Juvenile delinquency, social background and suicide—a Swedish national cohort study of 992 881 young adults

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Background As the suicide rates in young adults do not show a clear decline, it is important to elucidate possible risk factors. Juvenile delinquency has been pointed out as a possible risk behaviour.

Methods This register-based cohort study comprises the birth cohorts between 1972 and 1981 in Sweden. We followed 992 881 individuals from the age of 20 years until 31 December 2006, generating 10 210 566 person-years and 1482 suicides. Juvenile delinquency was defined as being convicted of a crime between the ages of 15 and 19 years. Estimates of risk of suicide were calculated as incidence rate ratio (IRR) with 95% confidence intervals (CIs) using Poisson regression analysis with adjustment for potential confounding by their own and their parents’ mental illness or substance abuse, parental education, single parenthood, social assistance, adoption and foster care.

Results Among females, 5.9%, and among males, 17.9%, had at least one conviction between the ages 15 and 19 years. In the fully adjusted model, females with one conviction had a suicide risk of 1.7 times higher (95% CI 1.2–2.4), the corresponding IRR for men was 2.0 (95% CI 1.7–2.4) and 5.7 (95% CI 2.5–13.1) and 6.6 (95% CI 5.2–8.3), for women and men with five or more convictions. The effect of severe delinquency on suicide was independent of parental educational level.

Conclusions This study supports the hypothesis that individuals with delinquent behaviour in late adolescence have an increased risk of suicide as young adults. Regardless of causality issues, repeated juvenile offenders should be regarded by professionals in health, social and correctional services who come into contact with this group as a high-risk group for suicide.

Keywords Juvenile delinquency, suicide, social background
Introduction

Mortality rates for young adults in the Western world have steadily decreased over recent decades. However, the suicide rates do not show the same decrease. Therefore, it is of great importance to elucidate the most likely risk factors for suicide in young adults. Several studies have pointed out juvenile delinquency as a risk behaviour, where adolescents involved in either the juvenile justice or child welfare systems have higher risks of suicidal behaviour compared with the general adolescent population. However, the majority of these studies have been restricted to small sample sizes, especially regarding female delinquents. One exception is a recent nested case-control study of suicide risk over three decades among all people processed by the national criminal justice system in Denmark.

Earlier findings have shown that delinquent youths also have higher all-cause mortality. It is also more common among delinquents to suffer from mental illness and substance abuse. It has also been shown that social disadvantage in childhood is associated with delinquency, and also with suicidal behaviour. Thus, there are several possible explanations to the increased suicide rates observed among young offenders.

In this study, we used Swedish national registers, which makes it possible to study large populations with information about criminal records and later suicide, while taking several other related risk factors into account, such as mental illness, substance abuse and social background factors during childhood.

We studied approximately 1 million adolescents, born between 1972 and 1981, to investigate whether juvenile delinquency, measured as being convicted of a crime between the ages of 15 and 19 years, increased the suicide risk in both males and females and whether related factors explain the association. In addition, we wanted to examine whether the risk increased with increasing numbers or severity of convictions. To further examine the association between delinquency and suicide with regard to socio-economic status, we also investigated whether socio-economic status modified the relationship between delinquency and suicide.

Materials and Methods

Study population

We selected all Swedish residents born between 1972 and 1981 (n = 1,067,202), constituting our study population. We excluded children who had been diagnosed with mental retardation during the age 0–17 years (n = 1834) and those who died before their 20th birthday (n = 4443). Another inclusion criterion was to be a Swedish resident during the age of 7–19 years. After excluding children (n = 68,728) who immigrated or emigrated during this period, our final cohort comprised 992,881 individuals. The follow-up period lasted from their 20th birthday until the 31 December 2006. Thus, the incidence of suicide was measured from the age of 20 to 25 years for those born in 1981, and up to the age of 34 years, at the most, for those born in 1972.

We used the unique personal identity number assigned to each Swedish citizen or permanent resident to link information from six population-based registers.

Measure of delinquency

In contrast with many other European countries, Sweden has extremely few young people under the age of 18 years in prison, even though the age of criminal responsibility is 15 years. The political consensus in Sweden has, during several decades, agreed on keeping offending youths out of prisons to avoid the risk of becoming apprentices in crime. Hence, the standard procedure for courts is to hand over cases of suspected delinquents to the Social Services, without any other legal sanctions imposed on the individual offender.

