

Long-term economic and social outcomes of youth suicide attempt

Massimiliano Orri, PhD,^{1,2} Francis Vergunst, DPhil,³ Gustavo Turecki, MD PhD,¹ Cédric Galera, MD, PhD,^{2,4} Eric Latimer, PhD,⁵ Samantha Bouchard, BA,⁶ Pascale Domond, PhD,³ Frank Vitaro, PhD,⁷ Yann Algan, PhD,⁸ Richard E. Tremblay, PhD,⁹ Marie-Claude Geoffroy, PhD,^{6*} Sylvana M. Côté, PhD^{10*}

Affiliations:

(1) McGill Group for Suicide Studies, Douglas Mental Health University Institute, Department of Psychiatry, McGill University, Montreal, Canada

(2) Bordeaux Population Health Research Centre Inserm U1218, University of Bordeaux, Bordeaux, France

(3) Ste-Justine Hospital Research Center and Department of Social and Preventive Medicine, University of Montreal, Montreal, Canada

(4) Department of School/Applied Child Psychology, McGill University, and McGill Group for Suicide Studies, Douglas Mental Health University Institute, Department of Psychiatry, McGill University

(4) Department of Child and Adolescent Psychiatry, Charles Perrens Hospital, and Bordeaux Population Health Research Centre Inserm U1218, Bordeaux, France

(5) Douglas Mental Health University Institute, Department of Psychiatry, McGill University, Montreal, Canada

(6) Department of School/Applied Child Psychology, McGill University, Montreal, Canada

(7) School of Psychoeducation, University of Montreal, Montreal, Canada

(8) Sciences Po, OFCE, Paris, France

(9) Department of Pediatrics and Psychology, University of Montreal, Montreal, Canada, and School of Public Health, Physiotherapy & Sport Science, University College Dublin, Dublin, Ireland

(10) Department of Social and Preventive Medicine, University of Montreal, Montreal, Canada, and Bordeaux Population Health Research Centre Inserm U1218, University of Bordeaux, Bordeaux, France

* Share senior authorship

Corresponding author:

Massimiliano Orri, PhD
McGill Group for Suicide Studies
Douglas Mental Health University Institute
6875 LaSalle Boulevard, Montreal H4H 1R3, Canada
massimiliano.orri@mcgill.ca

Accepted version

(Please see Cambridge Press embargo rules)

Citation: Orri M, Vergunst F, Turecki G, Galera C, Latimer E, Bouchard S et al. Long-term economic and social outcomes of youth suicide attempt. *BJPsych*

ABSTRACT

Background. Youth who attempt suicide are more at risk for later mental disorders and suicide. However, little is known about their long-term socioeconomic outcomes.

Aim. We investigated associations between youth suicide attempt and adult economic and social outcomes.

Methods. Participants were drawn from the Quebec Longitudinal Study of Kindergarten Children (N=2140) and followed up from ages 6 to 37 years. Lifetime suicide attempt was assessed at 15 and 22 years. Economic (employment earnings, retirement savings, welfare support, bankruptcy) and social (romantic partnership, separation/divorce, number of children) outcomes were assessed through data linkage with government tax return records obtained from age 22 to 37 years (2002-2017). Generalized linear models were used to test the association between youth suicide attempt and outcomes adjusting for background characteristics, parental mental disorders and suicide, and youth concurrent mental disorders.

Results. By age 22, 210 youths (8.9%) had attempted suicide. In fully adjusted models, youth who attempted suicide had lower annual earnings (average last 5 years, US\$-4,134, CI=-7,950 to -317), retirement savings (average last 5 years, US\$-1,387, CI -2,982 to 209), greater risk of receiving welfare support (RR=2.05, CI=1.39-3.04), and were less likely to be married/cohabiting (RR=0.82, CI=0.73-0.93), compared with those who did not attempt suicide. Over a 40-year working career, the loss of individual earnings attributable to suicide attempt was estimated at US\$129,926.

Conclusions. Youth who attempt suicide are at risk of poor adult socioeconomic outcomes. Findings underscore the importance of psychosocial interventions for young people who have attempted suicide to prevent long-term social and economic disadvantage.

