# Title Page

**Manuscript Title:**

Functional outcomes among young people with trajectories of persistent childhood psychopathology:

Results from a nationally representative cohort in Ireland

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# Key Points

**Question:** What functional outcomes in emerging adulthood are associated with persistent childhood psychopathology (ages 9-13)?

**Findings:** This cohort study of 5,014 participants showed that all types of psychopathology in childhood (internalising, externalising, or both) were significantly associated with poor functioning in emerging adulthood. These included poor mental and physical health, social isolation, heavy substance use, frequent health service use, poor subjective wellbeing, and adverse educational/economic outcomes.

**Meaning**: These findings highlight the lasting effects of childhood psychopathology on functional outcomes in emerging adulthood, and point to the need for a public health approach to youth mental health.

# Abstract

**Importance**: Understanding which children in the general population are at greatest risk of poor functional outcomes could improve early screening and intervention strategies.

**Objective**: To investigate the odds of poor outcomes in emerging adulthood (late teens-early 20s), for children with different mental health trajectories.

**Design**: Growing Up in Ireland is a longitudinal, nationally representative, cohort study. Data collection began in 2007/8, and was repeated most recently in 2018/9. All results were weighted to account for sampling bias and attrition, and were adjusted for socioeconomic factors. Data analysis took place June 2022-April 2023.

**Setting**: Population-based.

**Participants**: 5,141 individuals.

**Exposure**: Previously, we found that 4 latent classes captured variation in mental health at ages 9 and 13, based on the parent-completed Strengths and Difficulties Questionnaire (SDQ). Classes included: no psychopathology, internalising, externalising and high (comorbid) psychopathology. We focused on those who remained in the same class from ages 9-13.

**Main Outcomes**: Poor functional outcomes in emerging adulthood were measured at approximate ages 17 (range: 16-18) and 20 (19-21). Outcomes included: poor mental health, poor physical health, social isolation, heavy substance use, frequent health service use, poor subjective wellbeing, and adverse educational/economic outcomes.

**Results:** The sample included 5,141 individuals, classed as having no childhood psychopathology (3,726 [72%]), persistent externalising (1025 [20%]), persistent internalising (243 [5%]), or persistent high psychopathology (147 [3%]). Having any childhood psychopathology was associated with poorer functional outcomes in emerging adulthood. The internalising group had elevated odds of most outcomes (ORs = 1.38-3.09), but not heavy substance use. The externalising group had significantly elevated odds of *all* outcomes, albeit with relatively small effect sizes (ORs = 1.38-1.98). The high psychopathology group had elevated odds of all outcomes (ORs = 1.31-2.91), though with wide confidence intervals. Females with any psychopathology had significantly higher odds of poor physical health and frequent health service use, compared to males.

**Conclusions and Relevance:** In this longitudinal cohort study, we found that childhood psychopathology was associated with a widespread pattern of functional impairment in emerging adulthood. Findings point to the need to for a wider range of preventative interventions in child and adolescent mental health services.

# Introduction

Children with mental health problems are at increased risk of an array of difficulties in young adulthood. Previous research has focused on adult outcomes of specific child/adolescent diagnoses such as ADHD[1,2] and depression[3], and on children who engaged with mental health services[4]. However, children with “sub-threshold” symptoms can also be at increased risk of poor functional outcomes[5,6], and only half of adolescents with a probable mental disorder receive professional support[7,8]. It is therefore important to identify which children in the general population are at risk of poor functional outcomes, regardless of their diagnostic status or help-seeking behaviour. Studies have shown that children with psychopathology who receive psychological/psychiatric treatment often have better long-term functional outcomes, than those who do not receive treatment.[9-12]

Childhood psychopathology is associated with numerous functional impairments in adulthood, including, but not limited to, mental disorder in adulthood.[1,3,4,13-16] Childhood psychopathology has been linked with subsequent respiratory problems, infectious disease, cardiovascular disease, and weight problems.[17-19] This may be partially mediated by smoking, alcohol abuse and illicit drug use.[1,3,20,21] Social isolation and loneliness in young adulthood are also linked with childhood psychopathology, even after accounting for social isolation in childhood.[22,23]

