this is the first study to investigate risk factors for repeated suicide attempt among adolescents and young adults in a large 11-year cohort in Italy. In our study, younger age and psychiatric disorders were significantly associated with the risk of repeated suicide attempt. The rate of repetition was highest within the 3 months following the index attempt episode.

In line with previous studies, more female than male adolescents and young adults attempted suicide [5, 6, 9, 11, 14, 18, 20, 24, 33–36]. A gender difference in suicide attempts according to age was also observed, i.e., males were significantly more prevalent in young adult's group, whereas females in adolescent's group, similar to a higher mean age for males than females observed in previous studies [20, 37]. In regards to age, a higher number of 12–17 year-olds than 18–29 year-olds attempted suicide.

A majority of study patients (nearly 90%) had a diagnosis of psychiatric disorders, consistently with what reported elsewhere [20, 23, 24, 27, 29]. A higher prevalence of internalizing disorders, i.e., depression, anxiety disorder and anorexia nervosa were found among females, whereas externalizing disorders, i.e., alcohol and drug dependence were more prevalent among males [20, 35]. Our sample had a high prevalence of pharmacological treatment, with nearly half of patients using antidepressants and antipsychotics, possibly suggesting that a great deal of patients had a severe form of specific disorder.

About 20% of adolescents and young adults had a second access to hospital or ED for repeated suicide attempt in the 3-year span following the index attempt episode, whilst no reattempt occurred afterwards. The repetition rate observed in the present study was similar to 17–21% reported in some studies [1, 21, 23, 27], but lower than what reported in several other studies [20, 22, 24, 25]. These differences may be due to heterogeneity between studies, cultural diversities, methodological differences and duration of follow-up. For example, in our sample 18.8% of patients repeated suicide attempt within 12 months similarly to 17% observed in 1-year span by Groholt et al. (2006) [25]. The rate of repetition was 11.8%

Table 2 Risk factors for repeated suicide attempt among adolescents and young adults admitted to hospital or emergency department: bivariate Cox regression models

Characteristics	Reattempt	PY	Crude HR (95% CI)	p-value
Gender				
Male	21	7288.19	1	
Female	84	11011.54	2.25 (1.40–3.64)	0.001
Age (years)				
Continuous	105	18299.73	0.89 (0.84–0.93)	<0.001
Age (years)				
12–14	37	3261.38	1	
15–17	46	4797.66	0.89 (0.58–1.38)	0.607
18–20	6	2468.93	0.28 (0.12–0.66)	0.004
21–29	16	7771.76	0.28 (0.15–0.50)	<0.001
Citizenship				
Italian	76	13136.14	1	
Foreign	13	2372.51	0.97 (0.54–1.74)	0.906
Missing	16	2791.08	0.99 (0.58–1.71)	0.992
Country of birth				
Italy	90	14244.17	1	
Abroad	15	3804.12	0.71 (0.41–1.23)	0.229
Area deprivation index				
1–2 quintile (lowest deprivation)	33	5090.15	1	
3 quintile	23	4350.57	1.11 (0.65–1.88)	0.711
4 quintile	22	3579.86	1.23 (0.72–2.11)	0.453
5 quintile (highest deprivation)	11	2412.77	0.78 (0.39–1.54)	0.466
Missing	16	2866.38	1.02 (0.56–1.85)	0.948
Type of family household				
Ownership	62	9766.5	1	
Rent	26	4509.72	1.14 (0.71–1.83)	0.584
Other	8	1187.52	1.40 (0.66–2.94)	0.378
Missing	19	2835.99	1.31 (0.76–2.22)	0.312
Crowded household				
No	71	11360.31	1	
Yes	18	4278.09	0.65 (0.39–1.09)	0.106
Missing	16	2661.33	0.95 (0.56–1.64)	0.867
Psychiatric disorders				
No/Dependence/Anxiety/Adjustment	10	7869.39	1	
Schizophrenia	30	4035.98	4.39 (2.15–8.99)	<0.001
Bipolar disorder	11	689.71	8.47 (3.59–19.97)	<0.001
Anorexia nervosa	8	405.55	6.89 (2.72–17.48)	<0.001
Personality disorder	28	3647.32	4.53 (2.20–9.33)	<0.001
Depressive disorder	18	1651.78	5.00 (2.31–10.85)	<0.001
Antipsychotics				
No	42	11309.09	1	
Yes	63	6990.64	2.11 (1.43–3.11)	<0.001
Antidepressants				
No	46	9424.16	1	
Yes	59	8875.57	1.36 (0.93–2.00)	0.116
Physical illnesses				

