Heterogeneity in the course of suicidal ideation and its
relation to suicide attempts in first-episode psychosis: a
five-year prospective study

Roxanne Sicotte
Université de Montréal  https://orcid.org/0000-0002-3392-423X

Sridy N. Iyer
McGill University  https://orcid.org/0000-0002-8344-4955

Eric Lacourse
Université de Montréal  https://orcid.org/0000-0002-4779-9900

Jean R. Séguin
Université de Montréal  https://orcid.org/0000-0003-3359-6202

Amal Abdel-Baki (✉ amal.abdel-baki@umontreal.ca)
Université de Montréal  https://orcid.org/0000-0003-3333-9652

Research Article

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Abstract

Background

Although the risk of suicide is high in first-episode psychosis (FEP), little is known about the course of suicidal ideation and its relation with suicide attempts.

Aims

To identify five-year trajectories of suicidal ideation and associated factors in FEP and compare how suicide attempts were distributed across these identified trajectories.

Method

This five-year prospective study assessed suicidal ideation, suicide attempts and potentially associated factors through research interviews, chart review and coroner’s reports in 382 FEP patients [mean age = 23.53(SD = 3.61)] admitted to two five-year early psychosis services in Montreal, Canada. Trajectories were identified using a semiparametric mixture model, and associated factors with multinomial logistic regression.

Results

Three suicidal ideation trajectories were identified: low and decreasing (85.08%); early decline, then increasing (7.85%), and persistent suicidal ideation (7.07%). Suicidal ideation prior to admission (OR = 2.85, p < 0.05) and cocaine use disorder (OR = 6.78, p < 0.05) were associated with the early decline, then increasing suicidal ideation trajectory. Persons with prior suicide ideation (OR = 4.33, p < 0.05) and attempts (OR = 8.18, p < 0.001) and alcohol use disorder (OR = 3.63, p < 0.05) were more likely to belong to the persistent suicidal ideation trajectory, and to attempt suicide during follow-up.

Conclusions

Our study highlights heterogeneity in the course of suicidal ideation over five years and the importance of ongoing assessment of suicidal risk in FEP patients, particularly during periods of transition to other services and for patients who persistently report suicidal ideation, as they are more likely to engage in suicide attempts. Patients with factors associated with increased or persistent suicidal ideation trajectories should be targeted for suicide prevention interventions.

Introduction

Persons with psychotic disorders are at high risk of suicide, especially in the early years after the onset of psychosis (1). The rate of suicide in first-episode psychosis (FEP) has been found to be up to 18 times higher than the general population (2). About a third of persons with FEP have experienced suicidal ideation and suicide attempts prior to admission to services (3). The prevalence of suicidal ideation and attempts decreases in the first years following entry into services (3). Nonetheless, suicidal ideation and suicide attempts are major risk factors for death by suicide (4). Some studies have reported little overlap between FEP patients who attempted suicide at service entry...
and those who did so during follow-up (5-7), suggesting that there may be different patient subgroups who attempt suicide. Our recent systematic review concluded that longitudinal studies of suicidal thoughts and behaviors in FEP were limited (3), with only two studies examining the possibility of heterogenous patient subgroups with distinct courses of suicidal ideation (8, 9). A Danish study (n=521) reported three trajectories of suicidal ideation over a three-year period including the year before entry to the two-year program: low-decreasing suicidal ideation (61%), frequent-stable (33%), and frequent-increasing (6%) (8). A Spanish study (n=334) also identified three trajectories of suicidal ideation over a two-year period: non-suicidal ideation (83%), decreasing suicidal ideation (10%), and increasing suicidal ideation (7%) (9). Being a woman (8); and being older, having a longer duration of untreated psychosis and reduced sleep at baseline (9) were associated with trajectories of increasing suicidal ideation. In the Danish study, previous suicide attempts and more severe hallucinations at baseline were associated with the frequent-stable suicidal ideation trajectory. Patients in the frequent-stable and frequent-increasing suicidal ideation subgroups were respectively three and six times more likely to attempt suicide by five years of follow-up.