Childhood psychopathology also has long-term economic costs. It is associated with being Not in Employment, Education or Training (NEET) and claiming social benefits in adulthood[4,24-26], which may be partially explained by lower educational attainment.[26-29] Childhood psychopathology may also be associated with more frequent health service-use in adulthood, however this has only been prospectively investigated for childhood ADHD.[e.g.,1]

We opted to group children by their mental health symptoms over time, using data-driven methods. We did so because (1) childhood is characterised by significant movement between diagnostic categories[16] and (2) diagnostic thresholds are relatively arbitrary[6]. Previously, we performed Latent Class Transition Analysis (LCTA) on the Growing Up in Ireland (GUI) longitudinal cohort[30]. Childhood psychopathology groups were based on longitudinal patterns of scores from the Strength and Difficulties Questionnaire (SDQ) across ages 9, 13 and 17. Four groups were identified and were characterised by low scores in all SDQ domains (“no psychopathology”), moderately-high conduct & hyperactivity problems (“externalising”), high emotional & peer problems (“internalising”) and high scores in all domains (“high psychopathology”; **Figure 1**). In this study, we focus on individuals who remained in the same group between ages 9 and 13, which captures the majority of children (85%) and is more likely to capture significant psychopathology.

In these groups, we investigated seven areas of functioning in emerging adulthood: mental health, physical health, heavy substance use, social isolation, health service use, subjective wellbeing, and educational/economic outcomes. We hypothesised that those in the childhood psychopathology groups (internalising, externalising, high psychopathology) would have more poor functional outcomes, compared to the no psychopathology group.

# Methods

## Participants

Growing Up in Ireland (GUI) is an ongoing longitudinal study of children in Ireland. It was commissioned by the Irish Government, and funded by the Department of Health and Children, the Department of Social and Family Affairs, and the Central Statistics Office. Participants were originally sampled from primary schools nationwide, and constituted a nationally-representative sample of 9-year-olds in Ireland (n= 8,658).[31] This sample was followed up at ages 13 (n= 7,423; 88% retention), 17 (n= 6,216; 74%), and 20 (n=5,190; 61%). The latter two waves included participants from a range of ages from 16-18 (80% aged 17) and 19-21 (91% aged 20), respectively. For simplicity, we refer to these as the “age 17” and “age 20” time points. Given the continuity of age ranges, we combined information from these two waves to form outcome measures during “emerging adulthood”. Further sampling detail is available in the eSupplement, and a flowchart of the sample size is shown in eFigure 1.

GUI received ethical approval from the Health Research Board of Ireland. Assent/consent were provided by participants and their parents/carers.

## Measures

### Childhood Psychopathology

In a previous study on this cohort[30], Latent Class Analysis (LCA) and Latent Class Transition Analysis (LCTA) were applied to the four subscales of the parent-reported SDQ scores (emotional, peer, hyperactivity/inattention and conduct problems) from ages 9, 13 and 17 (N = 6,039). Both analyses suggested a 4-class model was the best fit to the data. Individuals were ascribed to a group based on posterior probabilities, with probabilities of final group membership ranging from 55-95%. Model entropy scores suggested low levels of misclassification.

**Figure 1**A depicts the four groups, and inter-group transitions between ages 9 and 13. Only those in the same LCTA group at both 9 and 13 years were included in this study. **Figure 1**B shows average SDQ percentile rankings for each group at ages 9 and 13 (raw SDQ score averages in eTable 3).

For descriptive purposes, we consider a score of 16 or over on the SDQ total problems scale as “high”, indicating clinical significance (sdqinfo.org).

### Emerging Adult Outcomes

Thirty dichotomous variables reflecting various functional outcomes were extracted from age 17 and age 20 data. These variables were grouped into 7 categories, which were the primary outcomes: poor mental health, poor physical health, heavy substance use, frequent health service use, social isolation, poor subjective wellbeing, and adverse educational/economic outcomes.