INTRODUCTION

Youth suicide attempt is a leading public health concern worldwide.¹ It is estimated that approximately 4-10% of youth aged 12-25 attempt suicide before reaching adulthood.^{1,2} This is likely to be an underestimation since a substantial proportion of young people who attempt suicide do not seek specialist services.¹ Additionally, emergency department visits for youth who have attempted suicide have increased in several countries in recent years.^{3,4} Previous studies showed that youth suicide attempt is associated with increased risk of suicide attempt repetition,⁵ suicide mortality,⁶ as well as mental disorders.⁷ For example, longitudinal studies show that young people who attempted suicide are more likely to experience depression, substance use, and antisocial behaviors in adulthood.⁸ However, negative outcomes of youth suicide attempt may go beyond mental health, and also include reduced life chances in terms of economic and social participation.^{7,9-11} If youth suicide attempt carries an additional risk of poor long-term social and economic outcomes above and beyond concurrent mental disorders, then it is vital to quantify this burden so that enhanced prevention efforts can be justified and implemented for at-risk youth. To our knowledge, the available evidence documenting the socioeconomic outcomes of youth suicide attempt is restricted to a handful of studies^{7,9-11} that have produced contradictory results and therefore limit firm conclusions. First, prior studies have mostly relied on self-reported economic outcomes which are vulnerable to reporting and recall bias,⁷ such as non-random dropout (e.g., individuals from lower socioeconomic backgrounds), social desirability, deliberate or nondeliberate misreporting (e.g., recall failure or lack of knowledge about income or welfare benefits).¹² The use of administrative data is therefore preferable since they are usually supplied by impartial third parties (e.g., employers or government agencies) and consequently provide more reliable estimates of individual and family economic circumstances especially over long follow-up periods.¹² Second, definitions of suicide attempt used in previous studies are inconsistent. In particular, some studies include youth who self-harmed irrespective of the intentionality of the act.^{7,9} This may create heterogeneity, given that evidence shows that later outcomes of youth self-harming behavior differ depending on the intentionality of the act.⁹ Third, it is unclear to what extent future negative socioeconomic outcomes of youth who attempt suicide are due to contemporaneous mental disorders and substance use. Results of previous studies are mixed, with some reporting that concurrent mental disorders fully explained the association between suicide attempt and socioeconomic outcomes,^{7,9} and others reporting an increased risk over and above concurrent mental disorders.^{10,11} Fourth, no study to date has quantified the individual and societal economic burden of youth suicide attempt across an individual's full working career. The present study sought to address these limitations by examining the association between youth suicide attempt and adult social and economic outcomes

(including earnings, welfare, and partnership status). We relied on a large population-based sample followed up from age 6 to 37 years with data on suicide attempt collected at ages 15 and 21 years via structured interviews and social and economic outcomes obtained from government administrative data.

METHODS

Participants

Participants were members of the Quebec Longitudinal Study of Kindergarten Children (QLSKC), a longitudinal cohort of children attending kindergarten in Quebec's French-speaking public schools (Canada) between 1986 and 1987.¹³ The cohort initially included 3020 children whose parents were born in Canada and whose mother tongue was French. The vast majority (88%) were non-Hispanic Whites. Of these children, 2000 (1000 boys and 1000 girls) were selected using a random sampling procedure stratified by administrative region, school board size and sex to be representative of the population (random sample). The remaining 1020 participants (600 boys and 420 girls) were oversampled for children exhibiting disruptive behaviors (disruptive sample). Children were followed up annually from age 6 to age 13 years and again at ages 15 and 22 years. Federal tax returns records from ages 22 to 37 years (2002-2017) were linked to the cohort. Written informed consent was obtained from the children's parents at each year of follow-up prior to participation. The study was approved by the University of Montreal, McGill University, and St-Justine Hospital ethics boards and Statistics Canada. The present study used data from 2,140 participants (1,060, 49.5% males) for whom data on suicide attempt were available (**Table 1**). Participants included in the sample were more likely to have more educated mothers, to be male, to have a father with a mental disorder, and to have a family history of suicide. To account for this differential attrition, inverse-probability weighting was used.

