

# School performance and the risk of suicide attempts in young adults: a longitudinal population-based study

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**Background.** Poor school performance is strongly associated with attempted suicide, but the mechanisms underlying this association are uncertain. We examined this relationship and the extent to which it is explained by (i) adult health behaviours and (ii) social conditions. Furthermore, we examined the potential modifying role of previous suicidal thoughts in the relationship.

**Method.** We conducted a longitudinal cohort study of 6146 individuals aged 18–33 years, recruited in 2002 and 2006 in Stockholm and resurveyed in 2007 and 2010 respectively. We estimated the risk of reported lifetime suicide attempts at follow-up among individuals without a history of suicide attempts at baseline and in relation to compulsory school-leaving grades, controlling for possible confounders and mediators.

**Results.** There were 91 cases of self-reported suicide attempts during the follow-up (5-year incidence of 1.5%). ORs ranged from 3.35 [95% confidence interval (CI) 1.88–5.96] for those in the lowest grade quartile to 2.60 (95% CI 1.48–4.57) and 1.76 (95% CI 0.99–3.13) for those in the second and third quartiles respectively. The relationship between school performance and risk of suicide attempts did not differ by sex. Adult health behaviours and social conditions marginally attenuated, but did not explain, the relationship. The gradient varied with baseline history of suicidal thoughts, and was found only among individuals without such a history.

**Conclusions.** Poor school performance was found to predict suicide attempts among young adults without a history of suicidal thoughts. Adult health behaviours and social conditions did not explain this relationship. Instead, other factors linked with poor school performance, such as poor coping ability, may increase the risk of suicide attempts.

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**Key words:** Adult health behaviours, adult social conditions, school performance, suicide attempts, young adults.

## Introduction

Recent studies have found a positive association between poor school performance and the risk of attempted and completed suicide in adulthood (Richardson *et al.* 2005; Jablonska *et al.* 2009; Gunnell *et al.* 2011). Other studies have found that poor performance on IQ tests, which is highly correlated with school performance (Furnham *et al.* 2009), is associated with an increased risk of subsequent suicide attempts and suicide (Allebeck *et al.* 1988; Gunnell *et al.* 2005; Hemmingsson *et al.* 2006; Andersson *et al.* 2008; Osler *et al.* 2008; Alati *et al.* 2009; Gravseth *et al.* 2009). Few studies have, however, examined possible explanations for these associations.

Some studies have suggested that the association between cognitive function and suicide is partially mediated by socio-economic status (SES) and psychiatric disorders. For example, cognitive ability has been associated with the risk of developing mental disorders (Mortensen *et al.* 2005; Gale *et al.* 2010), and adjustment for mental disorders attenuated, but did not fully explain, the association between cognitive function and self-harm (Osler *et al.* 2008; Jablonska *et al.* 2009). Furthermore, studies from Sweden found that adult SES may partially mediate the association between IQ and suicide (Hemmingsson *et al.* 2006; Sörberg *et al.* 2013). Parental SES appeared not to confound this association in other studies (Allebeck *et al.* 1988; Hemmingsson *et al.* 2006; Björkenstam *et al.* 2011; Sörberg *et al.* 2013).

However, other factors may also be important. In particular, adverse health behaviours, such as smoking and physical inactivity, correlate with cognitive ability (Batty *et al.* 2006; Corley *et al.* 2010, 2012; Gow *et al.* 2012), depressive symptoms and suicide (Li

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*et al.* 2012; Stavrakakis *et al.* 2012; Zhang *et al.* 2013) and could thus mediate the association between cognitive function and self-harm. Smoking, for example, was found to be an independent risk factor for suicidal behaviour in some (Breslau *et al.* 2005; Covey *et al.* 2012), but not all (Kessler *et al.* 2009), past studies and it may also be a proxy measure for risk taking and for use of other psychotropic substances. Engaging in physical activity may protect against suicidality through its effect on psychological well-being. To our knowledge, only one previous study has tested the hypothesis that adverse health behaviours may mediate the association between cognitive function and self-harm, and found that controlling for smoking and alcohol use attenuated the association of IQ with attempted suicide in a sample of Swedish men (Batty *et al.* 2010). Another possible mechanism is that low cognitive function may impair individuals' ability to develop relationships and social networks, resulting in poor social support and risk for self-harm, but this has not been investigated.