“Poor mental health” in emerging adulthood was defined as the presence of a mental health difficulty, or at least 1 consultation with a mental health professional in the past year, at either age 17/20. Criteria for “poor physical health” included obesity, difficulties sleeping, or poor general health, at age 17/20. “Heavy substance use” was defined as daily cigarette smoking or alcohol abuse (scores of 15 or more on the AUDIT questionnaire) reported at age 17/20. “Frequent health service use” was defined as at least 1 visit to the accident & emergency department of a hospital, or over 5 visits to their general practitioner per year, at age 17/20. “Social isolation” was considered as having fewer than three friends, or having nobody to turn to for help and advice, at 17/20. “Adverse educational/economic outcomes” included low educational attainment (300 or less points in the Leaving Certificate exams), being NEET (Not in Education Employment or Training), claiming social welfare, or reporting difficulty making ends meet, at age 20. All outcome variables were self-reported by the young person, except mental health difficulties and general health at age 17 (eTable 1).

Almost all participants had data on mental health, physical health, substance use, and health service use in emerging adulthood (N = 5,140-5,141); 5,117-5,118 had data on social isolation and subjective wellbeing; and 4,140 had data on educational/economic outcomes (eFigure 1).

### Covariates

Covariates included sex (male/female) and three socioeconomic factors measured at age 13: household income, parental education, and single parenthood. Household disposable income was equivalized to account for differences in the size and composition of families, and split into deciles to avoid outliers. Parental education was measured by the highest education level among both parents.

## Statistical Analysis

All analyses were performed using R version 4.2.2 (stats::*glm*) . Logistic regressions were used to estimate the odds of each of the 7 primary outcomes for any persistent psychopathology in childhood (internalising/externalising/high), and for each psychopathology group, in reference to the “no psychopathology” group. We also compared the odds of each outcome in a pairwise fashion across the three psychopathology groups.

A Bonferroni-corrected threshold of 0.007(0.05/7) was used to indicate significance. All reported estimates were fully adjusted for sex and socioeconomic factors. Case weights were used in all analyses to ensure representativeness of the target population, and to account for attrition. Age 20 weights were used where available (n= 4,024) and age 17 weights used for all others (n = 1,117). Weights were re-normalised such that their sum equalled the total sample size.

The 7 outcome categories were the primary outcomes, and represented any indicator of that particular functional impairment, at age 17 or 20. However, we also report adjusted odds of each specific indicator, to illustrate how effects may vary across outcome sub-type (e.g. obesity Vs sleep problems).

To check whether results differed between males and females, or between outcomes measured at age 17 and age 20, we performed sex- and age-stratified analyses.

To triangulate methods and facilitate replication, we performed additional analyses using more traditional cut-off points on the SDQ to define child psychopathology. We used the larger sample of 6,039 (before removing those who changed class) to create these groups. High psychopathology was defined by scores ≥80th percentile for all four SDQ scales, at ages 9 *and* 13. Internalising was defined as scoring ≥80th percentile in *either* peer or emotional problems at 9 and 13 years (<80th percentile on the other scales). Externalising was defined as scoring ≥80th percentile in *either* hyperactivity or conduct problems at both 9 and 13 years (<80th percentile on other scales). No psychopathology was defined by scoring <80th percentile in all SDQ scales, at both ages ([sdqinfo.org](http://sdqinfo.org))[32,33].

Further methodological detail is provided in the eSupplement, alongside details of STROBE reporting guidelines for cohort studies.

# Results

The sample (N=5,141) consisted of 3,726 individuals with no childhood psychopathology (72.5%), 1,025 with persistent externalising problems (19.9%), 243 with persistent internalising problems (4.7%), and 147 with persistently high psychopathology (2.9%; **Figure 1A**). The full sample consisted of 50.9% males and 49.1% females. Age at outcome ranged from 16 to 21, and rates of “high” SDQ total scores ranged from 4-5%. Childhood psychopathology groups differed on the proportion of males to females, and socioeconomic factors, validating the inclusion of these covariates in adjusted models (**Table 1**).