Table 2 (continued)

Characteristics	Reattempt	PY	Crude HR (95% CI)	p-value
No	72	10362.73	1	
Yes	33	7937	0.70 (0.46–1.06)	0.088

PY=Person-years; HR=Hazard Ratios; CI=Confidence Interval

Statistically significant results are marked in bold

Table 3 Risk factors for repeated suicide attempt among adolescents and young adults admitted to hospital or emergency department: multivariate Cox regression model

Predictors	Adj HR (95% CI)	p-value
Gender		
Male	1	
Female	1.40 (0.84–2.34)	0.193
Age (years)		
12–14	1	
15–17	0.91 (0.58–1.41)	0.667
18–20	0.26 (0.11–0.64)	0.003
21–29	0.29 (0.16–0.55)	<0.001
Psychiatric disorders		
No/Dependence/Anxiety/Adjustment	1	
Schizophrenia	3.88 (1.76–8.56)	0.001
Bipolar disorder	7.10 (2.91–17.33)	<0.001
Anorexia nervosa	4.32 (1.61–11.56)	0.004
Personality disorder	5.11 (2.38–10.97)	<0.001
Depressive disorder	4.02 (1.83–8.80)	0.001
Antipsychotics		
No	1	
Yes	1.32 (0.85–2.05)	0.224

Adj HR=Adjusted Hazard Ratios; CI=Confidence Interval

Statistically significant results are marked in bold

within the 3 months following the index episode, similarly to 12% reported by Spirito et al. (2003) [26], and then gradually declined afterwards. Since the first months are the period of the highest risk [27], with more than half of reattempts occurred in the three months following the index episode, clinicians and health care workers should carefully assist these frail young patients and their families closely after discharge from the hospital. Continuity of treatment between hospital and outpatient services is of paramount importance.

Female gender was not associated with repeated suicide attempt, similarly to what observed among ESPAD adolescents and elsewhere [14, 20, 21, 24]. Kokkevi et al. (2012) [14] argued that repeated attempts indicate more serious suicidal intent compared to single attempt, and therefore it is expected that female gender is not associated with repetition. It is indeed widely recognized that the rates of completed suicide are higher among males than females, suggesting a more serious intent among males [3, 7].

The rates of suicide reattempt were highest in the adolescence with the peak at the age of 16 and decreased afterwards, similar to the reported trend of suicide attempts observed by Goldston et al. (2015) [34]. In multivariate model, the earlier age of onset of suicide attempt was associated with a significantly higher risk of repetition. Psychosocial and physi-

cal changes, risk-taking behaviours (e.g. substance use, violence), poor family functioning and negative school experiences (e.g. bullying, poor academic performance) that emerge during adolescence may exceed their coping strategies to deal with these challenges and increase the risk for recurrent suicidal behaviour [12, 14, 19, 26, 38]. In addition, psychiatric disorders could exacerbate the risk of involvement in suicidal behaviour. Indeed, psychiatric disorders posed a significant higher risk for repeated suicide attempt in our study and elsewhere [20, 23, 25, 28, 29]. Mental health problems may lead to impaired daily functioning, interpersonal difficulties, psychosocial distress, stigma, social isolation, learning difficulties, emotional and behavioural problems, putting youth at risk during this developmental and vulnerable period of their life. Early detection and treatment are of eminent importance to tackle these issues.

In our sample, mood disorders played an important role as risk condition: bipolar disorders were associated with seven-fold, and depression with four-fold higher risk of repeated attempt [23, 28, 29, 39]. The association of bipolar disorder with suicide risk is well-known: suicide is one of the leading causes of death in bipolar disorders, and patients with bipolar disorder have high rates of fatal and non-fatal suicidal behaviours, also when compared to other psychiatric disorders [40–44]. Suicidal individuals who experience negative affective states may engage in suicidal behaviours to alleviate distress and reduce negative emotions [27, 39]. Indeed, anger, aggressiveness, affect dysregulation, depression-related symptoms (e.g. hopelessness and loneliness) and self-mutilation are conditions closely related with multiple suicide attempts [19, 25, 27, 39]. Moreover, Mirkovic et al. (2020) reported that the higher the score of depression symptoms the lower the positive effect of coping skills on the risk of suicide reattempt among adolescent who attempted suicide in France [24]. Finally, in a large study conducted in Spain, adolescents with bipolar experiences and symptoms were at high risk of suicide, emotional and behavioural difficulties, hyperactivity, and problems with peers, suggesting development of suicide risk prevention strategies focused on these factors [45].