Other mechanisms may also be involved. A study from the UK relating IQ to the risk of suicidal thoughts found an association with persistence of suicidal thoughts but not with their onset (Gunnell *et al.* 2009). The authors suggested that delayed recovery from suicidal thoughts may expose people to a prolonged period of heightened risk of suicide. If this hypothesis is true, the risk for self-harm should be higher among individuals with a history of suicidal thoughts. Individuals with low cognitive function may also have poor coping ability and, in times of crisis, are less able to identify solutions to their problems other than self-harm. If low cognitive performance also predicts suicide attempts among individuals without a history of suicidal thoughts, it is possible that there is an impairment of mechanisms that normally prevent individuals from acting immediately when suicidal thoughts emerge, for instance in stressful situations. Thus, the possibly modifying role of a history of suicidal thoughts may illuminate the mechanisms linking cognitive ability with suicide.

The aim of this study was to examine the longitudinal association of school performance, measured as grade-point averages in the ninth and final year of compulsory education, with self-reported suicide attempts in a large sample of young Swedish adults, and the extent to which this association is explained by (i) adult life health behaviours, including sedentary lifestyle, body mass index (BMI) and daily tobacco smoking, and (ii) adult social conditions, including social support, employment status and financial strain, while controlling for a range of possible confounders. We also examined the potential modifying role of previous suicidal thoughts in the association

between school performance and the risk of suicide attempts.

## Method

### Study population

The study population consisted of men and women aged 18–33 years who had participated in the 2002 and 2006 survey waves of the Stockholm Public Health Cohort (Svensson *et al.* 2012) and were resurveyed in 2007 and 2010 respectively ( $n=7816$ ). The surveys used area-stratified, random samples of the population of Stockholm County aged 18–84 years. Data were collected using postal or web-based questionnaires that elicited information on sociodemographic factors, psychological distress and suicide attempts, in addition to other health and lifestyle characteristics. Self-reported exposure and outcome information was complemented by information from longitudinal health and sociodemographic data registers regarding the study participants and their first-degree relatives. The key to record linkages was the unique personal identification number assigned to each resident in Sweden. Response rates among individuals aged 18–33 were 54% in 2002 and 51% in 2006. Retention rates for the 2007 and 2010 follow-ups were 68% and 59% respectively. Non-responders were more likely to be men, born outside Sweden, single or separated, unemployed and with lower incomes (Svensson *et al.* 2012). Individuals reporting lifetime suicide attempts at baseline ( $n=446$ ) and those with missing data ( $n=1081$ ) were excluded, leaving 6146 individuals in the final sample. Informed consent was obtained from all study participants, and the Stockholm regional ethical review board granted ethical approval for the study.

### Data collection and definitions

#### Main exposure

School performance was defined as grade-point averages in the final year of compulsory education (year 9, when participants were approximately 16 years old), retrieved from the National School Register (available at [www.skolverket.se](http://www.skolverket.se)), and was categorized into quartiles according to year of graduation.

#### Outcome

Suicide attempts were assessed at baseline and follow-up by a question based on the work of Meehan *et al.* (1992): 'Have you ever made an attempt to take your life?' There were four alternative answers: 'No, never', 'Yes, in the past week', 'Yes, in the past year' and 'Yes, more than a year ago'. Answer alternatives

were slightly different for the 2007 follow-up: 'No, never', 'Yes, in the past four years' and 'Yes, earlier'.