Those that were excluded based on changing psychopathology class had significantly more clinically-significant cases and socioeconomic risks, than the included sample, but not significantly more than those with persistent psychopathology. This suggests those with persistent and shifting psychopathology have similar symptom severities and socioeconomic backgrounds (eTable 2).

Each persistent psychopathology group (internalising, externalising and high psychopathology) had higher crude rates of adverse outcomes in young adulthood than to the no psychopathology group. The exception was heavy substance use, which was less common in the internalising group than the no psychopathology group (**Figure 2**).

After controlling for covariates, the odds of all adverse outcomes remained significantly higher for those with any persistent childhood psychopathology, compared to the no psychopathology group. Childhood psychopathology groups had an approximately two-fold increased odds of poor educational/economic outcomes (OR = 2.04 [95% CI = 1.75-2.37]), poor mental health (OR = 1.97 [1.70-2.28]) and poor subjective wellbeing (OR = 1.97 [1.72-2.26]). Slightly lower but still significant effects were observed on social isolation (OR = 1.72 [1.48-2.00]), heavy substance use (OR = 1.69 [1.44-1.98]), physical health problems (OR = 1.65 [1.42-1.91]), and frequent health service use (OR = 1.37 [1.21-1.57]; **Figure 3;** eTable 4).

There were differences in the patterns of poor outcomes among the childhood psychopathology groups (**Figure 3**).

The internalising group had the highest odds of several functional outcomes compared to the other psychopathology groups, most notably poor physical health and adverse educational/economic outcomes. Their odds of heavy substance use was significantly lower than the other two psychopathology groups, and did not significantly differ from the no psychopathology group (**Table 2,** eTable 5). The specific outcome variable most strongly associated with childhood internalising was having few friends at age 20 (OR = 6.08 [3.13-11.83]; **Table 2**)

The externalising group was the only group to have significantly elevated odds of all seven young adult outcomes, albeit with small odds ratios relative to the other psychopathology groups. In particular, their odds of poor mental health in adulthood was significantly lower than other psychopathology groups (eTable 5), but still significantly higher than the no psychopathology group. The specific outcome most strongly associated with childhood externalising was being NEET at age 20 (OR = 3.42 [2.41-4.86] ]; **Table 2**).

The high psychopathology group had the highest odds of heavy substance use of all psychopathology groups, and their odds of mental health problems and poor subjective wellbeing were as high as the internalising group. However, they did not have significantly elevated odds of adverse educational/economic outcomes, poor physical health or frequent health service use, compared to the no psychopathology group, likely due to wide confidence intervals (**Figure 3**). The specific outcome most strongly associated with being in the high psychopathology group was mental health difficulties at age 17 (OR = 7.83 [4.53-13.19]; **Table 2**).

Age-stratified analyses showed that childhood psychopathology remained significantly associated with increased odds of all adverse outcomes, whether they were measured at age 17 or 20. Odds ratios were generally larger for age 17 outcomes, with the exception of social isolation (eTable 6).

Sex-stratified analyses showed broadly similar results for males and females. However, females showed stronger associations between childhood psychopathology and both frequent health service use (OR = 1.69 [1.39-2.05]), and poor physical health (OR = 1.98 [1.62-2.42]). Testing the interaction between childhood psychopathology and sex verified significant moderation by sex (eTables 7-9).

Method Triangulation

Using alternative definitions for persistent childhood psychopathology, 123 individuals (5%) had persistently high psychopathology, 433 had persistent internalising symptoms (17%), 544 had persistent externalising symptoms (22%), and 1,420 had no psychopathology (56%; eTable 10). Results using these alternative groups were broadly similar to original results (eFigure 3). The internalising group had the highest odds of physical health problems of all groups, and had a null effect for heavy substance use. The externalising group had the lowest odds of poor mental health and poor subjective wellbeing, compared to other types of psychopathology (eTable 13). Unlike original results, the high psychopathology group had the highest rates of poor mental health and poor subjective wellbeing of all groups, and the association between internalising and poor educational/economic outcomes was not significant. Results may have varied due to differences in symptom severity, or size, of groups (eTable 3,11).