Studies considering individual variability are essential to better understand the evolution of suicidal thoughts and behaviors and their predictors in FEP, and can help provide tailored interventions to patients at risk of suicide. While suicide risk appears to be particularly high in the first five years after the onset of psychosis (3), these two previous trajectory studies only covered the first two-to-three years. Additional factors that could be associated with the evolution of suicidal ideation were not considered, such as Cluster B personality traits and specific substance use disorders. History of suicide ideation and attempts were not assessed separately (3). The course of suicide attempts throughout follow-up, a major risk factor for suicide, was also not documented.

**Aims**

Addressing these gaps and building on the Danish (8) and Spanish (9) studies, we aimed to identify trajectories of suicidal ideation and their predictors over the five-year period following entry into early intervention services (EIS) for psychosis, while accounting for sociodemographic, clinical, and functioning factors potentially associated with the course of suicidal ideation. As a secondary objective, we aimed to describe and compare the distribution of suicide attempts over the five-year follow-up across the identified suicidal ideation trajectories.

**Method**

**Setting and sample**

This five-year prospective study was conducted in two urban EIS for psychosis in Montreal, Canada affiliated with the University of Montreal: *Programme Premiers Épisodes Psychotiques* covering a population of 340,000 inhabitants in the eastside of the city, and *Clinique Jeunes Adultes Psychotiques*, located downtown and covering a population of 225,000. Both EIS provide five-year treatment based on guidelines for early intervention for psychosis (10) to persons aged 18-30 years with FEP in their respective defined catchment areas. Treatment includes intensive psychiatric follow-up; recovery-oriented case management; needs-informed, developmentally appropriate individual, group and family psychosocial interventions; and support and transition planning to other services at the end of follow-up.

All FEP patients admitted to these two EIS between 2005 and 2013 were invited to participate in the study when their condition was stabilized and their written informed consent sought. To be included, patients had to be between 18 and 30 years, diagnosed with an untreated psychotic disorder (or a psychotic disorder treated for less than one year) according to DSM-IV-TR criteria, and have an adequate understanding of French or English. Patients with moderate to
severe intellectual disability were excluded. To ensure representativeness to the entire sample that entered care in this timeframe, the Director of Professional Services and the Research Ethics Boards of both EIS approved retrospective chart review for all eligible patients, including those who could not be recruited via informed consent procedures (e.g., inability to consent given the severity of their illness, loss of contact with the patient prior to recruitment, etc.). This human subjects study was performed in accordance with the Helsinki Declaration and approved by the Centre de recherche du Centre Hospitalier de l’Université de Montréal and Centre de recherche de l’Institut Universitaire en Santé Mentale de Montréal.

Assessments

Suicidal ideation and suicide attempts

Upon admission, suicidal ideation and suicide attempts that may have occurred during the psychotic episode that led to admission to the EIS were assessed categorically (yes/no) through research interviews by a trained and experienced research assistant. Then, annually for five years, suicidal ideation and attempts within the past year were assessed using the same method. Retrospective chart review was conducted for all patients to determine whether suicidal ideation or attempts had been reported to the treating or hospital team. Coroners’ reports were requested for any FEP patient lost to follow-up to ascertain if any fatal suicide attempt had occurred after loss of contact. Suicidal ideation was defined as any passive or active thoughts of suicide, and suicide attempt was defined as deliberate, self-directed, and potentially dangerous behavior with a clear or ambivalent intent to die from that behavior.

Potential vulnerability factors

Along with several factors considered by previous trajectory studies (8, 9) (sex, age, occupation, functioning, alcohol use disorder, previous suicide attempts), we included other factors that were associated with suicidal thoughts and behaviors in FEP or that yielded conflicting results in our previously published systematic review (cluster B personality traits, clinical illness severity, cannabis, cocaine and amphetamines use disorder assessed separately, previous suicidal ideation) (3).

Socio-demographic characteristics were collected at admission through patient interviews and chart review. History of suicidal ideation and suicide attempt at any time prior to the psychotic episode that led to entry into EIS was assessed retrospectively at admission by patient interviews and chart review.

