SUPPLEMENTARY INFORMATION

Genetic Association of Attention-Deficit/Hyperactivity Disorder and Major Depression With Suicidal Ideation and Attempts in Children: The ABCD Study

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Figure S1. Genetic diversity of ABCD participants.

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**Table S1. Summary of lifetime suicide risk outcome measures.** KSADS-5: Kiddie schedule for affective disorders and schizophrenia for diagnostic and statistical manual for mental disorders 5th version. Youth and caregiver reports were used to calculate the number of cases using the listed KSADS-5 items. Total number of the participants was 11,878 for the baseline and 11,235 for the year 1.

| Outcome Measure             | Case Numbers (%) | | | | | | | | | |
|----------------------------|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|------------------|--|-------------------|
Table S2. Summary of eight psychiatric disorder GWAS datasets. ASD: autism spectrum disorder; ANX: anxiety disorder; ANO: anorexia nervosa; BIP: bipolar disorder; MD: major depression; SCZ: schizophrenia disorder

| Disorder | # Cases | # Controls | # All Study Samples | Pubmed ID | Download Source |
|----------|---------|------------|---------------------|-----------|-----------------|
| ADHD     | 19,099 | 34,194     | 53,293              | 30478444 | https://doi.org/10.6084/m9.figshare.14671965 |
| ASD      | 18,381 | 27,969     | 46,350              | 30804558 | https://doi.org/10.6084/m9.figshare.14671989 |
| ANX      | NA     | NA         | 175,163             | 31906708 | https://doi.org/10.6084/m9.figshare.14102594 |
| ANO      | 16,992 | 55,525     | 72,517              | 31308545 | https://doi.org/10.6084/m9.figshare.14671980 |
| BIP      | 41,917 | 371,549    | 413,466             | 31043756 | https://doi.org/10.6084/m9.figshare.14102594 |
| MD       | 170,756| 329,443    | 500,199             | 30718901 | https://datashare.ed.ac.uk/handle/10283/3203 |
| PTSD     | 23,212 | 151,447    | 174,659             | 31594949 | https://doi.org/10.6084/m9.figshare.14672133 |
| SCZ      | 40,675 | 64,643     | 105,318             | 29483656 | https://doi.org/10.6084/m9.figshare.14681220 |
Table S3. Comparison of the full cohort and the genetics sample of European ancestry. To assess distinct characteristics of suicide risk factors between the two groups, we used Welch’s two-sample t-test for quantitative measures and proportion tests for categorical variables in R (v4.0.5).

| Variable                        | N (Full Cohort) | N (Genetics Cohort) | mean (Full Cohort) | sd (Full Cohort) | mean (Genetics Cohort) | sd (Genetics Cohort) | test     | statistic | p.value |
|--------------------------------|-----------------|---------------------|--------------------|------------------|------------------------|----------------------|----------|-----------|---------|
| Sex                            | 11878           | 4344                | 0.38               | NA               | 0.36                   | NA                   | prop.test | 2.16      | 1.41E-01 |
| Age                            | 118.98          | 7.38                | 119.30             | 7.50             | 0.64                   | NA                   | t.test    | -2.42     | 1.55E-02 |
| Family history of suicide      | 0.36            | NA                  | 0.41               | NA               | 0.36                   | NA                   | prop.test | 17.28     | 3.23E-05 |
| parental.education             | 0.04            | NA                  | 0.13               | NA               | 0.10                   | NA                   | prop.test | 1107.24   | 2.05E-238|
| marital.status                 | 0.20            | NA                  | 0.45               | NA               | 0.20                   | NA                   | prop.test | 666.21    | 6.66E-147|
| household.income               | 0.16            | NA                  | 0.37               | NA               | 0.24                   | NA                   | prop.test | 1080.34   | 2.55E-235|
| poverty                        | 0.42            | NA                  | 0.09               | NA               | 0.09                   | NA                   | prop.test | 621.32    | 3.86E-137|

CBCL Total Problem T-score     | 45.85           | 10.66               | 46.09              | 11.34            | 0.34                   | NA                   | t.test    | -1.23     | 2.20E-01 |
Table S4. Comparison of the case groups identified from the full cohort and from the genetic sample with respect to demographic, socioeconomic, and child psychopathology measures. Cases include samples with SI and/or SA. To assess distinct characteristics of suicide risk factors between the two groups, we used Welch’s two-sample t-test for quantitative measures and proportion tests for categorical variables in R (v4.0.5).