# Discussion

In this general population study of 5,141 individuals, those with persisting psychopathology from ages 9 to 13 had more difficulties across a range of young adult outcomes, compared to those without childhood psychopathology.

**Replicated and novel findings**

Our findings support two well-replicated observations: (1) childhood psychopathology was linked with a range of adverse outcomes in adulthood, beyond poor mental health[4,5,34] and (2) children with externalising symptoms (with/without comorbid internalising symptoms) were at significant risk of substance use, unlike those with internalising symptoms alone.[35-38]

This study also presents some novel findings.

First, poor educational/economic outcomes were *as likely* as poor mental health for those who experienced persistent childhood psychopathology. Importantly, and replicating other findings[1,4,24], this effect remained significant after controlling for childhood socioeconomic background. Unlike mental health and wellbeing, which may fluctuate in and out of pathological ranges throughout the lifespan[16], low educational attainment is more likely to have long-lasting effects on the individual’s opportunities.

Second, the childhood externalising group, whilst characterised by mostly “subthreshold” SDQ scores, and accounting for 20% of this sample, had the widest range of functional impairments, as evidenced by elevated odds of all 7 young adult outcomes. This mirrors the range of functional outcomes associated with both clinical[9,39,40] and subclinical ADHD symptoms[1,37,41], and highlights the need for diverse and personalised supports for these children.

Lastly, the internalising group had the highest odds of many adverse outcomes, despite a less severe SDQ symptom profile than the high psychopathology group (Figure 1B). It may be that internalising symptoms, such as depressive, anxiety and inter-personal problems, are particularly harmful to functional development, or that these individuals “fly under the radar” in the absence of disruptive behaviours.[42] The internalising group had the highest odds of poor physical health, even when internalising was re-defined using SDQ cut-points. This could be mediated through the HPA-axis activation and inflammation associated with internalising symptoms[43-45]; however, unmeasured factors could also be contributing (e.g., genetic predisposition, pre-existing physical conditions).

**Practical Implications**

Targeting individuals with persistent childhood psychopathology for selective preventative interventions may be an efficient way to prevent poor functional outcomes among young adults. The long-term economic benefits of several intervention programmes for childhood psychopathology have been estimated to outweigh costs of implementation.[46,47]

Over 50% of all childhood psychopathology groups had adverse educational/economic outcomes by age 20 (Figure 2), which is not currently acknowledged within child and adolescent mental health services. Improving the integration between schools and mental health services may boost educational attainment in children with psychopathology[48] and subsequently reduce the risks of employment difficulties.[26]

The odds of frequent health service use were 37% higher in those who experienced persistent childhood psychopathology, than those with no psychopathology. While the effect size was small compared to other functional outcomes, the practical importance of this finding is underlined by the high cost of healthcare. The association appeared to be driven by females (as was the association between psychopathology and poor physical health). Further research is needed to test the generalisability of, and possible reasons for, these sex differences.

Finally, childhood psychopathology was assessed in 2007-2011 in this study, but international evidence suggest that youth mental health has worsened since then.[7,49] Given that the prevalence of childhood psychopathology may have increased, the scale of effects on young adulthood functioning may also have grown.[50]

**Limitations**

First, the sample may have been biased by the exclusion of children without SDQ data from 3 waves (though sampling weights were used to mitigate this), and those who changed classes from 9-13. We excluded this latter group because acknowledging all possible transitions (e.g. internalising-externalising) would have resulted in many qualitatively-different groups. These class-changers showed high levels of socioeconomic and clinical risk (eTable 2), and should be studied in future. Second, SDQs were parent-rated, while outcomes were predominantly youth-rated. Both sources may be biased, but different informants for exposure and outcome reduces the risk of common method variance. Third, unmeasured confounding may exist (e.g., early life adversity/trauma). Fourth, varying levels of missing data across outcomes may limit direct comparisons between them (eFigure 1). Finally, certain exposures and outcomes overlapped conceptually (e.g., SDQ peer problems and social isolation) which may change the interpretation of results to continuation, rather than diversification, of problems.