The Best-Estimate Consensus Method (11), involving a consensus between at least two trained raters (one psychiatry resident and one psychiatrist OR two psychiatrists) based on all available information, was used at baseline to determine the DSM-IV-TR diagnosis of psychotic disorder, the presence of Cluster B personality traits, the diagnosis of alcohol use disorder using the Alcohol Use Scale (12), and the diagnosis of cannabis, cocaine or amphetamines use disorder using the Drug Use Scale (12); and to score the Social and Occupational Functioning Assessment Scale (13) and the Clinical Global Impression of illness severity (14).

Statistical analyses

Trajectory analyses included persons with no missing data on selected predictors and with at least three time points with valid data for suicidal ideation.

First, using a semiparametric group-based approach with a SAS based procedure, PROC TRAJ, individual trajectories for suicidal ideation were identified (15). A binary logit distribution was used to identify distinctive clusters of individual trajectories over five years. To determine the optimal number of groups, one- to four-class models were
fitted to the data. Based on clinical utility of the model, the *Bayesian information criterion* (BIC), and the *Akaike information criterion* (AIC), the best-fitting model was selected. Lowest BIC and AIC values indicate the best fit. For each trajectory group, the appropriate shape (i.e., linear, quadratic, cubic) was determined based on the same fit estimates.

Second, each person's most likely trajectory, as determined by the posterior probabilities of membership in each trajectory group generated directly by PROC TRAJ, was extracted and added as a variable to the initial dataset.

Third, we identified factors associated with membership in suicidal ideation trajectories using the Statistical Package for Social Sciences (SPSS, v.27.0.1). We compared trajectory groups on each potential vulnerability factor using chi-square tests or ANOVAs. For significant factors, we performed post hoc analyses with Bonferroni correction for multiple comparisons to identify which group showed significant difference. To avoid excluding potentially important covariates, we then integrated all factors simultaneously into a multivariate multinomial logistic regression to assess factors associated with trajectory membership. Finally, we compared the frequencies of suicide attempts by trajectory membership using chi-square tests.

**Results**

Among all 567 eligible patients admitted to the two EIS, 382 had valid data for at least three time points for suicidal ideation and for selected factors and were therefore included in our study (Table S1 for details on reasons for missing data). Characteristics of the final sample are presented in Table 1. The mean age of our sample was 23.53 years, 78.01% were male, 63.52% had a schizophrenia-spectrum disorder, 26.18% an affective psychosis, and 10.47% another type of psychosis (i.e., brief psychotic disorder, delusional disorder or psychotic disorder not otherwise specified). A history of suicidal ideation and suicide attempts prior to EIS entry was reported by 26.96% and 8.90% of patients, respectively.

**Table 1. Baseline characteristics of the study sample and bivariate comparisons by suicidal ideation trajectory membership**
As shown in Table S2, compared with those excluded, included patients were more likely to be unemployed or not studying and have a primary diagnosis of schizophrenia-spectrum disorder vs. “other psychoses”; and less likely to have a cocaine use disorder at admission.

Seven persons died by suicide during follow-up (Table S3 for details), five of whom had to be excluded because they had less than three time points with valid data for suicidal ideation (n=4) or had missing data on the selected factors (n=1). The median time between admission to services and suicide was 11 months.

Suicidal ideation trajectories

Trajectories for suicidal ideation are shown in Figure 1. The best fitting model included three different classes. Fit estimates that supported model selection are presented in Table S4. Although the three-class model was associated with slightly higher BIC values than the two-class model, it allowed for the detection of the early decline, then...
increasing suicidal ideation trajectory which deserves to be examined for its clinical implications. In contrast, the four-class model only added a trajectory very similar to the low and decreasing one and had higher BIC and AIC values.

The first group, including most patients (n=325, 85.08%), followed a trajectory of low and decreasing probability of presenting suicidal ideation. The second group, (n=30, 7.85%), followed a trajectory of early decline, then increasing suicidal ideation. The probability of presenting suicidal ideation at admission was moderately high for this group (≈30%) followed by an absence of suicidal ideation until the last two years of follow-up where the probability increased again to about 45%. The third group (n=27, 7.07%) followed a trajectory of persistent suicidal ideation where the probability of having suicidal ideation at entry into services was moderately high (≈35%) and increased to about 70% between the first and third year of follow-up and then decreased in the last year of follow-up to nearly 40%.

