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Research report

IQ and adolescent self-harm behaviours in the ALSPAC birth cohort

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ABSTRACT

Background: Low IQ is associated with an increased risk of suicide and suicide attempt in adults, but less is known about the relationship between IQ and aspects of suicidal/self-harm behaviours in adolescence.
Methods: We used data from the Avon Longitudinal Study of Parents and Children (ALSPAC), a population-based prospective UK cohort. Binomial and multinomial logistic regression models were used to examine the association of IQ measured at age 8 with suicide-related outcomes amongst 4810 adolescents aged 16–17 years.
Results: There was some evidence that associations differed in boys and girls (p values for interaction ranged between 0.06 and 0.25). In boys higher IQ was associated with increased risk of suicidal thoughts (adjusted odds ratio per 10 point increase in IQ score = 1.14, 95% Confidence Interval [CI] 1.01–1.28) and suicidal plans (1.15, 95% CI 0.93–1.43), although statistical evidence for the latter association was limited. There was also evidence for an association with non-suicidal self-harm (1.24, 95% CI 1.08–1.45) but not suicidal self-harm (1.04, 95% CI 0.86–1.25). In girls higher IQ was associated with increased risk of non-suicidal self-harm (1.11, 95% CI 1.02–1.22) but not suicidal thoughts, suicidal plans or suicidal self-harm.
Limitations: Loss to follow up and questionnaire non-response may have led to selection bias.
Conclusion: In contrast to previous studies of IQ–suicide associations in adults, we found that higher IQ was associated with an increased risk of non-suicidal self-harm in male and female adolescents and suicidal thoughts in males. Associations of IQ with self-harm differed for self-harm with and without suicidal intent, suggesting that the aetiology of these behaviours may differ.

1. Introduction

Accumulating evidence suggests that lower IQ test score is associated with increased risk of suicide and suicide attempt (Allebeck et al., 1988; Andersson et al., 2008; Batty et al., 2009; Gravseth et al., 2010; Gunnell et al., 2005; O'Toole and Cantor, 1995; Sorberg et al., 2013). The observation may be due to the decreased ability to solve life problems among individuals of lower IQ. Additionally, lower intelligence may influence academic performance, leading to lower educational attainment, poor employment opportunities and financial difficulties; these are known risk factors for suicide. Furthermore, the observed association with lower IQ may not be causally related to suicidal behaviour; it is possible that mental illness, a major risk factor of suicide, leads to impaired performance on tests of intellectual function, or that there are other common prior causes of suicide and low IQ (e.g. severe childhood adversities).

Most previous studies of IQ and suicide focus on mortality and use measures of IQ recorded in early adulthood. Furthermore, most studies have been based on military conscription data, so the evidence to date is generally restricted to males; however a sex difference in the association of low IQ with suicide was shown in one recent study (Andersson et al., 2008). Studies assessing mortality generally find that low IQ is associated with an increased risk of suicide (Allebeck et al., 1988; Andersson et al., 2008; Batty et al., 2009; Gravseth et al., 2010; Gunnell et al., 2005; O'Toole and Cantor, 1995). Few population-based studies have investigated the association of low IQ with other suicidal spectrum problems such as suicidal thoughts and non-fatal self-harm or have used measures of IQ recorded in early childhood before the onset of many mental disorders. Furthermore, some studies have shown an inconsistent pattern of the relationship between low IQ and

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suicidal behaviours. One Australian cohort study reported that different aspects of IQ measured at age 14 had varying associations with suicide-related outcomes, including suicide attempts (Alati et al., 2009). Poor performance on a test of non-verbal reasoning (Raven's standard progressive matrices), but not the Wide Range Achievements Test, was associated with an increased risk of these outcomes. In the New Zealand Dunedin cohort study the inverse relationship between IQ test score at age 8–9 and risk of attempted suicide diminished after controlling for childhood behavioural problems (Fergusson et al., 2005). A recent Swedish study showed that around 45% of the association between lower IQ and suicide/suicide attempt could be attributable to mental illness, aspects of personality and maladaptive behaviours, and social circumstances (Sorberg et al., 2013), indicating that psychological and social factors may lie on the causal pathway between IQ and suicidal behaviours. Data from a British cohort showed that IQ was associated with recovery from rather than the occurrence of suicidal thoughts (Gunnell et al., 2009).

