

Cognitive ability in childhood and the chronicity and suicidality of depression

Galen Chin-Lun Hung, Stefanie A. Pietras, Hannah Carliner, Laurie Martin, Larry J. Seidman, Stephen L. Buka and Stephen E. Gilman

Background

There is inconsistent evidence regarding the influence of general cognitive abilities on the long-term course of depression.

Aims

To investigate the association between general childhood cognitive abilities and adult depression outcomes.

Method

We conducted a cohort study using data from 633 participants in the New England Family Study with lifetime depression. Cognitive abilities at age 7 were measured using the Wechsler Intelligence Scale for Children. Depression outcomes were assessed using structured diagnostic interviews administered up to four times in adulthood between ages 17 and 49.

Results

In analyses adjusting for demographic factors and parental psychiatric illness, low general cognitive ability (i.e. IQ < 85 v.

IQ > 115) was associated with recurrent depressive episodes (odds ratio (OR) = 2.19, 95% CI 1.20–4.00), longer episode duration (rate ratio 4.21, 95% CI 2.24–7.94), admission to hospital for depression (OR = 3.65, 95% CI 1.34–9.93) and suicide ideation (OR = 3.79, 95% CI 1.79–8.02) and attempt (OR = 4.94, 95% CI 1.67–14.55).

Conclusions

Variation in cognitive abilities, predominantly within the normal range and established early in childhood, may confer long-term vulnerability for prolonged and severe depression. The mechanisms underlying this vulnerability need to be established to improve the prognosis of depression among individuals with lower cognitive abilities.

Declaration of interest

None.

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Cognitive ability limitations are an established developmental risk factor for psychopathology. Numerous studies have reported that children or young adults with low cognitive ability, measured by scores on IQ tests, are more likely to develop a psychiatric disorder than children or young adults with better cognitive abilities. These studies have included as outcomes admission to psychiatric hospitals,^{1–4} out-patient psychiatric treatment,⁵ diagnoses of mood, anxiety and substance disorders^{6–9} and the presence of comorbid psychiatric disorders.^{2,9} Lower IQ scores are predictive of higher levels of psychiatric symptoms and psychological distress.^{10–15} Finally, lower IQ is associated with a greater risk of suicidal ideation and suicide mortality.^{8,16–22} Evidence from these studies is consistent with cognitive reserve theories, which posit that strengthened neural connections (presumably manifested by higher scores on IQ tests) not only protect against the development of psychiatric disorders but also attenuate the severity of disorders following onset.^{23–25} In theory, higher levels of cognitive reserve promote recovery from psychiatric disorders and protect against recurrence. However, with respect to the studies of psychiatric outcomes cited above, only three focused on severity or chronicity. Zammit *et al* examined the number and duration of psychiatric admissions as a function of IQ and found no association.⁴ In contrast, Gale *et al* reported that with each decrement in IQ, the number of hospital admissions for mood and other psychiatric disorders increased.² Finally, Koenen *et al* reported that each standard deviation increase in IQ was associated with a 25% lower risk of persistence, which they defined as ≥ 2 diagnoses of past-year depression across four interviews conducted between ages 18 and 32.⁹ Evidence is also limited, and conflicting, with respect to the association between cognitive ability and suicide in the context of psychopathology. Alati *et al* reported that lower IQ was associated with an increased risk of suicidal thoughts and attempts among individuals with a

lifetime diagnosis of major depression.¹⁷ Batty *et al*, however, reported no association between IQ and suicide attempts among individuals with a prior admission to hospital for psychosis.²⁶

Given these inconsistencies, and that aspects of cognition are thought to play a role in the aetiology of depression and its prognosis,²⁷ the current study investigates general cognitive abilities measured by tests of intelligence in early childhood in relation to the following outcomes of adult depression among participants in the New England Family Study (NEFS): presence of a recurrent episode in the past year, duration of longest depressive episode, admission to hospital for depression and suicide ideation or attempt during a depressive episode. As performance IQ (for example, processing speed, task organisation) might be more closely related to depression than verbal IQ (for example verbal comprehension, working memory),^{4,16,17} we conducted analyses of verbal IQ and performance IQ separately. We also evaluated whether the association between childhood IQ and adult depression outcomes is independent of educational attainment. Cognitive ability in childhood may affect the quantity or quality of schooling received, and lower educational attainment is predictive of depression chronicity.²⁸ Thus, the presence of a direct effect of IQ on depression outcomes that is not because of lower educational attainment among children with a lower IQ would provide further evidence for cognitive reserve theory.