Factors associated with trajectory membership

Bivariate analyses

As presented in Table 1, patients in the persistent suicidal ideation trajectory were more likely to have an alcohol use disorder at admission and to have attempted suicide prior to admission than those in the low and decreasing suicidal ideation trajectory.

Multinomial logistic regression

The low and decreasing trajectory group was used as the reference category. Having a history of suicidal ideation prior to admission and a cocaine use disorder at baseline significantly increased the odds of belonging to the early decline, then increasing suicidal ideation trajectory by 2.85 [95% CI=1.23-6.63] and 6.78 times [95% CI=1.08-42.75], respectively, compared to the low and decreasing group (Table 2). History of suicidal ideation and suicide attempts were the factors most strongly associated with membership in the persistent suicidal ideation trajectory compared with the low and decreasing suicidal ideation trajectory. Alcohol use disorder at admission was also associated with belonging to the persistent suicidal ideation trajectory as compared to the low and decreasing suicidal ideation trajectory.

Table 2. Multinomial logistic regression: factors associated with suicidal ideation trajectory membership
### Early decline and increasing suicidal ideation

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE</th>
<th>p-value</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
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<td>.453</td>
<td>.116</td>
<td>.491</td>
<td>.202-1.192</td>
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<td><strong>Age</strong></td>
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<td>.059</td>
<td>.389</td>
<td>.951</td>
<td>.848-1.066</td>
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<td>.416</td>
<td>.281</td>
<td>1.565</td>
<td>.693-3.533</td>
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<tr>
<td><strong>Cluster B personality traits or disorder</strong></td>
<td>-.892</td>
<td>.553</td>
<td>.107</td>
<td>.410</td>
<td>.139-1.213</td>
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<tr>
<td><strong>Clinical illness severity-CGI</strong></td>
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<td>.319</td>
<td>.367</td>
<td>1.333</td>
<td>.714-2.489</td>
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<tr>
<td><strong>Social and Occupational Functioning- SOFAS</strong></td>
<td>-.004</td>
<td>.023</td>
<td>.858</td>
<td>.996</td>
<td>.952-1.042</td>
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<tr>
<td><strong>Alcohol use disorder-AUS</strong></td>
<td>.629</td>
<td>.533</td>
<td>.238</td>
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<td>.660-5.328</td>
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<td><strong>Cocaine use disorder-DUS</strong></td>
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<td>.042</td>
<td>6.783</td>
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<td>1.028</td>
<td>.103</td>
<td>.187</td>
<td>.025-1.402</td>
</tr>
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</table>

### History of suicidal thoughts and behaviors (reference category= none)

<table>
<thead>
<tr>
<th></th>
<th>Ideation</th>
<th>B</th>
<th>SE</th>
<th>p-value</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
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<tr>
<td><strong>Male</strong></td>
<td>-.196</td>
<td>.624</td>
<td>.753</td>
<td>1.217</td>
<td>.358-4.135</td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>-.109</td>
<td>.065</td>
<td>.096</td>
<td>.897</td>
<td>.789-1.019</td>
<td></td>
</tr>
<tr>
<td><strong>Working or studying</strong></td>
<td>-.363</td>
<td>.496</td>
<td>.464</td>
<td>.695</td>
<td>.263-1.840</td>
<td></td>
</tr>
<tr>
<td><strong>Cluster B personality traits or disorder</strong></td>
<td>.393</td>
<td>.476</td>
<td>.410</td>
<td>1.481</td>
<td>.582-3.768</td>
<td></td>
</tr>
<tr>
<td><strong>Clinical illness severity-CGI</strong></td>
<td>-.183</td>
<td>.328</td>
<td>.577</td>
<td>.833</td>
<td>.437-1.585</td>
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<tr>
<td><strong>Social and Occupational Functioning- SOFAS</strong></td>
<td>-.009</td>
<td>.024</td>
<td>.706</td>
<td>.991</td>
<td>.944-1.039</td>
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<tr>
<td><strong>Alcohol use disorder-AUS</strong></td>
<td>1.289</td>
<td>.487</td>
<td>.008</td>
<td>3.628</td>
<td>1.397-9.424</td>
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</tr>
<tr>
<td><strong>Cocaine use disorder-DUS</strong></td>
<td>-.163</td>
<td>.489</td>
<td>.739</td>
<td>.850</td>
<td>.326-2.218</td>
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<tr>
<td><strong>Amphetamine use disorder-DUS</strong></td>
<td>-.154</td>
<td>.931</td>
<td>.097</td>
<td>.214</td>
<td>.034-1.326</td>
<td></td>
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</table>