| variable                  | Case # (Full Cohort) | Case # (Genetics Cohort) | mean (Full) | mean (Genetics Cohort) | test | statistic | p.value |
|---------------------------|----------------------|--------------------------|-------------|------------------------|------|-----------|---------|
| Age                       | 1040                 | 376                      | 9.91        | 9.89                   | t.test | 0.43      | 6.64E-01 |
| Sex                       | 0.37                 | 0.35                     |             |                        | prop.test | 0.11      | 7.45E-01 |
| CBCL Total Problem score  | 51.21                | 52.09                    |             |                        | t.test | -1.30     | 1.92E-01 |
| family suicide history    | 0.35                 | 0.41                     |             |                        | prop.test | 2.51      | 1.13E-01 |
| parental.education        | 0.09                 | 0.18                     |             |                        | prop.test | 52.19     | 1.26E-10 |
| marital.status            | 0.25                 | 0.43                     |             |                        | prop.test | 31.54     | 1.96E-08 |
| household.income          | 0.23                 | 0.37                     |             |                        | prop.test | 41.55     | 9.48E-10 |
| poverty                   | 0.40                 | 0.13                     |             |                        | prop.test | 39.33     | 3.57E-10 |
Table S5. Results of logistic regression analysis for eight psychiatric disorder PRSs on the youth-report-based lifetime suicide risk outcome measures. To examine association of PRSs and lifetime suicide risk, we used multiple logistic regression glm in R. Each outcome measure was used as a binary dependent variable, while PRS was used as a predictor variable along with age, sex, ten principal components of genetic ancestry as covariates. To measure the unique proportion of variance explained by PRSs, we calculated Nagelkerke’s pseudo-$R^2$. Associations with FDR q less than 0.05 are highlighted in bold.

| PRS | PHENO | Event | Subject_No | Case_No | Case_Ratio | R2_DIFF | Estimate | SE | statistics | OR | L95 | H95 | Pvalue | cor_Pvalue | FDR q |
|-----|-------|-------|------------|---------|------------|---------|----------|----|------------|----|------|------|---------|------------|-------|
| ADHD | NSI | baseline | 4344 | 256 | 0.06 | 0.06 | 0.06 | 0.06 | 0.98 | 1.07 | 0.94 | 1.21 | 3.26E-01 | 1.00E+00 | 5.74E-01 |
|      | SI | year1 | 4212 | 71 | 0.02 | 1.52 | 0.38 | 0.12 | 3.15 | 1.47 | 1.16 | 1.86 | 1.61E-03 | 7.73E-02 | 1.64E-02 |
| ANX  | NSI | baseline | 4344 | 256 | 0.06 | 0.07 | 0.07 | 0.07 | 1.07 | 1.07 | 0.94 | 1.22 | 2.83E-01 | 1.00E+00 | 5.22E-01 |
|      | SI | year1 | 4212 | 71 | 0.02 | 0.19 | 0.13 | 0.13 | 1.11 | 1.14 | 0.9 | 1.45 | 2.67E-01 | 1.00E+00 | 5.22E-01 |
| ASO  | NSI | baseline | 4344 | 256 | 0.08 | 0.06 | 0.06 | 0.05 | -0.99 | 0.94 | 0.85 | 1.05 | 2.80E-01 | 1.00E+00 | 5.21E-01 |
|      | SI | year1 | 4212 | 71 | 0.13 | 0.01 | 0.03 | 0.05 | -0.56 | 0.97 | 0.89 | 1.07 | 5.73E-01 | 1.00E+00 | 7.45E-01 |
| BIP  | NSI | baseline | 4344 | 256 | 0.06 | 0.00 | 0.01 | 0.01 | 0.11 | 1.01 | 0.89 | 1.14 | 9.12E-01 | 1.00E+00 | 9.12E-01 |
|      | SI | year1 | 4212 | 71 | 0.02 | 0.06 | 0.08 | 0.12 | -0.62 | 0.93 | 0.73 | 1.17 | 5.33E-01 | 1.00E+00 | 7.45E-01 |
| MO   | NSI | baseline | 4344 | 256 | 0.08 | 0.02 | 0.01 | 0.05 | -0.34 | 0.98 | 0.88 | 1.09 | 7.31E-01 | 1.00E+00 | 8.35E-01 |
|      | SI | year1 | 4212 | 71 | 0.13 | 0.00 | 0.01 | 0.05 | 0.27 | 1.01 | 0.93 | 1.11 | 7.83E-01 | 1.00E+00 | 8.35E-01 |
| PTSD | NSI | baseline | 4344 | 256 | 0.06 | 0.10 | 0.08 | 0.06 | 1.25 | 1.08 | 0.96 | 1.23 | 2.10E-01 | 1.00E+00 | 4.89E-01 |
|      | SI | year1 | 4212 | 71 | 0.02 | 0.22 | 0.11 | 0.05 | 2.06 | 1.12 | 1.01 | 1.34 | 3.92E-02 | 1.00E+00 | 7.17E-01 |
| SCZ  | NSI | baseline | 4344 | 256 | 0.08 | 0.09 | 0.07 | 0.05 | 1.29 | 1.07 | 0.96 | 1.19 | 1.96E-01 | 1.00E+00 | 4.85E-01 |
|      | SI | year1 | 4212 | 71 | 0.13 | 0.22 | 0.1 | 0.05 | 2.21 | 1.11 | 1.01 | 1.21 | 2.70E-02 | 1.00E+00 | 4.85E-01 |