Method

Participants

Participants were offspring of mothers enrolled in the Providence, Rhode Island and Boston, Massachusetts, sites of the United States Collaborative Perinatal Project (CPP) between 1959 and 1966. Offspring were interviewed in adulthood through participation in one of several follow-up studies (known as the NEFS), all

of which included structured diagnostic interviews for major depression. The current investigation includes follow-up data obtained from CPP offspring with a lifetime DSM-III²⁹ or DSM-IV³⁰ depression diagnosis recorded in one of five NEFS follow-up studies.^{31–33} Inclusion criteria for the current investigation, in addition to meeting diagnostic criteria for a lifetime depressive episode, required complete data on childhood IQ tests, depression-related outcomes and additional covariates described below. Out of 760 recorded individuals with depression across the five studies, 633 individuals ($n = 1067$ interviews) had complete data on all study variables and comprised the current analysis sample (characteristics of the five NEFS studies is provided in online Table DS1). The interviews were conducted under the oversight of the Institutional Review Boards of Harvard School of Public Health and Brown University.

Measures

Outcomes of major depression

Individuals with depression were identified using structured diagnostic interviews (either the Diagnostic Interview Schedule for DSM-III³⁴ or Composite International Diagnostic Interview for DSM-IV³⁵). Depression outcomes included episode duration and recurrence (markers of chronicity), admission to hospital and suicidality (markers of severity). Episode duration was defined as the length of participants' longest depressive episode (in weeks). Episode recurrence was defined as having a depressive episode in the past year among the 1067 interviews conducted, not counting 19 episodes that occurred in the year of first onset. Admission to hospital for depression was assessed by an item asking whether participants were ever admitted to hospital overnight for their sadness, loss of interest or pleasure. Suicide ideation was assessed by asking participants with a history of depression whether they have had ideas of taking their own life or made specific plans for suicide during any of their depressive episodes. Suicide attempt was ascertained by asking participants whether they have attempted suicide during any of their depressive episodes.

IQ

Childhood IQ was measured using seven subtests of the Wechsler Intelligence Scale for Children at age 7 (the vocabulary, comprehension, information and digit span subtests used in the score of verbal IQ, and the picture arrangement, block design, and digit symbol coding subtests used in the score of performance IQ).³⁶ Scores for full-scale, verbal and performance IQ were each collapsed into five categories for analysis in order to assess potential non-linearity in the association between childhood IQ and depression outcomes: <85, 85–95, 96–105, 106–115 and >115.

Childhood and adult covariates

We adjusted the analyses for parental factors associated with children's cognitive abilities that were assessed during the CPP and for participants' own demographic characteristics when interviewed as adults. Parental factors included maternal or paternal history of treated psychiatric, substance or neurological disorders (reported by mothers on their enrolment in the CPP); and a measure of high, medium or low socioeconomic disadvantage based on parental education, income relative to the US poverty threshold, occupation and family structure.³⁷ Participant demographic characteristics included highest level of education attained (less than high school, high school, some college, or college and higher), age at interview, ethnicity and gender.

Statistical analysis

We used repeated-measures logistic regressions to analyse past-year recurrent depressive episodes, wherein each participant contributed one observation for each follow-up assessment in which they participated;³⁸ in these analyses the person-interview was the unit of analysis. Duration of longest episode was analysed using negative binomial regressions; the exponentiated coefficients from these models quantify how much each covariate increases (or decreases) the duration (in weeks) of the longest episode. Admission to hospital for depression, suicide ideation and suicide attempt were analysed with logistic regressions. For each outcome we fitted two models: Model 1, IQ at age 7, participant demographic factors (age at interview, ethnicity and gender), parental socioeconomic disadvantage and parental psychiatric conditions; and Model 2, Model 1 covariates plus participant education. Using the model coefficients we generated effect estimates that contrast each lower IQ category (<85, 85–95, 96–105 and 106–115) to the highest (>115), as well as a single effect estimate that contrasts the lowest category (<85) to all others (85 and above). All models adjusted variance estimates for the presence of sibling sets in the sample, and for the presence of multiple responses per individual in the analyses of recurrent episodes, using generalised estimating equations.³⁸

Results

The study sample included 633 participants in one or more NEFS follow-up studies that met DSM-III or DSM-IV criteria for a depressive episode. The sample was 63% female, 88% White, and had a mean age of 39 years. Of the 1067 follow-up interviews, 934 were conducted between ages 30 and 49 (87.5%); 421 were conducted between ages 40 and 49 (39.5%). Table 1 presents the distributions of IQ scores at age 7 and indicators of depression severity/chronicity (demonstrating that 45% of the sample reported a depressive episode in the past year, 17% were admitted to hospital for a depressive episode, 42% reported suicidal ideation during a depressive episode and 14% had a history of suicide attempt during a depressive episode). Although 11% of the sample ($n = 69$) was in the lowest category of childhood IQ (<85), it is important to note that only 2% of the sample ($n = 14$) had IQ scores of 75 or below that would indicate an intellectual disability. Therefore, variations in IQ reported below are largely variations within the normal range. The distributions of each of the depression outcomes according to childhood IQ are shown graphically in Fig. 1 (also see online Table DS2). The figure shows that the distributions of IQ scores are lower among participants with a history of suicide ideation or attempt, more past-year episodes, a history of hospital admission for depression, and is inversely related to the duration of longest episode.