### Persistent suicidal ideation

<table>
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<th></th>
<th>Ideation</th>
<th>B</th>
<th>SE</th>
<th>p-value</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
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<td>.624</td>
<td>.753</td>
<td>1.217</td>
<td>.358-4.135</td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
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<td>.065</td>
<td>.096</td>
<td>.897</td>
<td>.789-1.019</td>
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<tr>
<td><strong>Working or studying</strong></td>
<td>-.363</td>
<td>.496</td>
<td>.464</td>
<td>.695</td>
<td>.263-1.840</td>
<td></td>
</tr>
<tr>
<td><strong>Cluster B personality traits or disorder</strong></td>
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<td>.476</td>
<td>.410</td>
<td>1.481</td>
<td>.582-3.768</td>
<td></td>
</tr>
<tr>
<td><strong>Clinical illness severity-CGI</strong></td>
<td>-.183</td>
<td>.328</td>
<td>.577</td>
<td>.833</td>
<td>.437-1.585</td>
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<tr>
<td><strong>Social and Occupational Functioning- SOFAS</strong></td>
<td>-.009</td>
<td>.024</td>
<td>.706</td>
<td>.991</td>
<td>.944-1.039</td>
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<td><strong>Alcohol use disorder-AUS</strong></td>
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<td><strong>Amphetamine use disorder-DUS</strong></td>
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<td>.931</td>
<td>.097</td>
<td>.214</td>
<td>.034-1.326</td>
<td></td>
</tr>
</tbody>
</table>

- Reference category = Low and decreasing suicidal ideation trajectory
- Clinical Global Impression Scale – illness severity is rated on a scale from 1-7 with 7 indicating the highest level of severity
- Social and Occupational Functioning Assessment Scale – functioning is rated using a score between 1-100 with 100 indicating excellent functioning
- Alcohol Use Scale
- Drug Use Scale
- The reference category was changed to compare persons in the early decline, then increasing suicidal ideation trajectory and persistent suicidal ideation trajectory. Except for a tendency that indicates that patients with Cluster B personality traits or dis more likely to be in the persistent suicidal ideation trajectory compared to the early decline, then increasing one (OR=3.613 [95% CI=0.927-14.079], p=0.064), no significant differences were detected between these trajectory groups.

The reference category was changed to compare the early decline, then increasing trajectory and the persistent suicidal ideation trajectory groups. No significant differences were identified between these groups, although there was a tendency for persons with Cluster B personality traits were more likely to belong to the persistent suicidal ideation trajectory compared to the early decline, then increasing one (OR=3.613 [95% CI=0.927-14.079], p=0.064).

### Frequency of suicide attempts by trajectory membership

Out of the 382 patients included in our study, 25 (6.54%) attempted suicide at least once during follow-up, including six persons (1.57%) who reported at least one suicide attempt in the past year during two of the study's five yearly assessments, and 1 person (0.26%) at three of the yearly assessments.
Except for the fourth year of follow-up when no one attempted suicide, the frequency of suicide attempts differed significantly at all years of follow-up according to trajectory membership (Table 3). At admission and for the following three years, a greater proportion of persons attempted suicide in the persistent suicidal ideation trajectory group compared to those following the other two trajectories.