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Table S6. Results of logistic regression analysis that includes both ADHD and major depression PRSs as predictors. Each outcome measure was used as a binary dependent variable, while depression and ADHD PRSs were used as independent variables along with age, sex, ten principal components of genetic ancestry as covariates. To measure the unique proportion of variance explained by PRSs, we calculated Nagelkerke’s pseudo-$R^2$. MD: major depression, SA: suicide attempts, SI: suicidal ideation. Estimate1, Std_Err1, and Pvalue1 are the effect estimate, standard error, and p-value for ADHD, while Estimate2, Std_Err2, and Pvalue2 are the effect estimate, standard error, and p-value for MD. R2_DIFF_m3vsm1 means the difference of the Nagelkerke’s $R^2$ for the model with and without two PRSs.

| PRS1 | PRS2 | PHENO | Event       | Subject_No | Case_No | Case_Ratio | R2_DIFF_m3vsm1 | Estimate1 | Std_Err1 | Pvalue1 | Estimate2 | Std_Err2 | Pvalue2 |
|------|------|-------|-------------|------------|---------|------------|----------------|------------|----------|---------|-----------|----------|---------|
| ADHD | MD   | SA    | baseline    | 4344       | 37      | 0.009      | 3.09E-02       | 0.10       | 0.17     | 5.38E-01 | 0.60      | 0.17     | 5.10E-04 |
| ADHD | MD   | SA    | year 1      | 4212       | 71      | 0.017      | 1.99E-02       | 0.32       | 0.12     | 9.20E-03 | 0.44      | 0.12     | 3.64E-04 |
| ADHD | MD   | SI    | baseline    | 4344       | 367     | 0.084      | 1.61E-03       | 0.14       | 0.06     | 1.09E-02 | 0.10      | 0.06     | 8.07E-02 |
| ADHD | MD   | SI    | year 1      | 4212       | 545     | 0.129      | 2.99E-03       | 0.19       | 0.05     | 5.36E-05 | 0.12      | 0.05     | 9.64E-03 |
Table S7. Results of logistic regression analysis for eight psychiatric disorder PRSs on the parent-report-based lifetime suicide risk outcome measures. To examine association of PRSs and lifetime suicide risk, we used multiple logistic regression glm in R. Each outcome measure was used as a binary dependent variable, while PRS was used as a predictor variable along with age, sex, ten principal components of genetic ancestry as covariates. To measure the unique proportion of variance explained by PRSs, we calculated Nagelkerke’s pseudo-$R^2$. NSSI: non-suicidal self-injury, SA: suicide attempts, SI: suicidal ideation. adhd: attention-deficits hyperactivity disorder, ano: anorexia nervosa, anx: general anxiety disorder, asd: autism spectrum disorder, bip: bipolar disorder, mdd: major depression, ptsd: post-traumatic stress disorder, scz: schizophrenia. Estimate, SE, and Pvalue are the effect estimate, standard error, and p-value for the corresponding PRS. OR is the exponential of the estimate, and L95 and H95 denotes the 95% confidence intervals for the OR estimate. R2_DIFF refers the difference of the Nagelkerke’s $R^2$ for the model with and without a PRS.

| Event | PHENO | PRS  | Subject_No | Case_No | Case_Ratio | R2_DIFF | Estimate | SE    | statistics | OR  | L95  | H95  | Pvalue  | FDR q  | Bonf.P |
|-------|-------|------|------------|---------|------------|----------|----------|-------|------------|------|-------|-------|---------|--------|--------|
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
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|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
|       |       |      |            |         |            |          |          |       |            |      |       |       |         |        |        |
Table S8. Partial correlation between PRSs and CBCL measures. To examine association of PRSs with child psychopathology, we calculated partial correlation between the two, adjusting for ancestry principal components, using the R `ppcor` package. Along with Pearson correlation estimates, t-score statistics were used to represent a standardized relationship of the two variables.