We retrieved all conviction data subsequent to attaining age of 15 years from the Crime Register. The Crime Register, held at the Swedish National Council for Crime Prevention, contains information on all convictions in Sweden from the age of 15 years and has very good coverage, where only 0.05% of crimes in the years 1988–2000 had incomplete personal identity numbers.

We summarized all convictions between the age of 15 and 19 years, categorizing our cohort into four groups: Group 0, comprising those who have never been convicted of a crime at the age of 15–19 years; Group 1 consists of individuals with one conviction only; Group 2 includes individuals with two to four convictions; and Group 3 is considered as severe delinquency and consists of individuals with five or more convictions and individuals with less than five convictions, but with more severe penalties, i.e. probation or imprisonment.

Violent crime was defined as homicide, assault, robbery, arson, any sexual offence (rape, sexual coercion, child molestation, indecent exposure or sexual harassment), illegal threats or intimidation (hence, burglary and other property offences, traffic offences and drug offences were excluded). When we dichotomized our analysis to violent and non-violent convictions, a subject with both types of conviction was placed in the ‘violent’ group.

Suicide

Suicide was defined as having an underlying cause of death in the Causes of Death Register, coded according to the international classification of disease (ICD) as (ICD-9: E950–E959, ICD-10: X60–X84) or as death with undetermined intent (ICD-9: E980–E989,
ICD-10: Y10–Y34). With our definition of suicide including deaths with undetermined intent, our aim was to reduce spatial and secular trends in detecting and classifying cases of suicide. The Causes of Death Register contains information on all deceased Swedish residents since 1952 and has a very high coverage. Since 1997, all deceased are included, though for 0.5%, there is a lack of medical information.

Potential confounders

Measurements of the individuals’ psychiatric history and drug abuse
We controlled for psychiatric in-patient care and hospitalization related to alcohol or drug abuse. This information was obtained from the National Patient Register, which includes all individuals admitted to any psychiatric or general medical hospital since 1987.

Measurements of social adversity during childhood
We also assessed whether parents had been treated in psychiatric care or with diagnoses related to alcohol or drug abuse. Only hospitalizations before their child’s 18th birthday were accounted for.

Highest attained parental education level when the index persons were 15 years (measured in year 1990 for those born 1972–1975) was obtained from the Swedish Register of Education at Statistics Sweden and was classified into three categories—1: 9 years of compulsory school, 2: 10–12 years of education, 3: >12 years of education. For households with two adults, we chose the highest educational level to characterize the household.

As children with single parents have shown increased suicide risks, we controlled for single parenthood, obtained from the Swedish Population and Housing Census 1990, which was a mandatory nationwide census conducted every 5 years between 1960 and 1990. We collected information on whether the household received social assistance or if any parent received a disability pension from the Total Enumeration Income Survey (which contains data on the income of and governmental benefits provided to all Swedish residents), since it has been shown that children in families receiving long-term social assistance face less satisfactory health. To fulfill the criterion of ‘receiving social assistance’, at least one parent had had to be receiving the assistance in at least 2 of the years, 1990–1992. Disability pension was selected in the same manner.

As former child welfare clients and adoptees have been shown to be a high-risk group for suicide attempts, these variables were controlled for. Information on adoption was retrieved from the Multi-Generation register, which contains all known relationships between children and parents (born in 1932 or later) since 1961. Information on foster care was retrieved from the Swedish Registry of Children and Young Persons Subjected to Child Welfare Measures.

Four categories of country of birth were created: those born in Sweden, Finland, other Nordic countries and the rest of the world.

Effect modification from combined exposures
To further investigate whether social background modified the relationship between delinquency and suicide, we established six mutually exclusive groups based on parental education and conviction group. The four groups for parental education were reduced to two groups: 9–12 years of education and >12 years of education. We merged the four conviction groups into three groups: conviction Group 0, conviction Group 1+2 and conviction Group 3.

Statistical analysis
Poisson regression analyses were used to evaluate the association between the conviction groups and suicide. As a measure of the relative occurrence of suicide, we used the incidence rate ratio (IRR). We assessed person-years at risk by adding up the years the individuals were alive and living in Sweden during the follow-up period. Four regression models were analysed, where Model I only adjusted for birth year. In Model II, we included indicators of mental health problems and substance abuse. In Model III, we added measurements of social adversity (social background factors, family factors and childhood environment), such as low parental educational level, single parenthood, place of residence, country of birth, parents’ country of birth, household receiving social assistance or a disability pension, adoption, foster care and, parents’ mental illness or substance abuse. Finally, all the variables available were included in Model IV. Since both psychiatric illness and substance abuse are well-known confounders, we also performed two subanalyses, where we first controlled for psychiatric in-patient care during the whole study period and in the second one, we controlled for both psychiatric in-patient care and substance abuse during the whole study period.