Table 3. Distribution of suicidal ideation and suicide attempts for each year of follow-up by trajectory membership

<table>
<thead>
<tr>
<th>Time point</th>
<th>Total sample</th>
<th>Trajectory group</th>
<th>X²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=382</td>
<td>1. Low decreasing n=325 (85.08)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suicidal ideation</td>
<td>(100)</td>
<td>2. Early decline, then increasing n=30 (7.85)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admission</td>
<td>57 (15.24)</td>
<td>8 (26.67)</td>
<td>10 (34.86)</td>
<td>16.07 &lt;.001</td>
</tr>
<tr>
<td>Year 1</td>
<td>60 (16.30)</td>
<td>0 (0)</td>
<td>18 (72.00) 64.58 &lt;.001</td>
<td></td>
</tr>
<tr>
<td>Year 2</td>
<td>43 (12.01)</td>
<td>0 (0)</td>
<td>20 (83.33) 125.24 &lt;.001</td>
<td></td>
</tr>
<tr>
<td>Year 3</td>
<td>36 (10.65)</td>
<td>0 (0)</td>
<td>18 (81.82) 126.29 &lt;.001</td>
<td></td>
</tr>
<tr>
<td>Year 4</td>
<td>32 (10.19)</td>
<td>22 (75.86)</td>
<td>10 (52.63) 204.23 &lt;.001</td>
<td></td>
</tr>
<tr>
<td>Year 5</td>
<td>19 (7.17)</td>
<td>13 (48.15)</td>
<td>6 (37.50) 107.38 &lt;.001</td>
<td></td>
</tr>
<tr>
<td>Suicide attempts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admission</td>
<td>5 (1.32)</td>
<td>1 (0.31)</td>
<td>1 (3.33) 3 (11.54) 24.25 &lt;.001</td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>6 (1.63)</td>
<td>0 (0)</td>
<td>4 (16.00) 34.60 &lt;.001</td>
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<tr>
<td>Year 2</td>
<td>15 (4.18)</td>
<td>0 (0)</td>
<td>9 (37.50)* 71.58 &lt;.001</td>
<td></td>
</tr>
<tr>
<td>Year 3</td>
<td>4 (1.18)</td>
<td>0 (0)</td>
<td>3 (14.29)* 32.90 &lt;.001</td>
<td></td>
</tr>
<tr>
<td>Year 4</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0) - -</td>
<td></td>
</tr>
<tr>
<td>Year 5</td>
<td>3 (1.13)</td>
<td>2 (7.41)</td>
<td>1 (6.25) 15.79 &lt;.001</td>
<td></td>
</tr>
</tbody>
</table>

b One patient died as a result of their suicide attempt

At the very end of follow-up, while no patients belonging to the low and decreasing suicidal ideation trajectory attempted suicide, 7.41% and 6.25% of patients in the early decline, then increasing suicidal ideation trajectory and the persistent suicidal ideation trajectory, respectively, reported suicide attempts. Two patients died by suicide at two and three years of follow-up, both of whom were in the persistent suicidal ideation trajectory.

**Discussion**

Our study captured the evolution of suicidal ideation and suicide attempts in FEP patients over a five-year follow-up. We identified three distinct trajectories of suicidal ideation – low and decreasing (85.08%); early decline, then increasing (7.85%), and persistent suicidal ideation (7.07%). Thus, while most patients experienced a decrease in suicidal ideation during follow-up, some FEP patients showed persistent and increasing suicidal ideation.

Our findings are in line with the two other studies (8, 9) that identified trajectories of suicidal ideation in FEP, both of which identified a trajectory including most patients that is characterized by no or low and decreasing suicidal ideation, another trajectory characterized by the persistence of suicidal ideation during follow-up and a trajectory with increasing suicidal ideation. In our study, however, the increase in the latter trajectory was preceded by an early decline in suicidal ideation.
Notably, the increase in suicidal ideation for a subgroup of FEP patients has been consistently observed by all three trajectory studies (including ours), regardless of the duration of follow-up. Transitions and lack of continuity in care can be risk factors for suicide (16). Feeling dependent on services at the end of the service episode and not ready to be discharged from EIS could lead to distress (17). We can therefore hypothesize that the end of follow-up or the transition from EIS to other services may be difficult for some patients, resulting in an increase in suicidal ideation. The initial decline in suicidal ideation in the early decline, then increasing trajectory group may be explained by patients feeling supported and cared for when treatment commences. This feeling may dissipate at the end of follow-up, possibly contributing to suicidal ideation.