| PRS EVENT | CBCL Variable                  | estimate | statistic | p.value     | cor.p   |
|-----------|--------------------------------|----------|-----------|-------------|---------|
| baseline  | cbcl_scr_syn_aggressive_t       | 0.08     | 4.97      | 7.01E-07    | 3.08E-05|
|           | cbcl_scr_syn_anxdep_t          | 0.03     | 1.78      | 7.44E-02    | 1.00E+00|
|           | cbcl_scr_syn_attention_t       | 0.09     | 5.91      | 3.77E-09    | 1.66E-07|
|           | cbcl_scr_syn_external_t        | 0.09     | 6.21      | 5.90E-10    | 2.60E-08|
|           | cbcl_scr_syn_internal_t        | 0.04     | 2.61      | 9.00E-03    | 3.96E-01|
|           | cbcl_scr_syn_rulebreak_t       | 0.09     | 5.61      | 2.11E-08    | 9.27E-07|
|           | cbcl_scr_syn_social_t          | 0.06     | 3.90      | 9.60E-05    | 4.22E-03|
|           | cbcl_scr_syn_somatic_t         | 0.05     | 3.58      | 3.43E-04    | 1.51E-02|
|           | cbcl_scr_syn_thought_t         | 0.06     | 3.67      | 2.43E-04    | 1.07E-02|
|           | cbcl_scr_syn_totprob_t         | 0.08     | 5.55      | 3.07E-08    | 1.35E-06|
|           | cbcl_scr_syn_withdep_t         | 0.04     | 2.42      | 1.56E-02    | 6.88E-01|
| ADHD      | cbcl_scr_syn_aggressive_t       | 0.08     | 5.31      | 1.15E-07    | 5.05E-06|
|           | cbcl_scr_syn_anxdep_t          | 0.04     | 2.44      | 1.49E-02    | 6.56E-01|
|           | cbcl_scr_syn_attention_t       | 0.10     | 6.66      | 3.08E-11    | 1.35E-09|
|           | cbcl_scr_syn_external_t        | 0.10     | 6.72      | 2.12E-11    | 9.31E-10|
|           | cbcl_scr_syn_internal_t        | 0.06     | 3.64      | 2.80E-04    | 1.23E-02|
|           | cbcl_scr_syn_rulebreak_t       | 0.11     | 6.82      | 1.07E-11    | 4.70E-10|
|           | cbcl_scr_syn_social_t          | 0.07     | 4.22      | 2.48E-05    | 1.09E-03|
|           | cbcl_scr_syn_somatic_t         | 0.06     | 3.79      | 1.53E-04    | 6.71E-03|
|           | cbcl_scr_syn_thought_t         | 0.07     | 4.73      | 2.28E-06    | 1.01E-04|
|           | cbcl_scr_syn_totprob_t         | 0.10     | 6.57      | 5.82E-11    | 2.56E-09|
|           | cbcl_scr_syn_withdep_t         | 0.05     | 3.07      | 2.17E-03    | 9.56E-02|
| year1     | cbcl_scr_syn_aggressive_t       | 0.07     | 4.75      | 2.07E-06    | 9.09E-05|
|           | cbcl_scr_syn_anxdep_t          | 0.07     | 4.84      | 1.35E-06    | 5.95E-05|
|           | cbcl_scr_syn_attention_t       | 0.06     | 3.71      | 2.14E-04    | 9.41E-03|
|           | cbcl_scr_syn_external_t        | 0.09     | 6.25      | 4.41E-10    | 1.94E-08|
|           | cbcl_scr_syn_internal_t        | 0.09     | 5.61      | 2.09E-08    | 9.21E-07|
|           | cbcl_scr_syn_rulebreak_t       | 0.08     | 5.48      | 4.53E-08    | 1.99E-06|
|           | cbcl_scr_syn_social_t          | 0.08     | 4.99      | 6.26E-07    | 2.75E-05|
|           | cbcl_scr_syn_somatic_t         | 0.08     | 5.45      | 5.46E-08    | 2.40E-06|
|           | cbcl_scr_syn_thought_t         | 0.07     | 4.32      | 1.57E-05    | 6.89E-04|
|           | cbcl_scr_syn_totprob_t         | 0.10     | 6.43      | 1.46E-10    | 6.43E-09|
|           | cbcl_scr_syn_withdep_t         | 0.06     | 3.98      | 7.12E-05    | 3.13E-03|
| MD        | cbcl_scr_syn_aggressive_t       | 0.08     | 5.05      | 4.67E-07    | 2.06E-05|
|           | cbcl_scr_syn_anxdep_t          | 0.07     | 4.57      | 5.12E-06    | 2.25E-04|
|           | cbcl_scr_syn_attention_t       | 0.07     | 4.25      | 2.20E-05    | 9.70E-04|
|           | cbcl_scr_syn_external_t        | 0.10     | 6.31      | 3.08E-10    | 1.36E-08|
|           | cbcl_scr_syn_internal_t        | 0.08     | 5.11      | 3.38E-07    | 1.49E-05|
|           | cbcl_scr_syn_rulebreak_t       | 0.09     | 5.58      | 2.60E-08    | 1.14E-06|
|           | cbcl_scr_syn_social_t          | 0.08     | 5.21      | 2.03E-07    | 8.94E-06|
|           | cbcl_scr_syn_somatic_t         | 0.07     | 4.35      | 1.42E-05    | 6.25E-04|
|           | cbcl_scr_syn_thought_t         | 0.09     | 5.62      | 2.08E-08    | 9.17E-07|
|           | cbcl_scr_syn_totprob_t         | 0.10     | 6.49      | 9.53E-11    | 4.19E-09|
|           | cbcl_scr_syn_withdep_t         | 0.06     | 3.91      | 9.27E-05    | 4.08E-03|
Table S9. Multiple logistic regression analysis results of the base and the PRS model. We assessed predictive improvement of PRSs on suicidality independent of known risk factors using two logistic regression models in R. The first model included known risk factors of suicide as independent variables (i.e., base model), while the second model included an additional variable of polygenic risk score (i.e., genetic risk model). In all analyses, we included ten ancestry principal components as covariates to account for potential population sub-stratification. Along with Nagelkerke’s pseudo-$R^2$, the likelihood ratio test was performed to assess whether a genetic risk model significantly improves the prediction of suicidality compared to a base model in R (v4.0.5). SA: suicide attempts, SI: suicidal ideation. ADHD: attention-deficits hyperactivity disorder, MD: major depression. Estimate, Std_Error, and Pvalue are the effect estimate, standard error, and p-value for the corresponding PRS. OR is the exponential of the estimate, and L95 and H95 denotes the 95% confidence intervals for the OR estimate. R2_DIFF refers the difference of the Nagelkerke’s R² for the model with and without a PRS. Associations with the p value less than 0.05 are highlighted in gray.