**Conclusion**

In this cohort study of 5,141 individuals, we found trajectories of persistent childhood psychopathology were related to widespread functional impairments in late adolescence and early 20s. Findings point to the need for improved public screening and treatment of child psychopathology.

# Tables & Figures

Table 1. Demographic and clinical characteristics of the sample

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Persistent Psychopathology Groups** | | | |  |
|  | Full Sample | None | Externalising | Internalising | High | Group Differenced |
| Max. N = | 5,141 | 3,726 | 1,025 | 243 | 147 |
| Male sex (%) | 2,618  (50.9%) | 1838 (49.4%) | 576  (56.1%) | 123  (50.4%) | 82  (55.6%) | 16.2\*\* |
| **Age at outcome (wave 3):** | | | | | | |
| Age 16/17a | 4,124  (80.2%) | 2,979 (80.0%) | 835  (81.5%) | 193  (79.3%) | 116 (79.3%) | 1.4 |
| Age 18 | 1,017  (19.8%) | 746  (20.0%) | 190  (18.5%) | 49  (20.7%) | 30  (20.7%) | 1.4 |
| **Age at outcome (wave 4):** | | | | | | |
| Age 19/20a | 3,694  (91.8%) | 2,706  (92.3%) | 718  (91.0%) | 181  (87.4%) | 89  (91.1%) | 7.0 |
| Age 21 | 330  (8.2%) | 225  (7.7%) | 71  (9.0%) | 26  (12.6%) | 9  (8.9%) | 7.0 |
| Low parental education (%)b | 661  (12.9%) | 404 (10.9%) | 161  (15.7%) | 35  (14.5%) | 60  (41.0%) | 125.0\*\*\* |
| Single parent home (%) | 875  (17.0%) | 513 (13.8%) | 249  (24.3%) | 66  (27.2%) | 47  (32.1%) | 107.5\*\*\* |
| Mean income decile (SD) | 6.21  (2.86) | 6.40  (2.85) | 5.66  (2.82) | 5.66  (2.62) | 4.43  (2.58) | 36.1\*\*\* |
| High SDQ total problem score, age 9 (%)c | 241  (4.7%) | 0  (0%) | 85  (8.3%) | 26  (10.6%) | 130  (90.9%) | 2602.6\*\*\* |
| High SDQ total problem score, age 13 (%)c | 211  (4.1%) | 0  (0%) | 38  (3.7%) | 38  (15.5%) | 135  (92.2%) | 3138.0\*\*\* |
| All statistics are weighted to account for sociodemographic sampling bias and attrition. Parental education, income and single parenthood recorded at participant age 13.  a. Too few participants aged 16 and 19 to list separately (N ≤ 30 in full sample)  b.  Low parental education defined as cases where parent(s) did not complete Leaving Certificate (final secondary school examinations) or an equivalent  c. High SDQ scores defined as scores of 17 or higher, by four-band categorisation system ([sdqinfo.org](http://sdqinfo.org))  d. Group differences across persistent psychopathology groups refer to Chi-square statistics or F-values from ANOVAs, for differences in frequencies and means respectively  \*p < .05, \*\*p < .01, \*\*\*p < .001 | | | | | | |

Table 2.