Factors associated with the trajectory of increasing suicidal ideation differ between FEP studies. Whereas it was identified in the other studies that women (8), older patients, those with longer duration of untreated psychosis, and reduced sleep (9) were more likely to belong to the trajectory of increased suicidal ideation, our study found that persons with prior suicidal ideation and cocaine use disorder at admission were at greater risk for following this type of trajectory. However, except for sex and age, which were assessed by the three studies, the other factors were only assessed by a single study, making it impossible to examine whether results diverge or converge. Nevertheless, these factors (i.e., longer duration of untreated psychosis, reduced sleep, prior suicidal ideation, cocaine use disorder) have all been associated with poorer symptomatic and functional outcomes in psychosis (18-20). The increase in suicidal ideation of patients in the early decline, then increasing suicidal ideation trajectory group may be associated with less favorable overall evolution and possibly less responsiveness to treatment.

Substance use disorder has often been studied in association with suicidal thoughts and behaviors in FEP by combining multiple substances together (3), making it difficult to compare with our finding that cocaine use disorder is associated with the early decline, then increasing suicidal ideation trajectory. However, one Spanish study found that stimulant abuse, including cocaine and amphetamines, was associated with a greater risk of suicidal behaviors in FEP (21).

Alcohol use disorder was associated with the persistent suicidal ideation trajectory. Findings on the association between alcohol use disorder and suicidal risk in FEP have yielded inconsistent results (3). It is possible that this risk factor did not emerge when considering only the group average, but rather represents a risk factor only for FEP patient subgroups following a less favorable suicidal course. A meta-analysis concluded that the longitudinal association between substance use disorder, including alcohol, and suicidal risk from adolescence to young adulthood was likely bidirectional (22). Alcohol use disorder at admission may therefore increase the risk of suicidal ideation, which in turn increases alcohol use, thus explaining the observed association with the persistent suicidal ideation trajectory.

Consistent with the Danish trajectory study (8), our study also highlighted that patients who previously presented suicidal ideation and suicide attempts prior to entry into services were at higher risk of following the persistent suicidal ideation trajectory. Although personality disorders, particularly borderline personality disorder, have been associated with an increased risk of suicidal behaviors (23), this association has rarely been studied in FEP (3). Aligned with our study, one previous study also reported that comorbid borderline personality disorder was associated with an increased risk of suicidal behaviors in FEP (24).

A greater proportion of persons in the persistent suicidal ideation trajectory attempted suicide during the five year follow-up and both persons who died by suicide after one year of follow-up were members of the persistent suicidal ideation trajectory. Concomitant with the increase in suicidal ideation in the early decline, then increasing suicidal ideation trajectory, there was also an increase in suicide attempts in this group, although the frequency was very
small (n=2). These results are nevertheless consistent with the literature showing that, as in the general population, suicidal ideation is a risk factor for suicide attempts in patients with FEP (3, 8, 25).

**Implications**

Despite the decrease in suicidal ideation for a majority of FEP patients, some patients presented persistent and increasing suicidal ideation, stressing the need for ongoing assessment and management of suicide risk in FEP. Our results suggest that patients with a history of suicidal thoughts and behaviors and those with persistent suicidal ideation may require particular attention throughout follow-up and highlight the importance of providing interventions that target suicidal ideation for this population. Although evidence and implementation of such interventions remain limited in FEP, a meta-analysis examining the effectiveness of suicide-focused psychosocial interventions reported that these interventions were associated with a decrease in suicidal thoughts and behaviors in FEP (26). A recent Italian study also showed that the decrease in suicidal ideation in patients with FEP was predicted by the number of sessions received of individual psychotherapy based on cognitive-behavioral principles (including modules on psychosis, distress, suicidal ideation, functioning and substance abuse)(27). Persons with cocaine and alcohol use disorder at admission should also be targeted early and assessed frequently for suicidal risk. As outlined in EIS guidelines, treatment of these co-morbid disorders should be integrated into services (10). Since a subgroup of persons appeared to be at risk for developing suicidal ideation at the end of follow-up, it appears essential to provide individualized support and even shared care during the transition from EIS to other services.