| ASSESSMENT | PHENO | PRS   | Subject_No | Case_No | Case_Ratio | CBCL_VARIABLE | R2_DIFF | Estimate | Std_Error | OR  | L95  | H95  | Pvalue |
|------------|-------|-------|------------|---------|------------|---------------|----------|----------|-----------|------|------|------|--------|
| baseline   | SA    | MD    | 4344       | 37      | 0.009      | cbcl_scr_syn_totprob_t | 0.0187   | 0.486    | 0.175     | 1.55 | 1.10 | 2.18 | 1.27E-02 |
| year1      | SA    | MD    | 4212       | 71      | 0.017      | cbcl_scr_syn_totprob_t | 0.0117   | 0.324    | 0.127     | 1.38 | 1.08 | 1.77 | 1.05E-02 |
| baseline   | SI    | ADHD  | 4344       | 367     | 0.084      | cbcl_scr_syn_totprob_t | 0.0013   | 0.086    | 0.057     | 1.09 | 0.98 | 1.22 | 1.30E-01 |
| year1      | SI    | ADHD  | 4212       | 545     | 0.129      | cbcl_scr_syn_totprob_t | 0.0039   | 0.139    | 0.048     | 1.15 | 1.05 | 1.26 | 3.71E-03 |
Table S10. Results of multiple logistic regression analysis that includes both ADHD and major depression PRSs, along with clinical, familial, and sociodemographic risk factors of suicide. Each outcome measure was used as a binary dependent variable, while depression and ADHD PRSs were used as independent variables along with known risk factors of suicide, age, sex, ten principal components of genetic ancestry as covariates. To measure the unique proportion of variance explained by PRSs, we calculated Nagelkerke’s pseudo-$R^2$. Due to space limitation, the wide table is displayed continuously in two sections. SA: suicide attempts, SI: suicidal ideation. ADHD: attention-deficits hyperactivity disorder, MD: major depression. Estimate1, Std_Err1, and Pvalue1 are the effect estimate, standard error, and p-value for the first PRS, while Estimate2, Std_Err2, and Pvalue2 are the effect estimate, standard error, and p-value for the second PRS. R2_DIFF_m2vsm0 refers to the difference of the Nagelkerke’s $R^2$ for the model with and without the second PRS. R2_DIFF_m3vsm0 refers to the difference of the Nagelkerke’s $R^2$ for the model with and without two PRSs. LRtest.p refers to the p-value of the likelihood ratio test between the model including both PRSs and the model including only the first PRS.

| baseline | PHENO | PRS1 | PRS2 | Subject_No | Case_No | Case_Ratio | CBCL_TSCORE | R2_DIFF_m1vsm0 |
|----------|-------|------|------|------------|---------|------------|-------------|----------------|
| baseline | SA    | MD   | ADHD | 4344       | 37      | 0.009      | cbcl_scr_syn_totprob_t | 0.019          |
| year1    | SA    | MD   | ADHD | 4212       | 71      | 0.017      | cbcl_scr_syn_totprob_t | 0.012          |
| year1    | SI    | ADHD | MD   | 4212       | 545     | 0.129      | cbcl_scr_syn_totprob_t | 0.004          |