### Covariates

With regard to adult health behaviours, current daily tobacco smoking was assessed at baseline by the question 'Do you smoke daily?', and was categorized as 'Yes' or 'No'. Responders were asked about their weight and height at baseline and BMI was calculated and categorized as: < 20, 20 to < 25, 25 to < 30, and  $\geq 30$  kg/m<sup>2</sup>. Responders were asked to estimate the average time per week they spent walking, cycling or getting any other form of exercise (Torgen *et al.* 1997). Those reporting less than 2 h/week of exercise were classified as having a sedentary lifestyle.

With regard to adult social conditions, responders reported their current employment status at baseline, categorized as: student, employed, unemployed, being on disability pension/sick leave, keeping the household/being on parental leave, and other. Financial strain was assessed by the questions: (i) 'In the past 12 months have you spent your entire paycheque/pension or run out of money and been forced to borrow from relatives and friends to buy groceries or pay the rent?' and (ii) 'In the past 12 months have you spent your entire paycheque or run out of money and been forced to turn to social services to buy groceries or pay the rent?' For both questions there were three response alternatives: 'No', 'Yes, once' and 'Yes, many times'. These were combined to create a three-category variable: 'no financial strain', 'sought financial help from others' and 'sought social benefits'. Social support was assessed by the question: 'Do you know any people who can provide you with personal support for personal problems or crises in your life?' There were four response alternatives: 'Yes, always', 'Yes, for the most part', 'No, usually not' and 'No, never', which were combined to create a dichotomized (Yes, No) variable.

Lifetime suicide thoughts were assessed at baseline by the question: 'Have you ever been in the situation that you seriously considered taking your own life, maybe even planned how you would do that?'. There were four alternative answers: 'No, never', 'Yes, in the past week', 'Yes, in the past year' and 'Yes, earlier than a year ago'. The three latter comprised our variable of having had lifetime suicide thoughts at baseline.

Information about country of birth was attained by linkage with the Longitudinal Integration Database for Health Insurance and Labour Market Studies (LISA), a central database held by Statistics Sweden that comprises family and individual data on socio-demographic parameters ([www.scb.se](http://www.scb.se)). We categorized

immigrant status as native Swede, European immigrant (those born, or born to parents with origins, outside Sweden in Europe) and Non-European immigrant (those born, or born to parents with origins, outside Europe). Data on study participants' own and parental education were also obtained from LISA and grouped into three categories: compulsory (duration 0–9 years), upper secondary (duration 10–12 years) and higher (duration > 12 years), according to the highest educational achievement of the mother or father. The Swedish Multi-Generation Register (Ekblom, 2011) was used to identify any adoptive parents for study participants. Information on diagnosis of mental disorder (any diagnosis in Chapter V of ICD-8 and ICD-9 or Chapter F of ICD-10) in study participants was obtained from the Swedish National Patient Register, which contains the dates and discharge diagnoses of all in-patient (since 1973) and specialist out-patient care (since 2001, although with incomplete psychiatric out-patient data) in Sweden (National Board of Health and Welfare, 2009) and the Stockholm County Adult Psychiatric Out-patient Register, which records the dates and diagnoses for any contact with specialist out-patient psychiatric services in Stockholm County since 1997 (Jorgensen *et al.* 2010). According to these registers, a positive history of mental illness was defined as having received any diagnosis of mental disorder between graduating from compulsory education and completing the baseline surveys.

In addition, we considered the following factors as possible confounders. Parental history of mental illness was obtained from the National Patient Register and the Stockholm County Mental Health Service Register and was defined as having received any diagnosis of mental disorder. These registers, along with the Cause of Death Register (1952 onwards), provided information on attempted or completed suicide in the parents of study participants. Data on childhood mental illness in study participants was obtained from the Child and Adolescent Psychiatric Register in Stockholm (Idring *et al.* 2012) and the National Patient Register and was defined as any diagnosis of mental disorder prior to completing compulsory education. Information on childhood socio-economic conditions when the study participants were approximately 5 years old, including parental SES, type of housing and being raised in a single-parent household, was obtained through linkage to Statistics Sweden and the Population and Housing Censuses, which were held every 4 years between 1978 and 1994. Register-based data were supplemented by self-reported information on parental SES, available from the 2002 survey. Parental income in childhood was obtained through LISA. The Medical Birth Register provided information on whether study participants were born