Assessment of suicide attempt

Suicide attempt was assessed at ages 15 and 22 years with structured interviews administered by a trained researcher. Assessments at age 15 were obtained from parental or youth responses to the Diagnostic Interview Schedule for Children (DISC), version 2. Participants and their parents were asked: "have you/your child tried to kill yourself/themselves?". Assessments at age 22 years was made using the same questions from the Diagnostic Interview Schedule (DIS) answered by the participant. We derived a lifetime suicide attempt variable, coded 1 if the participant or his/her parent reported a suicide attempt at either age 15 or 22 years, and 0 if not.

Economic and social outcomes

Outcome data were obtained annually from federal tax return records from age 22 to 37 years (2002-2017) and linked to the QLSKC cohort data.¹² Economic outcomes were: (i) personal earnings, measured as all pretax wages, salaries, and commissions, not including income from capital gains. (ii) Retirement savings, measured as the contribution to Registered Retirement Savings Plans and contributions to employer-sponsored retirement plans. For each of these outcomes, the mean of the 5 most recent tax return records was used (ages 32-37 years). All financial data were converted to US\$ prior to analysis (CA\$1=US\$0.75). (iii) Welfare support (i.e., social assistance), which provides ‘last resort’ financial help to people without income who are no longer eligible for unemployment insurance,¹⁴ excluding individuals with severely limited capacity for work, was dichotomously coded for each year of follow-up (received in the past year=1, not received in past year=0); scores were then summed to create a count variable representing the total number of years in which the participant received welfare support. (iv) Bankruptcy, which was extracted from the tax declaration and defined as having ever declared bankruptcy between 2002 and 2017 (binary variable). Social outcomes included: (i) partnership status, coded dichotomously based on reported marital status in the past year (married/cohabiting=1, single/separated/divorced=0); the final outcome was a count variable representing the number of years in which the participant declared being married/cohabitating (hereafter referred to as partnered). (ii) Separation/divorce, binary variable obtained by coding marital status as 1 if participants ever reported being separated/divorced, and 0 otherwise. (iii) Number of children, extracted from the last available data point (2017, age 37 years), included any children living in the household (i.e., not limited to biological offspring).

Covariates

Four sets of covariates were included. (1) Background, child and family characteristics: sex of the child; childhood socioeconomic adversity between ages 6 and 13 years (a composite measure including mother-reported information on parental education, occupational prestige, and family income); low birth weight (<2500g); child verbal IQ at age 13, measured using the Sentence Completion Task. This measure consists of 13 sentences containing one missing word which must be selected by the participant from a list of five options to complete the sentence (mean=9.03, SD=2.13, range=0-13); it correlates highly with other verbal and non-verbal measures of intelligence.¹⁶ (2) Family history of mental disorder and suicide: maternal or paternal suicide attempt or death by suicide, assessed when the participant was 15 years of age; maternal and paternal lifetime history of diagnosed anxiety and/or mood disorders (i.e., panic, generalized anxiety, depressive, dysthymic disorder and episodes of mania), assessed with the DISC when the participant was 15 years of age. (3) Participant mental disorders: meeting diagnostic criteria for any of the following disorders at ages 15 or

22 years, assessed with the DISC and the DIS respectively: depressive disorder, dysthymic disorder, manic episode/bipolar disorder, generalized anxiety disorder, simple phobia, social phobia, agoraphobia, panic disorder, conduct problems, attention-deficit/hyperactivity disorder, oppositional defiant disorder. (4) Substance use, including high alcohol use, defined as a consuming alcohol >3 days per week; cannabis use, defined as ever using cannabis; hard drugs use, defines as any consumption of illicit drugs (i.e., cocaine, psychedelics, sedatives such as barbiturates, opioids and inhalants). Substance use was self-reported with reference to the last 6 months and were assessed at age 15 and 22. For each substance, individuals reporting substance use at any of these time points were coded 1 or 0 otherwise.