Likelihood ratio tests were performed, both between models and for each variable.

SAS Genmod procedure was used to calculate IRRs and 95% confidence intervals (CIs) for suicide, with the non-convicted group as the reference group. SAS v. 9.1 (SAS Institute Inc., Cary, NC, USA) was used.

Results
Cohort characteristics for the four different conviction groups by sex are presented in Table 1. Among female adolescents, 5.9% (28325) had one or more convictions; the corresponding number for males was 17.9% (91248). Among women, 31% in conviction Group 3 had more severe penalties and 69% more than five convictions, whereas among men, 39% had more severe penalties and 61% more than five convictions.
Compared with adolescents with no convictions, those with higher numbers of convictions more often had psychiatric problems and problems with substance abuse (data not shown). Their parents had received social assistance or disability pensions more often, and suffered more from mental illness or substance abuse compared with parents of adolescents who were not convicted (data not shown). They were also more often raised in foster homes (data not shown).

The results in Table 2 show increased suicide risks among both female and male convicts. The crude IRRs (adjusted only for birth year) displayed a gradual increase of suicide risk, i.e. the risk increased as the number of convictions increased (Model I). Women with one conviction had 2.6 times higher suicide risk (95% CI 1.9–3.6) than non-convicted women. The corresponding IRR for men was 2.2 (95% CI 1.9–2.6). In Model II, the gradient remained, although with lower risks, especially for females. The suicide risk for women with one conviction was 1.9 (95% CI 1.4–2.6) and for men, 2.1 (95% CI 1.8–2.5). Adjustments made in the third model also tended to lower the risks, although less among females compared with Model II with adjustments for individual factors (one’s own mental illness or substance abuse). In the fully adjusted Model IV, the conviction group gradient still remained for both women and men.

In the subanalysis where we controlled for psychiatric in-patient care until the end of follow-up, the risk estimates decreased for both sexes and in all conviction groups (Model IIb). The risks further decreased when we also controlled for substance abuse until end of follow-up (Model IIc). In the fully adjusted model (IV), females in Group 3 had a risk of 3.7 (compared with 5.7) and males in Group 3 had a risk of 3.0 (compared with 6.6).

When we categorized the conviction groups into non-violent and violent crimes, female non-violent crime offenders had, in the fully multivariable adjusted model, an IRR of 1.5 (95% CI 1.0–2.1) and violent offenders an IRR of 4.2 (95% CI 2.8–6.1), the IRRs for men were 2.2 (95% CI 1.9–2.6) and 4.2 (95% CI 3.6–4.9), respectively (data not shown).

Separate analyses for suicides and for deaths coded as undetermined intent generated similar gradients; however, the risks were considerably higher for deaths with undetermined intent, especially among males (see Appendix). When looking at the age groups 20–24 and 25–34 years separately, we also received similar results (data not shown).

Results from the stratified analysis (Table 3) showed a tendency of a higher risk for adolescents whose parents had lower levels of education, in the crude model for both women and men. In the multi-adjusted model, however, these risks decreased, and the effect of severe delinquency was independent of parental educational level.
Discussion

Our study of 992,881 young adults shows that delinquency, manifested as one or more convictions during adolescence, is associated with a substantial increase in the risk of suicide in young adulthood. Significant risk increases remain, with a clear gradient, for no convictions compared with more convictions after adjustments for a range of possible risk factors, such as one’s own and parents’ mental illness or substance abuse, low parental educational level, receipt of social assistance, being in foster care or being adopted or living in a single parental household.

The strength of the study includes the population-based design, using national registers with high completeness and validity, together with the long follow-up time. In the Crime Register, only 0.05% of crimes in the years 1988–2000 had incomplete personal identity numbers.21 The validity in the Causes of Death Register is also very high, where only 0.5% of the deceased lack information on cause of death. By linking large register data with nationwide coverage, we have also been able to study the effect of several potential confounding social background factors. However, relying solely on register data, we can only capture and adjust for the most severe mentally ill treated in psychiatric in-patient care and individuals hospitalized for substance abuse. Thus, we lack complete information on these important confounders, which is a limitation. Further on, we only measure convicted youths, leading to the possible risk of non-differential misclassification of exposure, meaning some youths engaged in delinquent behaviour are not registered and convicted, and, hence, misclassified. If so, the consequence would be dilution of our results.