small for gestational age. Information on age at becoming a parent in study participants was obtained from the Multi-Generation Register at baseline. Information on participants' civil status (cohabiting or single) was self-reported. Study participants were asked about their history of specific somatic illnesses as diagnosed by health-care professionals including diabetes, angina pectoris, hypertension, myocardial infarction, heart failure, stroke and asthma at baseline. All positive answers were combined to produce a dichotomized (Yes/No) physical illness variable. Psychological distress was assessed at baseline with the 12-item version of the General Health Questionnaire (GHQ-12; Goldberg *et al.* 1997). We used a cut-off score of  $\geq 3$  (using the recommended standard 0–0–1–1 scoring), which is generally used in public health surveys and research reports to denote significant psychological distress, consistent with the presence of a common mental disorder. Alcohol consumption was obtained by self-report and categorized as: abstainer, moderate (1–24 and 1–12 g alcohol/week in men and women respectively) and heavy ( $>24$  and  $>12$  g alcohol/week in men and women respectively); information on previous use of cannabis was available for the 2002–2007 sample only.

### Statistical analysis

The 2002–2007 and 2006–2010 samples were pooled to increase the statistical power. The 76 individuals who had participated in both surveys were excluded from the analyses. We used calibration weights to reweight for non-response (Lundström & Särndal, 1999). Weights were designed by Statistics Sweden to recalculate the population structure of Stockholm County with compensation for systematic non-response, created on the basis of available auxiliary variables from national registries and their association with survey data. The auxiliary variables included sex, age, country of birth, civil status, income, educational level, sickness allowance and area of residence. We carried out survey-weighted logistic regression analyses to estimate crude and adjusted odds ratios (ORs) and their 95% confidence intervals (CIs) for self-reported suicide attempts at follow-up among individuals without a history of suicide attempts at baseline, in relation to school performance. Adjustments were made for potential confounders. In multivariate models, we adjusted for (i) those characteristics that were associated with the outcome and modified the sex- and age-adjusted association between exposure and outcome by at least 5%, and (ii) for those characteristics that were associated with the possible mediators and the outcome and modified the association between exposure and outcome, after adjusting for possible

mediating factors and confounders, by at least 5%. Model 1 included the covariates age and sex. Model 2 included the covariates of model 1 plus immigrant status, paternal education and adoptive parent. Adjusted ORs were also estimated with unweighted data.

Subsequent models were motivated by the specific mediating hypotheses to be tested. We examined the possible mediating effect of (i) adult health behaviours and (ii) adult social conditions in multivariate models where potential confounders were considered. Model 3 included the covariates of model 2 plus daily tobacco smoking, sedentary lifestyle and BMI, along with education and history of mental illness. Model 4 included the covariates of model 2 plus social support, employment status, financial strain, education and history of mental illness.

To examine the potential modifying role of history of lifetime suicide thoughts, we stratified the sample according to baseline history of such thoughts. Log-likelihood ratio tests were used to assess whether associations of school performance with suicide attempts differed in males and females and in those with and without a history of suicide thoughts respectively. Analyses were conducted using SAS version 9.1 (SAS Institute Inc., USA).

### Results

Baseline characteristics of the study participants according to school performance are presented in Table 1. The 6146 participants comprised 2465 men and 3681 women. Approximately 20% reported lifetime suicide thoughts at baseline (4.2% during the past year and 13.9% more than a year ago). At follow-up, 59 women and 32 men reported a history of suicide attempt (23 during the past 4 years, 48 more than a year ago, five during the past year and 15 more than 4 years ago). The corresponding 5-year cumulative incidence of self-reported suicide attempts was 1.2% among men and 1.8% among women.