Statistical analysis

Analyses were performed with Stata version 16. First, descriptive statistics for outcome variables were provided for all the available data (ages 22 to 37 years) for participants who attempted suicide and those who did not. Second, we investigated the association between suicide attempt and economic and social outcomes using generalized linear models with robust standard errors. To investigate the association between suicide attempt and earnings and retirement savings (continuous outcomes), we used Tobit regression left censored at US\$1,000. To investigate the association between suicide attempt and welfare and partnership (count outcomes), we used negative binomial regressions to account for overdispersion of the outcome variable. To investigate the association between suicide attempt and welfare receipt, bankruptcy, partnership (binary outcomes), we used Poisson regression. To examine to what extent the selected covariates explained the association between suicide attempt and outcomes, we fitted five models with different adjustment levels: model 1, unadjusted association; model 2, adjusted for child sex (to account for known sex differences in suicide attempt and outcomes); model 3, adjusted for background, family, child characteristics, and parental history of mental disorders and suicide; model 4, additionally adjusted for youth lifetime mental disorders assessed concurrently with suicide attempt; model 5, additionally adjusted for substance use. Additionally, all models were adjusted for study design variables, namely, the sample (representative vs. disruptive) and age at entry to the cohort. In supplementary analyses, we re-estimated model 5 using specific mental disorders (i.e., externalizing and internalizing), and the number of mental disorders as adjustment variables, instead of the variable combining all mental disorders. Results were consistent with the main analyses (**Supplementary Table S2**). To account for missing data in these covariates, we used multiple imputations: models were estimated across 50 datasets, and the results pooled. To test the sensitivity of our analyses to missing data, we re-estimated our models on all participants initially enrolled in the QLSKC study using multiple imputation as described above to additionally impute missing data for suicide attempt (**Figure 2**). Results were reported for males and

females combined, as we did not find evidence for sex-by-suicide attempt interactions ($P > .05$) for any of our outcomes. Finally, to examine the economic impact of suicide attempt, we estimated the loss of earnings over a 40-year work career as follows:¹⁷

$$\text{Financial effect} = \sum_{t=1}^{40} \frac{\beta}{1.03} = 23.8 \times \beta$$

Where β is the estimate obtained from the model and assuming the commonly used annual discount rate of 3%. This financial effect indicates how much would be gained in terms of individual earnings by preventing one suicide attempt, under the strong assumption that suicide attempt was a causal determinant of our outcomes of interest.

RESULTS

A total of 210 (8.9%) youth attempted suicide by age 22 years. Suicide attempt was more common among females ($n=140$, 12.4%) compared to male ($n=70$, 6.3%) participants (risk ratio 2.04, CI 1.54 to 2.76). Economic and social outcomes for the analysis sample are described in **Table 2**. At age 15, when both mother- and self-reported suicide attempt were assessed, 100 adolescents had suicide attempt according to either informant. For those there was an agreement between mother- and self-report for 20 participants, while 70 and 10 participants had suicide attempt according to self-reports only or mother-reports only, respectively (Cohen's kappa = 0.31, revealing low interrater agreement).

Descriptive statistics of our financial and social outcomes across follow-up are reported in **Figure 1**. At age 22, youth who attempted suicide had similar earnings compared to those who did not attempt suicide. However, over the course of follow-up, annual earnings among youth who attempted suicide rose more slowly compared to those who did not attempt suicide. As shown in **Figure 2 (see also Supplementary Table S1)**, youth who attempted suicide earned on average US\$-10,492 (-14,332 to -6,652) less in their mid-thirties than youth who did not attempt suicide. This association was partly explained by background family, child, and parental characteristics, as well as by contemporaneous mental disorders and substance use (which accounted for about 60% of the association). After accounting for all these factors, however, we found that youth who attempted suicide still had lower earnings compared to those who did not attempt suicide (adjusted beta US\$-4,134, CI -7,950 to -317). Over a 40-year career, this corresponds to a loss of earning of US\$249,702 (158,314 to 341,090), of which US\$ 98,384 (7,553 to 189,216) were attributable to suicide attempt after accounting for family and parental background and concurrent mental disorders and substance use. Furthermore, youth who attempted suicide reported lower annual retirement savings (beta US\$-2,689, CI -4,215 to -1,164). This estimate was