As we excluded individuals who died before the age of 20 years, we could not examine the link between youth offending and suicide before reaching the age of 20 years, which is a limitation.

Our results show that delinquency is a risk factor for suicide and, to the best of our knowledge, this is the largest study performed in this field. However, a major part of the increased risk is explained by comorbid/concomitant mental illness and substance abuse. Thus, we want to draw attention to this finding, which should be considered in future research where we suggest effort be put on improving the measuring of these profound confounders. Mental health problems represent one of the most important risk factors for suicide.4 In particular, when studying adolescents in juvenile detention and correctional facilities, these adolescents were about 10 times more likely to suffer from psychosis than the general adolescent population.12,13

Substance abuse is also a risk factor for suicide27 as well as a risk factor for delinquency.14,28 A large number of violent crimes have been shown to be committed by people who had been hospitalized for substance abuse.14 In Table 2, we see that the association

### Table 2: Conviction group and the risk of suicide in women and men

<table>
<thead>
<tr>
<th>Conviction Group</th>
<th>Number of person-years</th>
<th>Number of suicides</th>
<th>Suicide rate (100,000 person-years)</th>
<th>Adjusted relative risks (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suicide rate</strong></td>
<td><strong>Number of suicides</strong></td>
<td><strong>Adjusted relative risks (95% CI)</strong></td>
<td><strong>Model I</strong></td>
<td><strong>Model IIa</strong></td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
<td><strong>(Ref.)</strong></td>
<td><strong>(Ref.)</strong></td>
</tr>
<tr>
<td>0</td>
<td>401,304</td>
<td>29</td>
<td>7.27</td>
<td>1 (Ref.)</td>
</tr>
<tr>
<td>1</td>
<td>628,922</td>
<td>44</td>
<td>7.04</td>
<td>1.2 (1.0–1.4)</td>
</tr>
<tr>
<td>2</td>
<td>126,324</td>
<td>12</td>
<td>9.69</td>
<td>1.4 (1.2–1.6)</td>
</tr>
<tr>
<td>Men</td>
<td></td>
<td></td>
<td><strong>(Ref.)</strong></td>
<td><strong>(Ref.)</strong></td>
</tr>
<tr>
<td>0</td>
<td>390,851</td>
<td>60</td>
<td>15.3</td>
<td>1 (Ref.)</td>
</tr>
<tr>
<td>1</td>
<td>628,922</td>
<td>44</td>
<td>7.04</td>
<td>1.2 (1.0–1.4)</td>
</tr>
<tr>
<td>2</td>
<td>126,324</td>
<td>12</td>
<td>9.69</td>
<td>1.4 (1.2–1.6)</td>
</tr>
</tbody>
</table>

**Notes:**
-Adjusted for birth year.
-Adjusted for birth year, substance abuse and mental illness in the age group of 0–19 years.
-Adjusted for birth year, parental education, low parental household, house receiving disability pension, adoption, foster care, place of residence, country of birth and town and city of birth.
-Adjusted for birth year, parental education, low parental household, house receiving disability pension, adoption, foster care, place of residence, country of birth and town and city of birth.
-Adjusted for birth year, parental education, low parental household, house receiving disability pension, adoption, foster care, place of residence, country of birth and town and city of birth.
-Adjusted for birth year, parental education, low parental household, house receiving disability pension, adoption, foster care, place of residence, country of birth and town and city of birth.