There was a graded relationship between school performance and the risk of suicide attempts (Table 2) after adjustment for sex and age (model 1). ORs ranged from 3.35 (95% CI 1.88–5.96) for those in the lowest grade quartile to 2.60 (95% CI 1.48–4.57) and 1.76 (95% CI 0.99–3.13) for those in the second and third quartiles respectively. Controlling for family background (model 2) did not affect the relationship. The relationship was somewhat attenuated but remained after adjustment for adult health behaviours and social conditions. Adding alcohol or cannabis use in model 3 did not further attenuate the association (data not shown).

The results using weighted compared to unweighted data were similar, with most of the magnitudes of

**Table 1.** Baseline characteristics of study participants according to compulsory school-leaving grades in quartiles (n=6146)

	Lowest quartile (n=1039)	Second quartile (n=1370)	Third quartile (n=1728)	Highest quartile (n=2009)
Female gender	46.6	53.7	62.7	68.6
Low parental education (compulsory)	16.6	9.6	6.8	4.4
Low parental SES (manual worker)	15.6	8.0	5.6	4.4
Parental income lowest quartile	26.8	23.1	21.1	17.9
Raised with adoptive parent	3.0	1.8	2.3	1.3
Raised in single-parent household	33.5	26.4	24.1	20.3
Parents rented residency	46.3	36.6	29.3	25.6
Parental history of mental illness	24.9	21.2	17.3	14.8
Parental history of suicide attempt	1.6	1.8	1.0	1.1
Non-European first- or second-generation immigrant	27.7	24.7	22.9	22.8
Childhood mental illness	2.1	1.5	1.2	1.2
Small for gestational age	4.8	4.5	3.3	2.3
Cohabiting	55.8	52.2	54.0	50.7
Being a parent	26.9	17.6	15.6	13.1
Physical illness	16.3	13.1	13.5	12.2
Psychological distress	30	25.2	28.2	28.6
History of mental illness	6.7	4.7	3.2	3.4
Lifetime suicide thoughts	20.1	20.2	17.4	16.3
Current daily tobacco smoker	21.9	12.8	8.3	3.5
BMI > 30 kg/m <sup>2</sup>	10.8	5.0	3.6	1.4
Sedentary lifestyle	20.9	12.9	8.6	6.2
Current heavy alcohol drinker	29.9	33.4	35.2	31.6
Unemployed	7.8	5.2	3.2	3.2
Sought social benefits	3.6	1.2	1.2	0.5
Lacking social support	8.1	5.6	4.1	3.5
Low education (compulsory)	30.0	21.8	17.8	19.2

SES, Socio-economic status; BMI, body mass index.  
Values given as percentages.

**Table 2.** Suicide attempts at follow-up according to compulsory school-leaving grades in quartiles (n=6146)

	Cases/Non-cases	Model 1	Model 2	Model 3	Model 4
Lowest quartile	24/1015	3.35 (1.88–5.96)	3.54 (1.94–6.47)	2.85 (1.46–5.59)	2.94 (1.51–5.72)
Second quartile	27/1343	2.60 (1.48–4.57)	2.75 (1.55–4.87)	2.72 (1.50–4.92)	2.75 (1.52–4.98)
Third quartile	22/1706	1.76 (0.99–3.13)	1.75 (0.98–3.11)	1.75 (0.97–3.14)	1.70 (0.95–3.06)
Highest quartile	18/1991	1	1	1	1

Model 1: Adjusted for age and sex.

Model 2: model 1 further adjusted for parental education, immigrant status and adoptive parent.

Model 3: model 2 further adjusted for body mass index (BMI), sedentary lifestyle, current daily tobacco smoking, education and history of mental illness.

Model 4: model 2 further adjusted for employment status, financial strain, social support, education and history of mental illness.