Adjusted odds of adverse functional outcomes for each childhood psychopathology group (reference group = no psychopathology).

|  | **High Psychopathology**  **n = 147 (2.9%)** | | **Internalising**  **n = 243 (4.7%)** | | **Externalising**  **n = 1,025 (19.9%)** | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Functional Outcome (age, in years)** | **OR (95% CI)** | **p** | **OR (95% CI)** | **p** | **OR (95% CI)** | **p** | |
| **Poor mental health** | **2.91 (2.05-4.12)** | **<.001** | **3.08 (2.33-4.08)** | **<.001** | **1.66 (1.40-1.96)** | **<.001** | |
| Mental health  difficulty (17) \* | 7.73 (4.53-13.19) | <.001 | 3.65 (2.16-6.19) | <.001 | 1.82 (1.23-2.69) | 0.003 | |
| Mental health  difficulty (20) | 3.41 (1.88-6.21) | <.001 | 4.45 (2.99-6.63) | <.001 | 1.68 (1.23-2.29) | 0.001 | |
| Saw mental health professional (17) | 3.51 (2.35-5.27) | <.001 | 3.46 (2.51-4.77) | <.001 | 1.64 (1.32-2.03) | <.001 | |
| Saw mental health professional (20) | 1.17 (0.64-2.12) | 0.62 | 1.45 (0.98-2.16) | 0.06 | 1.42 (1.13-1.77) | 0.003 | |
| **Poor physical health** | **1.53 (1.06-2.21)** | **0.02** | **2.31 (1.74-3.07)** | **<.001** | **1.53 (1.30-1.80)** | **<.001** | |
| Bad general  health (17) \* | 1.42 (0.63-3.17) | 0.40 | 1.91 (1.04-3.50) | 0.04 | 0.74 (0.46-1.19) | 0.22 | |
| Bad general  health (20) | 1.74 (0.82-3.69) | 0.15 | 1.69 (0.95-2.98) | 0.07 | 1.19 (0.82-1.73) | 0.36 | |
| BMI in obese range (17) | 3.02 (1.93-4.74) | <.001 | 2.13 (1.39-3.26) | 0.001 | 1.80 (1.40-2.31) | <.001 | |
| BMI in obese  range (20) | 1.66 (0.91-3.04) | 0.10 | 1.67 (1.10-2.54) | 0.02 | 1.60 (1.26-2.04) | <.001 | |
| Sleep problems  (17) | 0.80 (0.26-2.44) | 0.70 | 1.49 (0.80-2.78) | 0.21 | 2.30 (1.68-3.15) | <.001 | |
| Sleep problems  (20) | 1.71 (0.81-3.62) | 0.16 | 1.72 (1.02-2.91) | 0.04 | 1.83 (1.35-2.47) | <.001 | |
| **Frequent health**  **service use** | **1.31 (0.93-1.83)** | **0.12** | **1.38 (1.05-1.81)** | **0.02** | **1.38 (1.19-1.60)** | **<.001** | |
| ≥ 1 emergency hospital visits per year (17) | 1.03 (0.66-1.62) | 0.89 | 1.07 (0.75-1.55) | 0.70 | 1.20 (0.99-1.45) | 0.06 | |
| ≥ 1 emergency hospital  per year (20) | 1.78 (1.09-2.90) | 0.02 | 1.07 (0.72-1.60) | 0.75 | 1.50 (1.22-1.84) | <.001 | |
| >5 GP visits  per year (17) | 2.10 (1.35-3.27) | 0.001 | 2.15 (1.50-3.08) | <.001 | 1.56 (1.25-1.95) | <.001 | |
| >5 GP visits  per year (20) | 0.40 (0.16-1.01) | 0.05 | 1.36 (0.89-2.07) | 0.16 | 0.94 (0.72-1.23) | 0.66 | |
| **Heavy substance use** | **2.36 (1.63-3.41)** | **<.001** | **1.04 (0.73-1.50)** | **0.82** | **1.77 (1.49-2.11)** | **<.001** | |
| Daily smoker (17) | 2.61 (1.61-4.25) | <.001 | 1.44 (0.88-2.34) | 0.15 | 2.45 (1.93-3.12) | <.001 | |
| Daily smoker (20) | 2.07 (1.25-3.42) | 0.005 | 0.77 (0.47-1.25) | 0.29 | 1.80 (1.44-2.24) | <.001 | |
| Alcohol abuse  (17) | 4.90 (3.02-7.95) | <.001 | 0.83 (0.38-1.78) | 0.63 | 1.84 (1.37-2.46) | <.001 | |