| R2_DIFF_m2vsm0 | R2_DIFF_m3vsm0 | Beta1 | Std_Error1 | Pvalue1 | Beta2 | Std_Error2 | Pvalue2 | LRtest.p |
|----------------|----------------|-------|------------|---------|-------|------------|---------|----------|
| 0.000          | 0.019          | 4.44E-01 | 1.76E-01 | 1.18E-02 | -6.59E-02 | 1.82E-01 | 7.17E-01 | 7.17E-01 |
| 0.005          | 0.015          | 3.02E-01 | 1.27E-01 | 1.78E-02 | 1.71E-01 | 1.30E-01 | 1.66E-01 | 1.66E-01 |
| 0.001          | 0.005          | 1.32E-01 | 4.84E-02 | 6.51E-03 | 6.23E-02 | 4.81E-02 | 1.96E-01 | 1.95E-01 |
Table S11. Sensitivity analysis results of depression and ADHD PRS risk models with respect to ten different p-value thresholds. PRS Threshold refers to the p-value used to generate PRS for each disorder. For example, Pt_5e.08 means SNPs with the p-value \( \leq 5 \times 10^{-8} \) from the disorder GWAS were used to calculate the PRS for the study participants in the ABCD. LRtest.p refers to the p-value of the likelihood ratio test between the model with and without the PRS.

| PHENO | Event | PRS          | Subject No | Case No | Case Ratio | PRS Threshold   | CBCL_TSCORE | R2_DIFF | Estimate | Std_Error | statistics | Pvalue | LRtest.p |
|-------|-------|--------------|------------|---------|------------|----------------|-------------|----------|----------|-----------|------------|--------|----------|
| SA    | baseline MD | 4344 37 0.009 Pt_5e.08 | no.cbcld | 1.30% | 0.41 | 0.19 | 2.21 | 2.69E-02 | 2.19E-02 |
| SA    | baseline MD | 4344 37 0.009 Pt_5e.05 | no.cbcld | 1.19% | 0.37 | 0.17 | 2.19 | 2.88E-02 | 2.81E-02 |
| SA    | baseline MD | 4344 37 0.009 Pt_0.005 | no.cbcld | 2.31% | 0.51 | 0.17 | 3.04 | 3.79E-03 | 2.23E-03 |
| SA    | baseline MD | 4344 37 0.009 Pt_0.05 | no.cbcld | 3.50% | 0.62 | 0.17 | 3.19 | 3.21E-04 | 2.44E-04 |
| SA    | baseline MD | 4344 37 0.009 Pt_0.1  | no.cbcld | 3.58% | 0.54 | 0.17 | 3.19 | 1.42E-03 | 2.44E-03 |
| SA    | baseline MD | 4344 37 0.009 Pt_0.2  | no.cbcld | 2.19% | 0.50 | 0.17 | 2.95 | 3.20E-03 | 2.91E-03 |
| SA    | baseline MD | 4344 37 0.009 Pt_0.3  | no.cbcld | 1.57% | 0.42 | 0.17 | 2.50 | 2.04E-02 | 1.67E-02 |
| SA    | baseline MD | 4344 37 0.009 Pt_0.4  | no.cbcld | 1.86% | 0.46 | 0.17 | 2.71 | 6.89E-03 | 6.71E-03 |
| SA    | baseline MD | 4344 37 0.009 Pt_0.5  | no.cbcld | 1.55% | 0.42 | 0.17 | 2.48 | 1.35E-02 | 1.35E-02 |
| SA    | baseline MD | 4344 37 0.009 Pt_1    | no.cbcld | 1.45% | 0.41 | 0.17 | 2.39 | 1.62E-02 | 1.56E-02 |
| SA    | baseline MD | 4344 37 0.009 Pt_5e.08 | cbcld_scr_syn_totprob_t | 2.12% | 0.36 | 0.18 | 1.96 | 4.94E-02 | 4.34E-02 |
| SA    | baseline MD | 4344 37 0.009 Pt_5e.05 | cbcld_scr_syn_totprob_t | 0.68% | 0.26 | 0.17 | 1.51 | 1.31E-01 | 1.31E-01 |
| SA    | baseline MD | 4344 37 0.009 Pt_0.005 | cbcld_scr_syn_totprob_t | 1.38% | 0.38 | 0.17 | 2.15 | 3.14E-02 | 3.07E-02 |
| SA    | baseline MD | 4344 37 0.009 Pt_0.05  | cbcld_scr_syn_totprob_t | 1.87% | 0.44 | 0.17 | 2.49 | 1.27E-02 | 1.18E-02 |
| SA    | baseline MD | 4344 37 0.009 Pt_0.1   | cbcld_scr_syn_totprob_t | 1.39% | 0.38 | 0.18 | 2.15 | 3.12E-02 | 2.99E-02 |
| SA    | baseline MD | 4344 37 0.009 Pt_0.2   | cbcld_scr_syn_totprob_t | 1.17% | 0.35 | 0.18 | 1.98 | 4.73E-02 | 4.64E-02 |
| SA    | baseline MD | 4344 37 0.009 Pt_0.3   | cbcld_scr_syn_totprob_t | 0.64% | 0.26 | 0.18 | 1.46 | 1.43E-01 | 1.42E-01 |
| SA    | baseline MD | 4344 37 0.009 Pt_0.4   | cbcld_scr_syn_totprob_t | 0.88% | 0.31 | 0.18 | 1.72 | 8.59E-02 | 8.43E-02 |
| SA    | baseline MD | 4344 37 0.009 Pt_0.5   | cbcld_scr_syn_totprob_t | 0.64% | 0.26 | 0.18 | 1.47 | 1.43E-01 | 1.41E-01 |
| SA    | baseline MD | 4344 37 0.009 Pt_1     | cbcld_scr_syn_totprob_t | 0.59% | 0.25 | 0.18 | 1.40 | 1.61E-01 | 1.59E-01 |