Past-year depression, duration of longest episode and admission to hospital for depression

Participants with childhood IQ scores <85 had a higher odds of past-year depression than participants in the highest IQ category (odds ratio (OR) = 2.19, 95% CI 1.20–4.00) and than participants with IQ scores 85 or above (OR = 1.62, 95% CI 1.03–2.55) (Table 2). This association was attenuated after adjusting for participant education (OR = 1.65, 95% CI 0.86–3.16). Lower IQ was also associated with the duration of participants' longest depressive episode: it was more than four times longer among participants in the lowest IQ group (<85) than the highest (rate ratio (RR) = 4.21, 95% CI 2.24–7.94) and more than two times longer than participants in all other IQ groups (RR = 2.62, 95% CI 1.53–4.50). The association between IQ and duration of longest

Table 1 Characteristics of participants with a lifetime diagnosis of depression in the New England Family Study (*n* = 633)

Characteristics	
Age, years: mean (s.d.)	39.0 (4.8)
Female, <i>n</i> (%)	400 (63.2)
White, <i>n</i> (%)	555 (87.7)
Parental socioeconomic disadvantage, <i>n</i> (%)	
High	84 (13.3)
Medium	270 (42.7)
Low	279 (44.1)
Parental psychiatric history, <i>n</i> (%)	81 (12.8)
Age-7 IQ score category, <i>n</i> (%)	
<85	69 (10.9)
85–95	134 (21.2)
96–105	186 (29.4)
106–115	162 (25.6)
>115	82 (13.0)
Educational attainment, <i>n</i> (%)	
Less than high school	67 (10.6)
High school	112 (17.7)
Some college	310 (49.0)
College or above	144 (22.8)
Indicators of depression severity/chronicity	
Past-year depressive episode, <i>n</i> (%)	286 (45.2)
Duration of longest episode in weeks, mean (s.d.)	68.9 (188.3)
Ever admitted to hospital overnight for depression, ^a <i>n</i> (%)	104 (16.9)
Suicide ideation during depressive episode, <i>n</i> (%)	264 (41.7)
Suicide attempt during depressive episode, <i>n</i> (%)	89 (14.1)

a. Sample size for the analysis of admissions to hospital, *n* = 614.

episode was maintained although reduced in magnitude after adjustment for educational attainment (RR = 3.69, 95% CI 1.91–7.11). Participants with childhood IQ scores were also more likely to be admitted to hospital for depression than participants with childhood IQ scores in the highest category (OR = 3.65, 95% CI 1.34–9.93) and participants with IQ scores > 85 (OR = 2.07, 95% CI 1.09–3.93). Given the strong association between low educational attainment and admission to hospital for depression (OR = 3.90, 95% CI 1.50–10.10), adjustment for education attenuated the associations of childhood IQ.

Suicide ideation and attempt

Compared with participants with childhood IQ scores >115, participants with IQ scores <85 had higher risks for suicide ideation (OR = 3.79, 95% CI 1.79–8.02) and attempt (OR = 4.94, 95% CI 1.67–14.55). Participants in the lowest IQ category also had higher risk for suicidality when the reference group was collapsed to include all participants with IQ scores ≥85 (OR = 3.00, 95% CI 1.67–5.37 for suicide ideation; OR = 2.98, 95% CI 1.47–6.01 for suicide attempt) (Table 3). The associations were unchanged after adjustment for participant education.

Performance v. verbal IQ scores and depression outcomes

We included performance and verbal IQ in a combined model for each outcome to examine whether there was a specific domain of cognitive ability most strongly related to depression chronicity or suicidality. In these combined models (Table 4), it was low performance IQ that was most strongly associated with past-year depression (OR = 1.95, 95% CI 1.08–3.54), duration of longest episode (RR = 2.66, 95% CI 1.21–5.85), hospital admission for depression (OR = 4.60, 95% CI 1.80–11.75), suicide ideation (OR = 2.54, 95% CI 1.20–5.36) and suicide attempt (OR = 3.42, 95% CI 1.50–7.83). In contrast, the effects of verbal IQ on depression chronicity and suicidality were smaller and non-significant.

Supplemental analyses

We generated three additional sets of analyses to illustrate this study’s findings. First, we derived predicted values of each depression outcome using the Model 1 coefficients shown in Tables 2 and 3; these values are plotted in Fig. 2 against childhood IQ. The figures depict the substantial elevation in the probabilities of a past-year depressive episode, hospital admission for depression, suicide ideation and suicide attempt and in the mean number of weeks of participants’ longest depressive episode, among those in the lowest IQ category (<85) at age 7. The figures also demonstrate that associations between IQ and depression outcomes are not consistently monotonic across IQ categories. Second, to compare our study’s results with those of prior studies that parameterised IQ in standard deviation units, we re-analysed the data with IQ as a

Table 2 Association between age-7 IQ and chronicity of depression (*n* = 633)