| Alcohol abuse (20) | 2.42 (1.28-4.56) | 0.006 | 0.80 (0.45-1.41) | 0.43 | 1.82 (1.43-2.31) | <.001 | |
| **Social Isolation** | **1.79 (1.23-2.59)** | **0.002** | **1.98 (1.48-2.66)** | **<.001** | **1.65 (1.40-1.95)** | **<.001** | |
| Few friends (17) | 2.63 (1.67-4.15) | <.001 | 2.86 (1.99-4.09) | <.001 | 1.81 (1.44-2.28) | <.001 | |
| Few friends (20) | 0.99 (0.15-6.53) | 0.99 | 6.08 (3.13-11.83) | <.001 | 3.21 (1.90-5.42) | <.001 | |
| No perceived social support (17) | 0.71 (0.36-1.41) | 0.33 | 1.38 (0.90-2.12) | 0.14 | 1.37 (1.09-1.72) | 0.008 | |
| No perceived social support (20) | 2.76 (1.40-5.43) | 0.003 | 1.82 (1.04-3.21) | 0.04 | 1.74 (1.24-2.44) | 0.001 | |
| **Poor subjective wellbeing** | **2.38 (1.69-3.36)** | **<.001** | **2.62 (1.98-3.46)** | **<.001** | **1.80 (1.55-2.09)** | **<.001** | |
| Low self-esteem  (17) | 1.70 (1.13-2.55) | 0.01 | 3.22 (2.41-4.31) | <.001 | 1.94 (1.63-2.29) | <.001 | |
| Low self-esteem  (20) | 1.54 (0.87-2.70) | 0.14 | 2.06 (1.43-2.96) | <.001 | 1.70 (1.37-2.12) | <.001 | |
| Dissatisfied with life (17) | 5.20 (3.52-7.70) | <.001 | 1.64 (1.07-2.51) | 0.02 | 1.86 (1.48-2.35) | <.001 | |
| Dissatisfied with life (20) | 1.65 (1.00-2.72) | 0.05 | 2.55 (1.83-3.55) | <.001 | 1.66 (1.35-2.04) | <.001 | |
| **Adverse educational/ economic outcomes** | **1.64 (1.06-2.51)** | **0.03** | **2.55 (1.87-3.47)** | **<.001** | **1.98 (1.67-2.35)** | **<.001** | |
| Low educational attainment (17/20) | 2.79 (1.53-5.10) | 0.001 | 2.14 (1.49-3.08) | <.001 | 2.98 (2.43-3.65) | <.001 | |
| NEET  (20) | 5.11 (2.73-9.56) | <.001 | 5.08 (3.08-8.36) | <.001 | 3.42 (2.41-4.86) | <.001 | |
| Social welfare  recipient (20) | 2.53 (1.57-4.08) | <.001 | 3.04 (2.17-4.27) | <.001 | 1.10 (0.86-1.40) | 0.44 | |
| Difficulty making ends meet (20) | 0.91 (0.40-2.04) | 0.82 | 1.50 (0.92-2.44) | 0.10 | 1.76 (1.34-2.31) | <.001 |
| Adjusted for child’s sex, parent education level, single-parenthood & household income at age 13  NEET = Not in Education, Employment or Training  \*parent-reported | | | | | | | |

Figure 1.

**A.** Sankey diagram, adapted from Healy et al.[30], showing transition between mental health classes at ages 9 and 13, and the sub-sample chosen for this study within hatched lines. **B.** MeanSDQ scoring profiles for each class, split by age. Vertical reference show 80th and 90th percentiles.

Figure 2.

Unadjusted prevalence of poor functional outcomes, for each childhood mental health group.

Figure 3.

Fully-adjusted odds of poor functional outcomes for each childhood psychopathology group, and all three combined. Reference group: no childhood psychopathology.

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**Authors’ contributions**

Dr Dooley had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Prof Cannon was the senior author of this study.

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