Values given as adjusted odd ratios (95% confidence intervals).

effects being slightly lower with the unweighted data. Unweighted ORs were 3.00 (95% CI 1.60–5.60) for those in the lowest grade quartile, and 2.36

(95% CI 1.29–4.33) and 1.51 (95% CI 0.81–2.84) for those in the second and third quartiles respectively (model 1).

**Table 3.** Suicide attempts at follow-up according to compulsory school-leaving grades in quartiles, by baseline history of lifetime suicide thoughts ( $n=6146$ )

	Positive history of suicide thoughts ( $n=1113$ )	No history of suicide thoughts ( $n=5033$ )
Lowest quartile	1.38 (0.57–3.35)	10.86 (2.96–39.84)
Second quartile	1.62 (0.76–3.45)	5.67 (1.53–21.06)
Third quartile	0.88 (0.40–1.95)	4.35 (1.18–15.97)
Highest quartile	1	1
School performance $\times$ suicide thoughts interaction <sup>a</sup>	$\chi^2$ (df=3)=10.26	$p=0.017$

df, Degrees of freedom.

<sup>a</sup> $\chi^2$  value based on the log-likelihood ratio test.

Values given as odd ratios (adjusted for age, sex, parental education, immigrant status and adoptive parent), with 95% confidence intervals in parentheses.

The relationship between school performance and the risk of suicide attempts were found to differ by baseline history of suicide thoughts (Table 3). Among those without a history of suicide thoughts, ORs ranged from 10.86 (95% CI 2.96–39.84) for those in the lowest grade quartile to 5.67 (95% CI 1.53–21.06) and 4.35 (95% CI 1.18–15.97) for those in the second and third quartiles respectively (model 2). No significant associations were found among those with a history of suicide thoughts at baseline. Finally, the association between school performance and suicide attempts did not differ between men and women ( $\chi^2=0.21$ ,  $df=3$ ,  $p=0.98$  for the log-likelihood test on the school performance  $\times$  sex interaction).

## Discussion

In this large population-based study, we found a clear positive gradient in the risk of incident suicide attempts with decreasing levels of compulsory school-leaving grades among young adults. The increase in risk of suicide attempts seemed to concern only individuals without a history of suicidal thoughts. Adjustment for adult health behaviours, including sedentary lifestyle, daily tobacco smoking, BMI, cannabis use and alcohol consumption, did not explain this relationship. The same was true for adult employment status, social support and financial strain.

Our finding that poor school performance during childhood predicts suicide attempts during adult life is in line with some previous studies. A register-based study from Sweden found that the relationship between school performance and hospital admissions due to self-harm was similar among men and women and was only marginally attenuated by family

background (Jablonska *et al.* 2009). To our knowledge, our study is the first to examine the association between school performance and self-reported suicide attempts in a general population of young adults in Sweden. One longitudinal study from New Zealand also found a positive relationship between school achievement and self-reported suicide attempts in a birth cohort of 1265 adolescents and young adults (Fergusson *et al.* 2003). Another register-based study from Sweden found that advantageous school performance is associated with a reduced risk of suicide attempt in men, but this protective effect was not seen among individuals with severe psychiatric illness (Gunnell *et al.* 2011). A recent study among Swedish male conscripts found that low IQ was associated with risk of suicide attempts later in adulthood and this relationship was only marginally attenuated by adult SES and family status (Sörberg *et al.* 2013). Our study also suggests that a lack of social support does not mediate the association between poor school performance and suicide attempts, even though social support probably reflects important predictors of suicidal behaviour, such as relationships with friends and relatives or the ability to engage in social networks and self-esteem (Fergusson *et al.* 2003). Controlling for smoking and alcohol use was reported by Batty *et al.* (2010) to attenuate the association of IQ with attempted suicide in a sample of Swedish men. We were able to test this hypothesis in both sexes and with a wider range of health behaviours. However, we found that health behaviours only accounted for a minor share of the association between school performance and self-reported suicide attempts. Furthermore, several previous studies failed to find a relationship between cognitive function and suicidality