Overall, results from existing studies on the relationship between IQ test score and a wide range of suicidal behaviours are conflicting, and very few studies have used community samples of both males and females. Also, many previous studies assessed IQ in early adulthood; this may compromise the ability to infer a causal relationship between IQ and self-harm behaviours as performance on IQ tests might be influenced by pre-existing mental illness or the context (conscription medical examinations) in which the tests were carried out. Due to limitations in data availability, many previous studies focused on suicide or suicide attempts leading to hospital admission; cases who were not admitted or did not visit hospital were not included. Furthermore, a growing body of evidence indicates that although suicidal and non-suicidal self-harm behaviours frequently co-occur they may differ in several aspects, including behavioural motivation, frequency, lethality and expected behavioural functions (Hamza et al., 2012; Lloyd-Richardson et al., 2007). Individuals who engage in non-suicidal self-harm do not intend to end their lives – the most frequent motivations for such acts are to find relief from distressing affective states, to get control of a situation or to get a reaction from someone (Hamza et al., 2012; Lloyd-Richardson et al., 2007). Non-suicidal self-harm also tends to be a frequently repeated behaviour and involve methods of low lethality (Hamza et al., 2012; Lloyd-Richardson et al., 2007). Exploring risk factors for a wide range of non-fatal self-harm behaviours is important not only because these spectrum behaviours are precursors of suicide, but also because they are in themselves major public health concerns, particularly in adolescents (Hawton et al., 2002; Kidger et al., 2012).

The aim of the current study is to explore the relationship between IQ test score and the risks of a wide range of suicidal behaviours, including suicidal thoughts, plans and self-harm behaviours with and without suicidal intent in adolescents. Non-suicidal self-harm behaviour, commonly referred to as non-suicidal self-injury (NSSI) (Wilkinson and Goodyer, 2011), has been found to show some distinct characteristics compared to suicidal self-harm behaviour (Brausch and Gutierrez, 2010). The study utilises data from the Avon Longitudinal Study of Parents and Children (ALSPAC), a large UK based birth cohort.

2. Methods

2.1. Sample

The Avon Longitudinal Study of Parents and Children (www.alspac.bris.ac) is a population-based prospective study of children born between 1 April 1991 and 31 December 1992 to mothers living in the former Avon health authority area (Boyd et al., 2013). The former County of Avon includes both urban and rural areas and the population is broadly representative of children in the UK. The ALSPAC core sample consists of 14,541 pregnant women, who were invited to participate in a prospective study to collect a range of measures on socio-economic, environmental and health factors relating to themselves and their new born children (14,062 live births), from early pregnancy and at a number of follow-up points through childhood and adolescence. Participants have been followed up in research clinics, by questionnaire and through links to routine data since birth. The current study examined data obtained from 4810 participants who completed a self-harm questionnaire at 16–17 years (Kidger et al., 2012). Please note that the study website contains details of all the data that are available through a fully searchable data dictionary (http://www.bristol.ac.uk/alspac/researchers/data-access/data-dictionary/). Ethical approval for the study was obtained from the ALSPAC Ethics and Law Committee and the Local Research Ethics Committees.

2.2. Measurements

At 16–17 years, participants were sent a questionnaire which included detailed questions on suicidal thoughts and self-harm. The response rate and the estimated prevalence of self-harm have been reported previously (Kidger et al., 2012). Briefly, of the 9384 participants who received the questionnaire 4855 (51.7%) returned it and 4810 (51.3%) responded to the self-harm questions (Fig. 1). Their mean age was 16 years 8 months (standard deviation [SD]= 2.9 months) at the time of completing the questionnaire. Those who returned the questionnaire were more likely to be female, have a mother in a non-manual social class, and have relatively high educational qualifications (Kidger et al., 2012).

In the self-harm questionnaire participants were asked “have you ever hurt yourself on purpose in any way (e.g. by taking an overdose of pills or by cutting yourself)?” Positive responses to this question were used to indicate a history of self-harm. Participants who responded yes to either of the two questions below were classified as self-harm with suicidal intent: (i) when being asked “Do any of the following reasons help to explain why you hurt yourself on that occasion (i.e. the last time you hurt yourself on purpose)?” those who ticked the box “I wanted to die” were classified as subjects with suicidal self-harm; (ii) those who responded yes to “On any of the occasions when you have hurt yourself on purpose, have you ever seriously wanted to kill yourself?” were classified as subjects with suicidal self-harm. In the main analysis we treated those responded yes to either question as suicidal self-harm. However, a previous study showed that a small number of subjects ($n=50$) who responded yes to the first suicidal intent question but no to the second question, suggesting that they may harm themselves in an attempt to express or relieve their feelings of misery but were not necessarily try to kill themselves (Kidger et al., 2012). Therefore in a sensitivity analysis we classified only those who responded yes to the second suicidal intent question as suicidal self-harm, as they explicitly expressed a wish to kill themselves. Participants were also asked whether they had ever thought of killing themselves, or made plans to kill themselves; answering ‘yes’ to the former was classified as having a history of suicidal thoughts and to the latter was classified as having a history of suicidal plans.

Participants′ IQ was measured at age 8 years using the Wechsler Intelligence Scale for Children (WISC-III) (Wechsler et al., 1992). A short version of the test consisting of alternate items only (except the coding subset) was applied by trained psychologists. Verbal (information, similarities, arithmetic, vocabulary, comprehension) and performance (picture completion, coding, picture arrangement, block design, object assembly) subtests were administered, their scores scaled according to age, and the total IQ scores derived.