	Past-year depression ^a OR (95% CI)		Duration of longest depressive episode, RR (95% CI)		Ever admitted to hospital overnight for depression, OR (95% CI)	
	Model 1 ^b	Model 2 ^c	Model 1 ^b	Model 2 ^c	Model 1 ^b	Model 2 ^c
Age-7 IQ, 5 categories						
<85	2.19 (1.20–4.00)	1.65 (0.86–3.16)	4.21 (2.24–7.94)	3.69 (1.91–7.11)	3.65 (1.34–9.93)	2.16 (0.75–6.19)
85–95	1.42 (0.85–2.37)	1.14 (0.66–1.94)	2.28 (1.27–4.09)	2.04 (1.12–3.72)	2.17 (0.86–5.46)	1.45 (0.57–3.68)
96–105	1.50 (0.93–2.41)	1.27 (0.78–2.09)	1.73 (1.01–2.97)	1.58 (0.83–3.02)	2.00 (0.82–4.88)	1.48 (0.60–3.66)
106–115	1.57 (0.98–2.52)	1.38 (0.85–2.25)	1.69 (1.06–2.69)	1.55 (0.97–2.48)	2.23 (0.92–4.51)	1.78 (0.74–4.25)
>115	1	1	1	1	1	1
Age-7 IQ, 2 categories ^d						
<85	1.62 (1.03–2.55)	1.39 (0.85–2.27)	2.62 (1.53–4.50)	2.47 (1.43–4.26)	2.07 (1.09–3.93)	1.54 (0.77–3.09)
≥85	1	1	1	1	1	1
Participant education						
Less than high school		2.13 (1.22–3.71)		1.37 (0.60–3.14)		3.90 (1.50–10.10)
High school		1.86 (1.15–3.00)		1.11 (0.50–2.46)		2.46 (1.08–5.64)
Some college		1.43 (0.98–2.07)		1.40 (0.70–2.81)		2.18 (1.10–4.29)
College or above		1		1		1

OR, odds ratio; RR, rate ratio.
a. 326 past-year depressive episodes were recorded across 1048 person-interviews, representing 286 New England Family Study participants (249 reporting past-year depression once, 34 twice, and 3 three times).
b. Model 1 adjusted for age, gender, ethnicity, parental psychiatric history and parental socioeconomic disadvantage.
c. Model 2 also adjusted for participant educational attainment.
d. Odds/rate ratios for the comparison of IQ scores <85 to scores ≥85 derived from linear contrasts of the regression coefficients in the model parameterised with five IQ categories.