in people with severe mental illness (Andersson *et al.* 2008; Batty *et al.* 2010; Gunnell *et al.* 2011; Webb *et al.* 2011). It could be hypothesized that severe mental illness is over-represented among individuals with a past history of suicide thoughts. If true, this could explain the weak relationship between poor school performance and the risk of suicide attempts among individuals with a history of suicidal thoughts, confining the relationship to individuals who did not report suicidal thoughts. However, we adjusted for a history of mental illness in our study, thus mental illness is unlikely to explain this finding. To our knowledge, no other studies have examined the potential modifying role of previous suicidal thoughts in the relationship between cognition and self-harm.

This study's strengths include its large population-based sample and the combined use of self-reported and register-based data. The longitudinal design allowed us to avoid issues of reverse causality. We used a validated instrument to identify suicide attempters (Meehan *et al.* 1992) and we were able to adjust for a range of potentially confounding factors. Most previous studies on the association between cognitive performance and self-harm have been register based and used cases of hospital admissions for self-inflicted injury as outcome. However, not all suicide attempters seek treatment and decision on hospitalization depends on medical practice. We were able to avoid measurement error of this kind by using self-reported outcome. There are, however, some limitations. We studied young individuals, who are least likely to participate in surveys (de Graaf *et al.* 2000). Although we used weights to adjust for non-participation, selection bias at baseline and attrition may have influenced our results to some extent. We were not able to impute data on individuals who refused to participate because of restrictions from our data provider Statistics Sweden. Furthermore, the exclusion of individuals reporting suicide attempts at baseline may have led to an underestimation of the relationship in our study. Lastly, although we had access to more comprehensive data than prior studies and could adjust for numerous potentially confounding factors, residual confounding by unmeasured exposures cannot be ruled out.

Individuals with poor school performance are more disadvantaged and have fewer resources than those succeeding in school, as shown by the data in Table 1, and may therefore suffer greater exposure to stress and adverse life circumstances. It is likely that they have poorer problem-solving abilities and lack of advantageous coping strategies and stress resilience (Fergusson & Lynskey, 1996). Such characteristics may induce a sense of powerlessness in times of crisis, with consequent loss of ability to identify alternative

solutions to coping with distress. Furthermore, cognitive ability seems to have a genetic basis and to correlate with some personality factors (Chamorro-Premuzic & Furnham, 2004; Bratko *et al.* 2012). There are indications that aspects of the personality, such as impulsivity and neuroticism, are related to both cognitive ability (Buchmann *et al.* 2011) and suicidal behaviour (Fergusson *et al.* 2003; O'Connor *et al.* 2012) and could partially explain the relationship. Of note, a recent study (Sörberg *et al.* 2013) found that two personality variables, 'social maturity' and 'emotional control', were the only variables with substantial explanatory impact on the association between cognitive ability and self-harm.

Our finding that a history of suicidal thoughts modifies the association between school performance and suicide attempts may offer some insight into the mechanisms involved. It is plausible that all suicidal acts are preceded by suicidal thoughts, which may differ in intensity and duration and may be impulsive or not. If individuals with low cognitive ability have less emotional control (Sörberg *et al.* 2013), they may be at increased risk of acting on impulsive suicidal thoughts. Hence, we speculate that poor coping ability or related personality factors (e.g. impulsivity) may explain the heterogeneity in school performance: suicide attempts associations found in young people with and without a history of suicidal thoughts. An alternative explanation could be that suicide thoughts are a strong competing risk factor for suicide attempts, obscuring the effect of other risk factors.

In conclusion, school performance seems to be a strong predictor of future suicide attempts in young adults, and this relationship is particularly strong in individuals without a history of suicidal thoughts. Adult socio-economic factors and health behaviours do not seem to explain this relationship. Instead, other factors linked with poor school performance such as poor coping mechanisms and an increased risk of acting on suicidal thoughts in stressful situations may explain the relationship.

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### Declaration of Interest

None.

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