**Strengths and limitations**

This is the first study to identify trajectories over the entire critical period of the first five years after FEP. Considering individual variability allowed us to identify different evolution patterns that we would not have been able to observe by looking only at the group average. Ours is also the first study to examine whether suicidal ideation trajectories were differentially associated with suicide attempts occurring during follow-up, an important outcome EIS seek to prevent. An additional strength is our inclusion of a range of potential factors, guided by a systematic review and prior trajectory studies.

The results of our study must be considered in the context of certain limitations. We excluded from our study persons with less than three time points with valid data for suicidal ideation or missing data on factors potentially associated. Patients included in our study were generally similar to those excluded due to missing data. Nonetheless, included patients were more likely to be unemployed or not studying at admission and to have a schizophrenia-spectrum disorder diagnosis, and both these aspects have been associated with poorer long-term outcomes (28, 29), potentially suggesting an overrepresentation of persons with less favorable outcomes. Included patients were also less likely to have a cocaine use disorder, which was associated with the trajectory of early decline, then increasing suicidal ideation. A stronger association may thus have been observed if more of these patients had been included. Also, five of the seven patients who died by suicide had to be excluded for the above mentioned reasons, therefore excluding some individuals with severe suicidal risk. Nevertheless, our study provides a fairly representative picture of suicidal risk among FEP patients as our sample was drawn from all treated cases of FEP in two defined catchment areas.

Two trajectories included only 7% of participants which may have limited our statistical power to identify predictors, albeit the identified predictors had moderate to large effect sizes. Due to the low number of suicide attempts, it was not possible to identify trajectories of suicide attempts or factors associated with attempts. However, we went beyond describing trajectories of suicide attempts by comparing the distribution of attempts across the three identified suicidal ideation trajectories and showing that more FEP patients with persistent suicidal ideation attempted suicide.
We only included in the analyses factors measured at admission although some of these would have evolved during follow-up (e.g., symptoms). Some important risk factors, such as depressive symptoms, impulsivity, and duration of untreated psychosis, were not considered either because data were not collected or because there was too much missing data. Furthermore, our measure of suicidal ideation and attempts did not account for frequency or severity as it assessed yearly periods and was binary.

To address these limitations, further studies should be fully longitudinal, with most variables collected at all time points, conducted with large sample sizes by considering time-varying covariates and proximal risk factors for suicidal ideation and suicide attempts. The use of a scale designed to assess suicidal thoughts and behaviors and used repeatedly during the same year could provide a more accurate and detailed account of suicidal risk. Future studies should also examine whether the different trajectories are associated with subsequent deaths by suicide and whether interventions that target modifiable factors reduce suicidal risk. Qualitative studies would help us better understand the experience of those for whom there is a persistence or increase in suicidal ideation and suicide attempts and unpack how care transitions can contribute to increases in suicidal ideation.

**Conclusion**

Our study extends the two other previous trajectory studies of the evolution of suicidal ideation to a longer period of five years. Our findings suggest the importance of closely monitoring suicidal risk of FEP patients who persistently report suicidal ideation, as they are more likely to engage in suicidal behaviors, and of paying particular attention to the end of follow-up and times of transition to other services, which may represent a period of greater risk for a subgroup of patients. Further studies will be needed to better characterize who belongs in each group and, eventually, develop and study prevention strategies tailored to each subgroup.

**References**


**Declarations**

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**Figures**

![Figure 1](image-url)

**Figure 1**

Months since admission to early intervention services for psychosis
Trajectories of suicidal ideation over the five-year follow-up

1. Low and decreasing, 2. Early decline, then decreasing, 3. Persistent

Dashed lines represent predicted values, solid lines represent observed values

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- S1fileTrajectoriesSIFEP.docx
- S2fileTrajectoriesSIFEP.docx
- S3fileTrajectoriesSIFEP.docx
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