Continued on the next page
| PHENO | Event | PRS | Subject No | Case No | Case Ratio | PRS Threshold | CBLCL_TSCORE | R2_DIFF | Estimate | Std_Error | statistics | Pvalue | LTest.p |
|-------|-------|----|------------|--------|------------|---------------|---------------|-----------|-----------|-----------|-----------|---------|--------|
| SL    | baseline | ADHD | 4344 367 | 0.084   | P0.08      | no.cbl        | 0.00%         | 0.00      | 0.05      | 0.01      | 9.93E-01  | 9.93E-01 |
| SL    | baseline | ADHD | 4344 367 | 0.084   | P0.05      | no.cbl        | 0.24%         | 0.12      | 0.06      | 2.12      | 3.42E-02  | 3.41E-02 |
| SL    | baseline | ADHD | 4344 367 | 0.084   | P0.05      | no.cbl        | 0.19%         | 0.10      | 0.05      | 1.90      | 5.78E-02  | 5.77E-02 |
| SL    | baseline | ADHD | 4344 367 | 0.084   | P0.05      | no.cbl        | 0.42%         | 0.16      | 0.06      | 2.82      | 4.75E-03  | 4.65E-03 |
| SL    | baseline | ADHD | 4344 367 | 0.084   | P0.05      | no.cbl        | 0.46%         | 0.16      | 0.05      | 2.96      | 3.05E-03  | 3.01E-03 |
| SL    | baseline | ADHD | 4344 367 | 0.084   | P0.05      | no.cbl        | 0.33%         | 0.14      | 0.05      | 2.50      | 1.24E-02  | 1.23E-02 |
| SL    | baseline | ADHD | 4344 367 | 0.084   | P0.05      | no.cbl        | 0.31%         | 0.13      | 0.05      | 2.43      | 1.51E-02  | 1.49E-02 |
| SL    | baseline | ADHD | 4344 367 | 0.084   | P0.05      | no.cbl        | 0.36%         | 0.14      | 0.06      | 2.62      | 8.72E-03  | 8.61E-03 |
| SL    | baseline | ADHD | 4344 367 | 0.084   | P0.05      | no.cbl        | 0.37%         | 0.15      | 0.06      | 2.66      | 7.78E-03  | 7.67E-03 |
| SL    | baseline | ADHD | 4344 367 | 0.084   | P0.05      | no.cbl        | 0.38%         | 0.15      | 0.06      | 2.67      | 7.59E-03  | 7.48E-03 |
| SL    | baseline | ADHD | 4344 367 | 0.084   | P0.05      | no.cbl        | 0.39%         | 0.16      | 0.06      | 2.68      | 7.45E-03  | 7.34E-03 |

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## Table S12. Logistic regression analysis results of new onset cases in year 1 using baseline features. fam_scd refers to the family history of suicide.

| Dependent Variable | Estimate | Std | Error | OR  | L95  | H95  | z    | Pr(>|z|) |
|--------------------|----------|-----|-------|-----|------|------|------|---------|
| new onset SA in year 1 |          |     |       |     |      |      |      |         |
| age                | 0.35     | 0.15| 1.42  | 1.06| 1.91 | 2.35 | 1.87E-02 | *       |
| sex                | 0.12     | 0.30| 1.13  | 0.63| 2.04 | 0.41 | 6.79E-01 |         |
| marital.status     | -0.62    | 0.35| 0.54  | 0.27| 1.07 | -1.77| 7.76E-02 |         |
| parental.education | -0.11    | 0.16| 0.89  | 0.66| 1.22 | -0.70| 4.83E-01 |         |
| household.income   | -0.06    | 0.17| 0.94  | 0.68| 1.32 | -0.34| 7.34E-01 |         |
| poverty            | -0.14    | 0.57| 0.87  | 0.28| 2.66 | -0.25| 8.03E-01 |         |
| cbcl_total         | 0.99     | 0.15| 2.70  | 2.00| 3.64 | 6.53 | 6.72E-11 | ***     |
| fam_scd            | 0.21     | 0.11| 1.24  | 0.99| 1.55 | 1.90 | 5.76E-02 |         |
| MD_PRS             | 0.34     | 0.15| 1.40  | 1.04| 1.89 | 2.25 | 2.47E-02 | *       |
| ADHD_PRS           | 0.25     | 0.15| 1.28  | 0.95| 1.72 | 1.63 | 1.04E-01 |         |