**References:**
- Our study of 992,881 young adults shows that delinquency, manifested as one or more convictions during adolescence, is associated with a substantial increase in the risk of suicide in young adulthood. Significant risk increases remain, with a clear gradient, for no convictions compared with more convictions after adjustments for a range of possible risk factors, such as one’s own and parents’ mental illness or substance abuse, low parental educational level, receipt of social assistance, being in foster care or being adopted or living in a single parental household.
- The strength of the study includes the population-based design, using national registers with high completeness and validity, together with the long follow-up time. In the Crime Register, only 0.05% of crimes in the years 1988–2000 had incomplete personal identity numbers.21 The validity in the Causes of Death Register is also very high, where only 0.5% of the deceased lack information on cause of death. By linking large register data with nationwide coverage, we have also been able to study the effect of several potential confounding social background factors. However, relying solely on register data, we can only capture and adjust for the most severe mentally ill treated in psychiatric in-patient care and individuals hospitalized for substance abuse. Thus, we lack complete information on these important confounders, which is a limitation. Further on, we only measure convicted youths, leading to the possible risk of non-differential misclassification of exposure, meaning some youths engaged in delinquent behaviour are not registered and convicted, and, hence, misclassified. If so, the consequence would be dilution of our results.
- As we excluded individuals who died before the age of 20 years, we could not examine the link between youth offending and suicide before reaching the age of 20 years, which is a limitation.
- Our results show that delinquency is a risk factor for suicide and, to the best of our knowledge, this is the largest study performed in this field. However, a major part of the increased risk is explained by comorbid/concomitant mental illness and substance abuse. Thus, we want to draw attention to this finding, which should be considered in future research where we suggest effort be put on improving the measuring of these profound confounders. Mental health problems represent one of the most important risk factors for suicide.4 In particular, when studying adolescents in juvenile detention and correctional facilities, these adolescents were about 10 times more likely to suffer from psychosis than the general adolescent population.12,13
between delinquency and suicide decreases when mental illness and substance abuse are accounted for. Since we can only measure part of all mental illness and substance abuse, the measured increased risk would probably decrease even more if we could control for all mental illness and all substance abuse.

When we controlled for psychiatric in-patient care during the whole study period, the risk estimates decreased.

Still, even after controlling for these confounders, we see a gradient in delinquency, where those in the most severe group have highest suicide risks. In this study, the exposure is measured during adolescence (aged 15–19 years) and the effect still shows at the age of 34 years. This could imply that delinquency in itself is a risk factor for suicide, something that smaller studies have previously indicated. 5,7

In the subanalysis where we separated suicides and deaths with undetermined intent, the latter showed considerably higher risk estimates. A possible explanation could be the higher prevalence of substance abuse among delinquent youth, which could lead to both unintentional as well as intentional poisonings. 29

When we categorized the conviction groups into non-violent and violent crimes, we found a higher suicide risk among individuals convicted for violent offences. The increased suicide risk in this group is in line with previous studies. 8,30,31

One explanation for violent offenders’ higher risk is the possibility of shared, common biological mechanisms for homicidal and suicidal behaviour through serotonin dysfunction, which is related to several impulse disorders. 30

When previous studies have focused on gender differences, the majority have studied only few delinquent women. 3,4,9,10,27,32 In our large study population, 5.9% of the women had one or more convictions compared with 17.9% of the men. Earlier research has shown that female offenders have significantly higher rates of self-destructive behaviour than delinquent men. 6,29