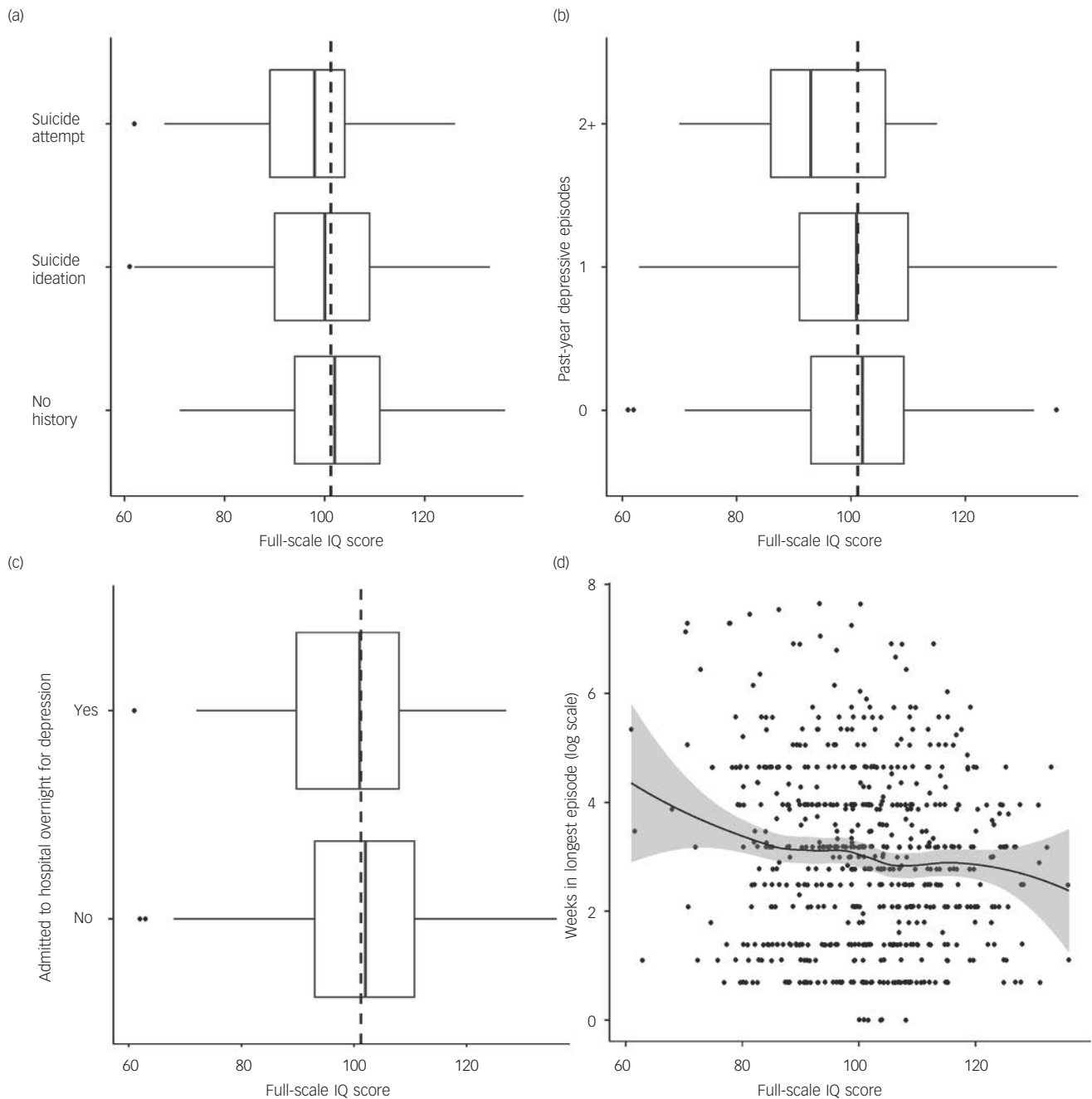


Fig. 1 Outcomes of depression according to childhood cognitive abilities.

Distributions of depression outcomes according to participants' full-scale IQ measured at age 7. Box plots depict the distributions of IQ scores according to (a) the presence of suicide ideation and attempt (shown here among participants with suicide ideation), (b) the number of past-year depressive episodes and (c) history of being admitted to hospital overnight for depression. The dashed line in each panel depicts the mean IQ score in the sample. (d) Participants' duration of longest depressive episode, in weeks, is plotted against IQ scores; the solid black line and grey band overlay a smoothed regression line with its 95% confidence interval.

continuous variable, and generated effect estimates for each outcome corresponding to a 15-point decrease in childhood IQ (online Table DS3). Third, we added interaction terms between IQ category and gender to Model 1 (in Tables 2 and 3) for each outcome to evaluate gender differences; none of these interactions was significant.

Discussion

We sought to investigate the association between cognitive abilities during childhood and the severity and chronicity of major depression, measured by five important outcomes: recurrent

depression in the past year, episode duration, hospital admission for depression and suicide ideation and attempt during a depressive episode. Low childhood IQ was associated with higher risks for each of these outcomes, and associations were stronger for performance IQ than verbal IQ. Except for past-year depression and admission to hospital, associations between IQ and depression outcomes were independent of participants' own educational attainment.

Limitations

First, participants in this study were individuals with depression identified through participation in one of five NEFS follow-up

Table 3 Association between age-7 IQ and risk of suicide ideation and attempt ($n = 633$)

	Suicide ideation, OR (95% CI)		Suicide attempt, OR (95% CI)	
	Model 1 ^a	Model 2 ^b	Model 1 ^a	Model 2 ^b
Age-7 IQ, 5 categories				
<85	3.79 (1.79–8.02)	4.17 (1.91–9.11)	4.94 (1.67–14.55)	4.29 (1.41–13.05)
85–95	1.44 (0.76–2.73)	1.56 (0.82–2.98)	2.69 (1.00–7.20)	2.53 (0.98–6.53)
96–105	1.24 (0.70–2.21)	1.31 (0.74–2.34)	2.43 (0.94–6.30)	2.38 (0.96–5.90)
106–115	1.43 (0.82–2.51)	1.48 (0.84–2.59)	1.16 (0.43–3.14)	1.14 (0.43–2.99)
>115	1	1	1	1
Age-7 IQ, 2 categories ^c				
<85	3.00 (1.67–5.37)	3.17 (1.71–5.86)	2.98 (1.47–6.01)	2.65 (1.21–5.81)
≥85	1	1	1	1
Participant education				
Less than high school		0.84 (0.41–1.71)		1.60 (0.60–4.27)
High school		0.66 (0.37–1.18)		0.97 (0.42–2.24)
Some college		1.02 (0.66–1.56)		1.09 (0.57–2.07)
College or above		1		1

a. Model 1 adjusted for age, gender, ethnicity, parental psychiatric history and parental socioeconomic disadvantage.
b. Model 2 also adjusted for participant education.
c. Odds ratios for the comparison of IQ scores <85 to scores ≥85 derived from linear contrasts of the regression coefficients in the model parameterised with five IQ categories.

