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The association between premorbid cognitive ability and social functioning and suicide among young men: A historical-prospective cohort study

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Abstract

Previous studies have found associations between low cognitive ability and later completed suicide. The aim of this study was to examine the association between cognitive ability and social functioning in adolescence, and later completed suicide in a large population-based longitudinal study. Data from the Israeli Draft Board Register for 634,655 Israeli male adolescents aged 16 and 17 was linked to a causes-of-death data registry, with a mean follow-up of 10.6 years for completed suicide. Our results show that in males without a psychiatric diagnosis, both low (adjusted HR=1.51, 95% CI: 1.19-1.92) and high (adjusted HR=1.36, 95% CI: 1.04-1.77) cognitive ability, and very poor (adjusted HR=2.30, 95% CI: 1.34-3.95) and poor (adjusted HR=1.64, 95% CI: 1.34-2.07) social functioning were associated with increased risk for later completed suicide; however positive predictive values were low (PPVs=0.09% and 0.10%, for low cognitive ability and very poor or poor social functioning, respectively). No association between cognitive ability or social functioning and risk for suicide

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was found in males with a psychiatric diagnosis. These data do not support the clinical utility of screening for such potential predictors.

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1. Introduction

Suicide is the third most common cause of death among adolescents and young adults in Western countries (Haas et al., 2010; Pompili et al., 2010), and is complex outcome of multiple, inter-related genetic and environmental factors (Mann, 2002; Moscicki, 1997). This highlights the importance of attempting to characterize adolescents who later died by suicide; adolescents at high risk for suicide might then be the focus of interventions aimed to decrease risk, and hopefully decrease rates of adolescent suicide.

Studies on the relationship between pre-morbid intelligence and risk for completed suicide have shown both higher (Gunnell et al., 2005; Osler et al., 2008; Sörberg et al., 2013) and lower intelligence (Apter et al., 2008; Voracek, 2013) to be associated with later suicide. In addition, previous research has emphasized the importance of social aspects in understanding suicidal behavior in adolescents, however most of the work done in this context examined suicide attempts or suicidal ideation, and not completed suicides (King and Merchant, 2008). Studies assessing the role of social factors in completed suicides are sparse, and retrospective, were based on psychological autopsies (Manoranjitham et al., 2010; Zhang et al., 2010) or did not include a control group (Heikkinen et al., 1995). A recent longitudinal study on a small study of male adolescents (Buhnick-Atzil et al., 2015) found that those who later died by suicide were described as having more interpersonal difficulties in comparison with matched living controls. Correspondingly, a retrospective study (Zhang et al., 2010) found that having low levels of social support were associated with increased risk of suicide. An additional study (Manoranjitham et al., 2010) found that living by oneself and the ending of a steady relationship within the past year were associated with increased risk of suicide.

To date, there are no reports of a large longitudinal study assessing the association between social functioning and completed suicide in a general population sample. Since suicide is a rare event, studying risk factors for suicide needs large samples, in order to include a significant number of suicides, and therefore it is of extreme importance to utilize large population-based cohorts when possible.

The Israeli military routinely screens all Jewish male adolescents in the population, as part of their assessment for eligibility to serve. Using a historical-prospective design, we utilized data on the pre-induction assessments of almost 1 million Israeli male adolescents, and followed them (mean follow up of 10 years) for suicide using a national registry of causes of death. The aim of this study was to characterize the cognitive and social functioning of adolescents who later died by suicide. As far as we know, this is the first large study to use prospectively collected data to examine the association between social functioning and completed suicide.

2. Experimental procedures

2.1. Study population

Baseline data was available for 988,847 Israeli male adolescents who were consecutively screened by the Israeli Draft Board. After the exclusion of 351,986 adolescents with missing data on cognitive ($n=96,219$), social functioning ($n=195,253$) or SES measures ($n=170,427$), and the exclusion of 4455 adolescents who had died for reasons other than suicide, the final sample included 634,655 conscripts with complete data (some conscripts had missing data and died for reasons other than suicide). The mean age of the final sample at the draft boards was 16.97 (SD=0.52). Over a mean follow-up time of 10.6 years (SD=5.9 years), 482 (0.1%) of the 634,655 were identified in the Central Bureau of Statistics as having died by definite suicide and 113 (0.02%) died of undetermined causes of death. As suicide is strongly associated with mental disorders (Bolton et al., 2015), we stratified the analyses in this study according to the presence or absence of psychiatric illness at the draft board assessment.

2.2. Assessment of cognitive ability

All 16 to 17 year old Israeli males undergo cognitive, behavioural, medical and psychiatric assessments by the Draft Board in order to determine their eligibility and aptitude for military service. The cognitive assessment has four sub-tests: (a) Arithmetic - R, which assesses cognitive reasoning, concentration, and concept manipulation. This sub-test is similar to the 'arithmetic' sub-test from the Wechsler Intelligence Scales. (b) Similarities - R, which assesses verbal abstraction and categorization (i.e. the ability to understand the relationship between words and the use of this relationship in several contexts). This test is a revised version of the 'similarities' sub-test from the Wechsler Intelligence Scale. Unlike the Wechsler test, subjects are requested not only to identify and report the semantics of causal relationships between the test items, but also to apply these relations to target items; (c) A spatial analogies test, which measures non-verbal abstract reasoning and problem-solving abilities. This test is also a multiple-choice test; (d) OTIS - R, a modified, Otis-type verbal intelligence test adapted from the US Army Alpha Instructions Test, which measures the ability to understand and carry out verbal instructions (Lezak, 1995). All the subtests are progressive, beginning with relatively simple items and becoming more difficult, are group-administered and time-limited. The sum of the four scores is a validated measure of IQ, scoring on a nine-point scale between 10 (low) and 90 (high), with a 10-point increment at each score. The 95th percentile of the total cognitive score was equivalent to an IQ above 135, and its correlation with the WAIS total IQ was above 0.90 (Gal, 1986).

2.3. Assessment of social functioning

After the cognitive assessment male conscripts are assessed by trained personnel using a semi-structured interview to assess personality and behavioural traits that might affect their suitability for military service (Gal, 1986). This assessment includes a subscale assessing social functioning, including of social abilities and desire for

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