In regards to other psychiatric conditions, it is widely recognized a risk of suicidal behaviour among patients with anorexia nervosa, schizophrenia and personality disorder [46–53]. Our finding adds to the literature and confirms such associations in youth who attempted suicide, i.e., the diagnosis of anorexia nervosa, schizophrenia and personality disorders were associated with four to five times higher risk of recurrent suicide attempt. Anorexia nervosa is often a comorbid diagnosis with depression, and the risk of suicidality among anorexic patients may be especially elevated when depression comorbidity is present [54, 55]. In regards to schizophrenia, our findings are confirmatory of prior study that found increased risk of recurrent suicide attempt among Australian adolescent attempters diagnosed with psychotic disorders [20]. Schizophrenia may cause impaired psychosocial functioning that could lead to severe suicidal outcomes. Finally, the association of personality disorders with suicide reattempt is in line with results of a recent meta-analysis [28]. Previous studies on adolescents with personality disorders found a significant effect of depression, interpersonal difficulties, emotional dysregulation and impulsivity on suicidal behaviour [56, 57]. Moreover, Sekowski et al. (2022) reported that some personality disorder symptoms such as identity disturbance, chronic emptiness, abandonment avoidance and transient paranoia are associated with suicidality [58].

This study has a number of strengths. This is the first longitudinal study investigating risk factors for suicide repetition among youth in a large 11-year cohort in Italy. The sam-

ple included all attempts referred from hospitals and EDs in the region, irrespective of the attempt method used. Several information on the study patients were available from administrative and health registers. However, the study results should be considered also in a light of some limitations. The suicide attempts are potentially underestimated due to misclassified and underreported cases, i.e., those not accessing emergency department or hospital, and those registered with other diagnoses, e.g., accidents. So, the sample may not be representative of all suicide attempts in the regional catchment area but biased toward the most seriously affected cases. The information on some important factors such as personal skills characteristics wasn't available in our dataset, so we were unable to assess the effect of all potential risk factors. Moreover, we did not have information on the severity of psychiatric disease, and consequently we could not adjust for severity. However, we adjusted for the use of psychotropic drugs (antipsychotics), a factor that likely acts as proxy for severity of the disorder, i.e., patients with severe psychiatric diagnosis are more likely to receive psychotropic treatment. Finally, the comparison of results across studies may be difficult due to the ambiguous and inconsistent definition of suicide attempt sometimes including self-injurious acts with and without suicidal intent.

In conclusion, about 20% of adolescents and young adults who attempt suicide also repeat the attempt in the 3-year span. Earlier age of onset of suicidal behaviour and psychiatric disorders were significantly associated with repeated suicide attempt. Due to the well-known strong relation between multiple suicide attempts and completed suicide, addressing risk factors for recurrent suicidal behaviour is of prominent importance in these early onset cases. Better understanding of risk factors and effective treatment of mental disorders could help suicide prevention to reduce the burden of the problem among young people. Special attention should be paid during the initial months following discharge from hospital or ED, when the risk of suicide reattempt is very high.

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Author Contribution Federica Vigna-Taglianti, Roberto Diecidue, Giuseppe Costa, Giuseppe Maina and Gianluca Rosso designed the study. Gian Luca Cuomo extracted the data, performed preliminary analyses and created the dataset. Emina Mehanović and Federica Vigna-Taglianti drafted the paper. Emina Mehanović carried out the statistical analysis. All authors provided critical revision, contributed to and approved the final manuscript.

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Declarations

Ethics standards Linkages among archives of socio-demographic and health data were performed using the anonymous identification code attributed to subjects in the framework of the Piedmont Longitudinal Study. The National Statistical Act legitimates the Piedmont Longitudinal Study to the use and linkage of data for scientific purposes without the need of an Ethical Committee approval.

Conflict of interests Giuseppe Maina is/has been a consultant and/or a speaker and/or has received research grants from Angelini, Boheringer Ingelheim, FB—Health, Janssen, Lundbeck, Otsuka, Innova Pharma. Gianluca Rosso is/has been a speaker and/or consultant from Angelini, Janssen, Lundbeck, Otsuka, Viartis. Other authors declare that they have no conflict of interest.

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