Table 4 Association between age-7 verbal and performance IQ with depression chronicity and suicidality ($n = 633$)^a

	Past-year depression OR (95% CI)	Duration of longest depressive episode RR (95% CI)	Ever admitted to hospital overnight for depression, OR (95% CI)	Suicide ideation OR (95% CI)	Suicide attempt ^b OR (95% CI)
Age-7 verbal IQ					
5 categories					
<85	1.30 (0.68–2.48)	1.86 (0.77–4.52)	0.84 (0.28–2.55)	1.47 (0.68–3.21)	1.62 (0.64–4.06)
85–95	1.34 (0.80–2.25)	1.28 (0.61–2.69)	0.93 (0.39–2.24)	1.33 (0.72–2.47)	2.49 (1.20–5.16)
96–105	1.58 (0.98–2.56)	1.40 (0.69–2.82)	1.09 (0.46–2.60)	1.03 (0.56–1.88)	1.64 (0.78–3.44)
106–115	1.81 (1.08–3.03)	0.95 (0.46–1.97)	1.42 (0.60–3.36)	1.58 (0.85–2.94)	1
>115	1	1	1	1	1
2 categories ^c					
<85	0.93 (0.58–1.49)	1.63 (0.84–3.15)	0.77 (0.34–1.72)	1.22 (0.68–2.17)	1.01 (0.49–2.08)
≥85	1	1	1	1	1
Age-7 performance IQ					
5 categories					
<85	1.95 (1.08–3.54)	2.66 (1.21–5.85)	4.60 (1.80–11.75)	2.54 (1.20–5.36)	3.42 (1.50–7.83)
85–95	1.41 (0.84–2.35)	1.62 (0.75–3.52)	1.24 (0.49–3.17)	1.43 (0.76–2.68)	0.99 (0.45–2.20)
96–105	1.12 (0.76–1.65)	1.33 (0.83–2.13)	1.42 (0.72–2.79)	0.94 (0.57–1.57)	1.09 (0.62–1.90)
106–115	1.38 (0.92–2.08)	1.28 (0.77–2.12)	1.33 (0.66–2.70)	1.37 (0.83–2.27)	1
>115	1	1	1	1	1
2 categories ^c					
<85	1.61 (0.97–2.66)	2.06 (1.09–3.91)	3.72 (1.81–7.64)	2.18 (1.17–4.05)	3.34 (1.63–6.84)
≥85	1	1	1	1	1

OR, odds ratio; RR, rate ratio.
a. In addition to performance IQ and verbal IQ, models also included age, gender, ethnicity, parental psychiatric history and parental socioeconomic disadvantage.
b. Reference group is ≥106 for both verbal IQ and performance IQ in suicide attempt models.
c. Odds/rate ratios for the comparison of IQ scores <85 to scores ≥85 derived from linear contrasts of the regression coefficients in the model parameterised with five IQ categories.

studies conducted in a single geographic location based on a cohort born within a narrow time frame. We cannot rule out the possibility of selection bias on the basis of cognitive abilities, and cannot regard the current analysis sample as a representative sample of all lifetime cases of depression in the underlying CPP cohorts. That said, none of the individual follow-up studies selected participants on the basis of depression or other psychiatric problems. Second, although our analyses controlled for the level of socioeconomic disadvantage of children's households and for parental psychiatric history, there are unmeasured factors, that may have biased our results. These include antecedents of low IQ and depression (for example biological antecedents such as acquired brain damage and environmental antecedents such as childhood exposure to abuse or neglect), participants' own experiences of depression during childhood that could have influenced their performance on the IQ tests and residual confounding because of limitations in the

maternal reports of family psychiatric history. Third, our analyses were, of course, conditional on participants' survival, which has implications for the analyses of suicidality. To the extent that suicide deaths occurred among CPP offspring with lower cognitive abilities, our analyses of suicide attempts likely underestimated their true associations.

IQ and depression chronicity, admission to hospital and suicidality

Lower IQ in childhood was associated with a higher risk of chronic depression, as indicated by the recurrence of depression in the past year and longer-duration episodes, and severe depression, as indicated by the likelihood of admission to hospital for depression and by suicide ideation and attempt. The most pronounced difference in depression outcomes across categories of childhood IQ involved the contrast between the lowest (<85) and highest (>115) categories. However, contrasts