| Dependent Variable | Estimate | Std | Error | OR  | L95  | H95  | z    | Pr(>|z|) |
|--------------------|----------|-----|-------|-----|------|------|------|---------|
| new onset SI in year 1 |          |     |       |     |      |      |      |         |
| age                | 0.06     | 0.06| 1.07  | 0.95| 1.20 | 1.07 | 2.84E-01 |         |
| sex                | 0.01     | 0.12| 1.01  | 0.80| 1.28 | 0.11 | 9.13E-01 |         |
| marital.status     | -0.18    | 0.16| 0.83  | 0.61| 1.14 | -1.15| 2.48E-01 |         |
| parental.education | -0.02    | 0.07| 0.98  | 0.86| 1.12 | -0.26| 7.98E-01 |         |
| household.income   | -0.12    | 0.07| 0.89  | 0.77| 1.02 | -1.68| 9.34E-02 |         |
| poverty            | -0.16    | 0.30| 0.85  | 0.48| 1.53 | -0.53| 5.97E-01 |         |
| cbcl_total         | 0.53     | 0.06| 1.70  | 1.52| 1.92 | 8.86 | < 2.00E-16 | ***     |
| fam_scd            | -0.01    | 0.06| 0.99  | 0.89| 1.11 | -0.13| 8.97E-01 |         |
| MD_PRS             | 0.04     | 0.06| 1.04  | 0.92| 1.17 | 0.61 | 5.43E-01 |         |
| ADHD_PRS           | 0.19     | 0.06| 1.21  | 1.07| 1.36 | 3.10 | 1.97E-03 | **       |
Table S13. Two PRS prediction model with suicide PRS and other clinical risk factors, including age, sex, child psychopathology, family history of suicide, socioeconomic status. Due to space limitation, the wide table is displayed continuously in two sections. SA: suicide attempts, SI: suicidal ideation. ADHD: attention-deficits hyperactivity disorder, MD: major depression, SA1: suicide attempt GWAS based on Mullins et al. 2019. Beta1, Std_Err1, and Pvalue1 are the effect estimate, standard error, and p-value for the first PRS, while Beta2, Std_Err2, and Pvalue2 are the effect estimate, standard error, and p-value for the second PRS. R2_DIFF_m1vsm0 refers to the difference of the Nagelkerke’s R^2 for the model with and without the first PRS. R2_DIFF_m2vsm0 refers to the difference of the Nagelkerke’s R^2 for the model with and without the second PRS. R2_DIFF_m3vsm0 refers to the difference of the Nagelkerke’s R^2 for the model with and without two PRSs. LRtest.p refers to the p-value of the likelihood ratio test between the model including both PRSs and the model including only the first PRS.

| baseline | PHENO | PRS1 | PRS2 | Subject_No | Case_No | Case_Ratio | CBCL_TSCORE | R2_DIFF_m1vsm0 |
|----------|-------|------|------|------------|---------|------------|-------------|----------------|
| year1    | SA    | MD   | SA1  | 4344       | 37      | 0.009      | cbcl_scr_syn_totprob_t | 0.019          |
| year1    | SA    | ADHD | SA1  | 4212       | 71      | 0.017      | cbcl_scr_syn_totprob_t | -0.017         |

| R2_DIFF_m2vsm0 | R2_DIFF_m3vsm0 | Beta1 | Std_Error1 | Pvalue1 | Beta2 | Std_Error2 | Pvalue2 | LRtest.p |
|----------------|----------------|-------|------------|---------|-------|------------|---------|----------|
| 0.014          | 0.031          | 4.08E-01 | 1.76E-01  | 2.04E-02 | 3.44E-01 | 1.72E-01 | 4.58E-02 | 4.52E-02 |
| 0.007          | 0.249          | 1.23E-01 | 1.23E-04  | 3.96E-02 | 1.21E-01 | 3.97E-02 | 4.73E-01 | 9.70E-04 |
| 0.002          | 0.104          | 4.80E-02 | 4.41E-03  | 2.87E-02 | 4.75E-02 | 2.89E-02 | 1.37E-01 | 8.44E-03 |
SUPPLEMENTARY FIGURES

Figure S1. Genetic diversity of ABCD participants. The first and the second principal components of ABCD genetic samples after quality control are displayed in the X and the Y-axis respectively. Each dot on the plot represents individuals. ABCD participants who clustered with HapMap III European references are highlighted in blue among other participants in black.
Figure S2. Distinct socioeconomic background of suicidal participants. Plots display socioeconomic background of the genetic cohort compared to the full cohort. The genetics sample consists of European descents and the displayed socioeconomic factors show statistically different proportions of distributions from the full cohort when tested using proportions test ($p<1e-05$). The first clustered bars in red represent highest parental education, and the second clustered bars in blue represent household income. Poverty status is designated if household income is less than $20,000. All socioeconomic data were obtained from the Parent Demographic Survey.