In young delinquent populations, it appears that, overall, females present more

Table 3 Parental education, conviction group and the risk of suicide

<table>
<thead>
<tr>
<th>Parental education and conviction group</th>
<th>Number of individuals</th>
<th>Number of suicides</th>
<th>Suicide rate (Number/100 000 person-years)</th>
<th>Adjusted relative risks (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
<td></td>
<td>Model Ia</td>
</tr>
<tr>
<td>&gt;13 years of education, conviction Group 0</td>
<td>139 386</td>
<td>88</td>
<td>6.5</td>
<td>1 (Ref.)</td>
</tr>
<tr>
<td>9–12 years of education, conviction Group 0</td>
<td>258 202</td>
<td>193</td>
<td>7.4</td>
<td>1.1 (0.9–1.4)</td>
</tr>
<tr>
<td>&gt;13 years of education, conviction Groups 1 + 2</td>
<td>7019</td>
<td>13</td>
<td>20.3</td>
<td>3.2 (1.8–5.7)</td>
</tr>
<tr>
<td>9–12 years of education, conviction Groups 1 + 2</td>
<td>18 069</td>
<td>42</td>
<td>24.6</td>
<td>3.8 (2.7–5.5)</td>
</tr>
<tr>
<td>&gt;13 years of education, conviction Group 3</td>
<td>42</td>
<td>1</td>
<td>272.2</td>
<td>43.5 (6.1–312.4)</td>
</tr>
<tr>
<td>9–12 years of education, conviction Group 3</td>
<td>163</td>
<td>6</td>
<td>385.5</td>
<td>59.0 (25.8–135.0)</td>
</tr>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
<td></td>
<td>Model Ia</td>
</tr>
<tr>
<td>&gt;13 years of education, conviction Group 0</td>
<td>130 988</td>
<td>191</td>
<td>15.0</td>
<td>1 (Ref.)</td>
</tr>
<tr>
<td>9–12 years of education, conviction Group 0</td>
<td>232 153</td>
<td>350</td>
<td>14.9</td>
<td>1.0 (0.8–1.2)</td>
</tr>
<tr>
<td>&gt;13 years of education, conviction Groups 1 + 2</td>
<td>19 211</td>
<td>77</td>
<td>40.8</td>
<td>2.7 (2.1–3.6)</td>
</tr>
<tr>
<td>9–12 years of education, conviction Groups 1 + 2</td>
<td>55 833</td>
<td>261</td>
<td>46.1</td>
<td>3.1 (2.6–3.8)</td>
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<tr>
<td>&gt;13 years of education, conviction Group 3</td>
<td>785</td>
<td>12</td>
<td>159.8</td>
<td>10.7 (6.0–19.1)</td>
</tr>
<tr>
<td>9–12 years of education, conviction Group 3</td>
<td>4493</td>
<td>82</td>
<td>185.1</td>
<td>12.5 (9.6–16.1)</td>
</tr>
<tr>
<td><strong>Both women and men</strong></td>
<td></td>
<td></td>
<td></td>
<td>Model Ia</td>
</tr>
<tr>
<td>&gt;13 years of education, conviction Group 0</td>
<td>270 374</td>
<td>279</td>
<td>10.6</td>
<td>1 (Ref.)</td>
</tr>
<tr>
<td>9–12 years of education, conviction Group 0</td>
<td>490 355</td>
<td>543</td>
<td>11.0</td>
<td>1.0 (0.9–1.2)</td>
</tr>
<tr>
<td>&gt;13 years of education, conviction Groups 1 + 2</td>
<td>26 230</td>
<td>90</td>
<td>35.6</td>
<td>3.3 (2.6–4.2)</td>
</tr>
<tr>
<td>9–12 years of education, conviction Groups 1 + 2</td>
<td>73 902</td>
<td>303</td>
<td>41.1</td>
<td>3.9 (3.3–4.6)</td>
</tr>
<tr>
<td>&gt;13 years of education, conviction Group 3</td>
<td>827</td>
<td>13</td>
<td>165.1</td>
<td>15.5 (8.9–27.1)</td>
</tr>
<tr>
<td>9–12 years of education, conviction Group 3</td>
<td>4656</td>
<td>88</td>
<td>191.9</td>
<td>18.1 (14.3–23.0)</td>
</tr>
</tbody>
</table>

aAdjusted for birth year.

bAdjusted for birth year, substance abuse, mental illness, parental mental illness, parental substance abuse, single household, household receiving social assistance, household receiving disability pension, adoption, foster care, region and country of birth (own and parental).

cAdjusted for birth year, sex, substance abuse, mental illness, parental mental illness, parental substance abuse, single household, household receiving social assistance, household receiving disability pension, adoption, foster care, region and country of birth (own and parental).
mental health problems than males, which have also been shown in this study. When it comes to completed suicide in adolescents, males exhibit higher rates than females. However, this male predominance is not as evident among delinquent adolescents. In our study, delinquent males had higher risks for completed suicide in general, while in the most severe conviction group (Group 3), females showed both higher suicide rates as well as suicide risks than males did.

Among men, the risk gradient is obvious even after controlling for all confounders that we can measure, which is not the case for females. It is clear that the small group of females who repeatedly commit offenses constitute a more highly selected, poor resource group than the corresponding group of males, also shown in a study of 2865 Swedish offenders.

We found a relationship between socio-economic disadvantage in childhood and delinquency. A study in Norway showed that parents’ low level of education was associated with higher offending rates among 49,975 children, which could also be seen in our results.

We found a slight increase in suicide risk for those whose parents had less years of education, also shown by others. However, after adjusting for a range of other social background factors and mental health factors, this association was eliminated.

In sum, repeatedly convicted youths have strikingly high risks for suicide that remain high not only after adjustment for a long series of background factors, but also after adjustments for a high prevalence of substance abuse and mental health problems. Regardless of causality issues, juvenile repeat offenders should be regarded as a high-risk group for suicide by professionals in health, social and correctional services that come into contact with this group. This knowledge should, generally, guide mental health services targeting juvenile delinquents.

Conflict of interest: None declared.

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possibilities and pitfalls in healthcare and medical research. 