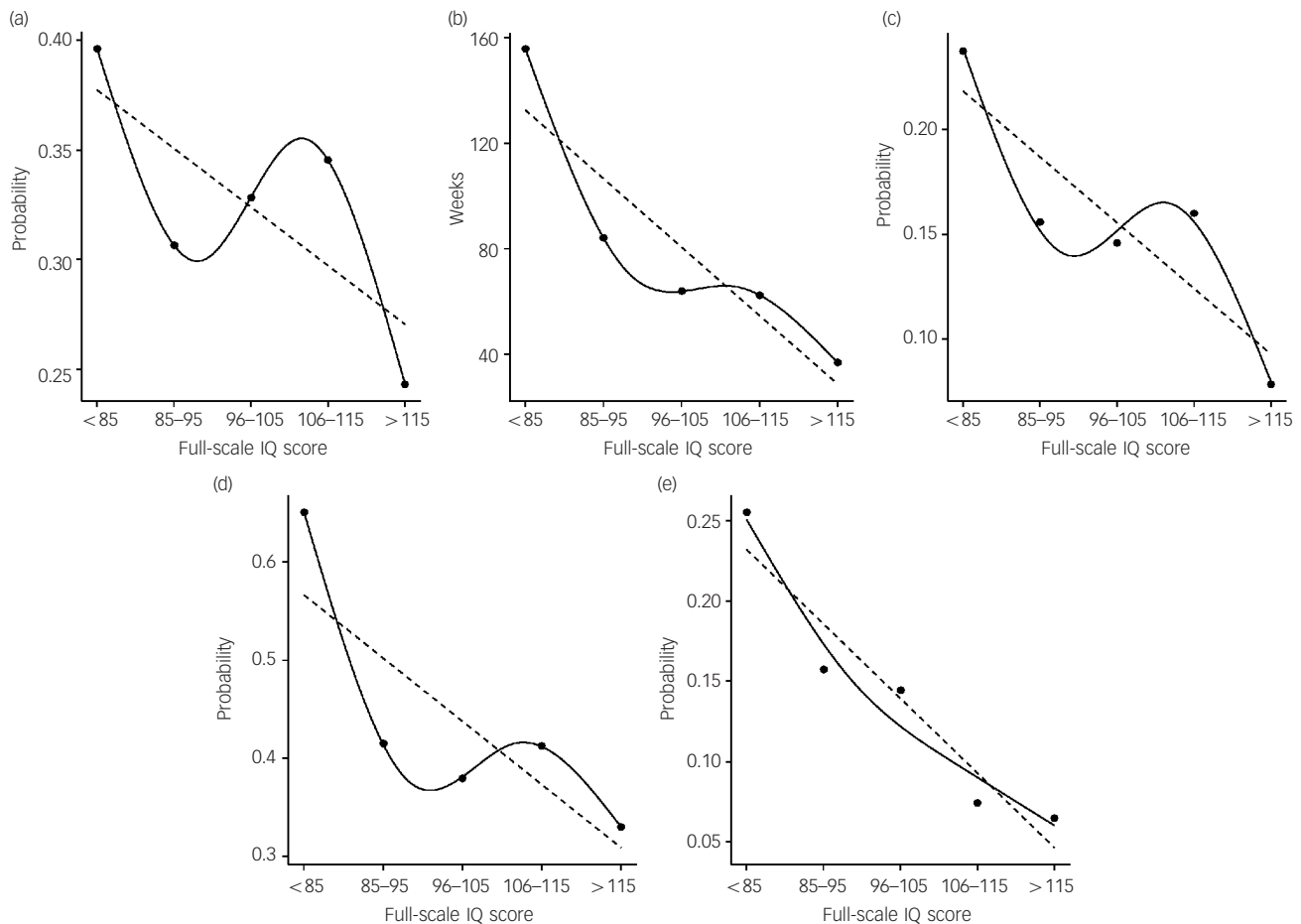


Fig. 2 Predicted values of depression outcomes according to childhood cognitive abilities.

(a) Past-year depression, (b) duration of longest episode, (c) admission to hospital for depression, (d) suicide ideation and (e) suicide attempt. Each panel shows the predicted metric values of depression outcomes derived from the coefficients in Tables 2 and 3 (Model 1). The dashed line is the linear regression line through the predicted values, and the solid curve is a cubic polynomial function fitted to the predicted values. Except for suicide attempt, where the linear and polynomial functions roughly coincide, there are pronounced non-linearities in the association between childhood IQ and depression severity and persistence that are in part because of the most severe outcomes in the lowest IQ category.

between the lowest IQ category and other categories were significant for all but one outcome (duration of longest episode). For three of the five outcomes (past-year depression, admission to hospital and suicide attempt) there was a general pattern of increasing risk for poor prognosis at each lower category of childhood IQ, similar to Koenen *et al's* finding that each standard deviation increase of IQ was associated with a lower risk of depression recurrence.⁹ Viewing these results together, higher general cognitive ability may be beneficial for the prognosis of major depression, and this extends across the distribution of IQ. That said, there also appears to be a discontinuous effect at the low end of the distribution such that children with the lowest level of general cognitive ability have the highest risk for chronic or severe depression subsequent to first onset. In terms of generalisability, it is important to re-state that these effects pertain largely to variation within the normal range of IQ; only 2% of the current sample would have been considered to have an intellectual disability. We did not find evidence for gender differences in the association between childhood IQ and the course of adult depression,^{8,12,20} although such differences have been reported previously.^{13,14,18}

We found that performance IQ was more strongly associated with depression-related outcomes than verbal IQ. Primarily involving spatial reasoning and planning, fluid intelligence and processing speed, performance IQ may be more closely related to problem-solving skills and therefore, crucial to the self-management of depression, and the avoidance of viewing suicide as the only

solution. Poor performance IQ relative to verbal IQ has been a standard finding in patients with major depression, although this finding in patient samples could be attributable to the effect of depressive symptoms on test performance.³⁹ Our findings suggest that deficits in performance IQ relative to verbal IQ antecede the occurrence of chronic and severe depression.

The observed associations between IQ and depression outcomes cannot be readily explained by the shorter educational careers of lower IQ children. And, given that most adult interviews took place after the age when participants would have completed their formal schooling, the associations are unlikely to be as a result of the reciprocal effects of depression on educational attainment.⁴⁰ Vulnerability to severe depression conferred by lower childhood IQ is therefore unrelated to school attendance nor adverse social or occupational outcomes associated with low educational attainment. Rather, it is suggestive of a long-lasting cognitive vulnerability to depression that is established during early childhood. This vulnerability may still include non-cognitive components, however, in light of evidence that children with lower IQs are at increased risk for exposure to traumatic events.⁴¹

Explanations for the association between cognitive ability and depression prognosis cover several domains. Childhood cognitive ability is formative in the development of coping skills and emotion-regulating capability. Consequently, children with lower cognitive abilities may be more prone to experience developmental, interpersonal and school difficulties in the domains of achievement and behavioural control, which may increase susceptibility to

more severe depressive disorder in adulthood. This could be the result of a range of pathways that include low self-esteem, frustration, internalised stigma from teasing or bullying and executive dysfunctions leading to poor problem-solving and reduced capacity to navigate the healthcare system.

The association between low childhood IQ and being admitted to hospital for depression, indicating the influence of IQ on depression severity, could be because of differences in the clinical features of depression associated with cognitive abilities (such as atypical presentation of depression, poorer response to treatment) as well as the importance of cognitive skills in treatment-seeking behaviours to avoid admission to hospital and in navigating the healthcare system.

Explanations for the inverse association between childhood IQ and suicidal risk have also focused on coping-related abilities. When encountering stressful life events, for example in the absence of adequate cognitive skills necessary for coping, individuals are more likely to exhibit suicidal behaviours.¹⁶ Individuals with lower IQ also have been shown to experience prolonged suicide ideation, and, consequently, are more likely to act on their thoughts and plans.²⁰

This study supports the theory that childhood intelligence can be viewed as a marker of cognitive reserve, defined as the structural and functional capacity of the brain to deal with physical and psychosocial challenges, including psychiatric illnesses. We have shown that IQ has a 'pathoplastic' effect, moderating symptom severity and persistence.²³ Lower intelligence may also be a marker of early subclinical disease processes of the brain that precede the onset of psychiatric disorders including schizophrenia and depression.¹ The cognitive reserve model is broadly consistent with evidence supporting the neurodevelopmental origins of depression and other forms of psychopathology,⁴² yet it is important to recognise that our study did not incorporate other aspects of neurodevelopmental vulnerability (such as neurological abnormalities) that may be more common at the lower end of the IQ distribution, and other cognitive diatheses of depression such as helplessness and rumination.⁴³

Implications

Recurrence, episode duration, admission to hospital and suicidality are intertwining features of a chronic and severe type of depression,²⁷ and we have shown that childhood cognitive ability can serve as an early indicator of risk for such chronicity and severity. Future work should pursue the cognitive mechanisms underlying the long-term prognosis of depressive illness, differentiate cognitive from other neurodevelopmental aspects of risk for depression and other forms of psychopathology, and evaluate interventions or policies to promote cognitive development of children and their potential long-term mental health benefits.

Galen Chin-Lun Hung, MD, ScM, Department of Psychiatry, Taipei City Psychiatric Center, Taipei City Hospital, Taiwan, Department of Public Health, School of Medicine, National Yang-Ming University, Taipei, Taiwan; **Stefanie A. Pietras**, SM, Mathematica Policy Research, Cambridge, Massachusetts, USA; **Hannah Carliner**, ScD, MPH, Department of Epidemiology, Mailman School of Public Health, Columbia University, New York, USA; **Laurie Martin**, ScD, MPH, RAND Corporation, Santa Monica, California, USA; **Larry J. Seidman**, PhD, Massachusetts Mental Health Center Public Psychiatry Division of the Beth Israel Deaconess Medical Center, and Department of Psychiatry, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts, USA; **Stephen L. Buka**, ScD, Department of Epidemiology, Brown University, Providence, Rhode Island, USA; **Stephen E. Gilman**, ScD, Department of Social and Behavioral Sciences and Department of Epidemiology, Harvard School of Public Health Boston, Department of Psychiatry, Massachusetts General Hospital, Boston, Massachusetts, USA

Correspondence: Stephen E. Gilman, Harvard School of Public Health, 677 Huntington Avenue, Boston, MA 02115, USA. Email: sgilman@hsph.harvard.edu

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words

Survival in somatoform disorders

Santosh K. Chaturvedi, Geetha Desai

Feeling sick or ill is a worthy investment. It is like a defence and a protective mechanism a blessing in disguise. Studies show that the standardised mortality rates for somatoform disorders are much lower than mortality rates for most psychiatric disorders. The health concern and anxiety keeps such patients under constant medical vigil. Though at a heavy cost of repeated investigations and burden on healthcare systems, those who feel sick despite reassurances will likely outlive others! As Kay (Diane Keaton) tells the ailing Michael Corleone (Al Pacino) in *The Godfather Part III*, 'The sicker you are the wiser you get'!

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