reduced by half after accounting for all covariates (adjusted beta -1,387, CI -2,982 to 209). Over the follow-up period, youth who attempted suicide were more than twice as likely to rely on welfare support compared to those who did not attempt suicide (adjusted RR 2.05, CI 1.39 to 3.04). **Figure 1** shows that the gap in the probability of receiving welfare, for participants in the suicide attempt and no suicide attempt groups, was largest when participants were in their twenties but declined and eventually levelled off in their thirties. Finally, we observed that youth who attempted suicide were more likely to declare bankruptcy (RR 1.94, CI 1.28 to 2.93; **Figure 3**), although the estimate did not reach conventional thresholds for statistical significance in the fully adjusted models (RR 1.44, CI 0.92 to 2.27). **Figure 2** shows that the analyses conducted in the fully imputed sample (N=3,020) are virtually identical to those in the analysis sample, suggesting that attrition did not bias the results.

Figure 1 shows that youth who attempted suicide were more likely to report being partnered in early adulthood (age 22-23 years). However, this tendency was reversed from 27 years onward, when the partnering gap for the two groups began widening. Overall, youth who attempted suicide were almost two times more likely to be unpartnered from age 22 to 37 years, compared to those who did not attempt suicide (adjusted RR 0.82, CI 0.73 to 0.93). However, no difference was observed regarding the likelihood of being separated/divorced (adjusted RR 1.21, CI 0.90 to 1.63) or the likelihood of having children living in the household (RR 0.88, CI 0.76 to 1.02) in fully adjusted models. Once again, estimates for the fully imputed sample were consistent with those reported for the analysis sample (**Figure 2**).

DISCUSSION

Relying on data from official government reports linked to a population-based cohort, we found that youth who attempted suicide were more likely to experience negative economic and social outcomes in adulthood compared to those who did not attempt suicide. These outcomes include personal wealth, social welfare needs, and partnership, which underpin key elements of human health and wellbeing.¹⁸ These associations were partially explained by background sociodemographic characteristics, IQ, parental mental disorders, as well as concurrent youth mental disorders and substance use, accounting for up to 60% of the associations. However, our findings suggest that risk of negative economic and social outcomes for youth who attempted suicide were still higher than those who did not after accounting for these factors. Although these associations do not indicate causal mechanisms, these findings suggest that suicide attempt signals profound distress that goes beyond concurrent mental health problems and undermines full social and economic participation in society.

Studies of suicide attempt (or self-harm) and subsequent economic and social outcomes are rare in population-based samples. Our results concur with previous work that used stringent definitions of suicide attempt and administrative outcome data¹⁰ but not with a study of adolescent self-harm and self-reported earnings.⁷ Borschmann et al.⁷ reported that adolescent self-harm in an Australian population-based sample was associated with self-reported financial hardship at age 35 years but not after mental disorders and substance use were adjusted for (suicide attempt was not assessed). Likewise, no association between self-harm and partnership or welfare receipt was found. In contrast, a study of the Dunedin cohort in New Zealand found that youth who attempted suicide in adolescence (age 17 at first attempt) were more likely to experience longer periods of unemployment and welfare receipt by age 38 years (both measured by official records), compared to those who did not attempt suicide.¹⁰ Thus, when a narrower definition of suicide attempt is used (as an intentional act towards ending one's own life vs. self-harm with unspecified intent) in conjunction with objectively measured economic data (rather than self-reports), youth suicide attempt indeed appear to be associated with adverse economic and social outcomes.

Understanding the mechanisms explaining these associations would be the first step to inform possible interventions to mitigate the negative economic and social outcomes of youth who attempt suicide. First, youth who attempted suicide may be more likely to experience a continuation or aggravation of mental health problems,¹⁰ which in turn can negatively influence their functioning in society. Second, youth who attempt suicide are more likely to have academic difficulties (including school drop-out),⁹ or to leave the school system for long periods to receive inpatient and/or outpatient mental health care.¹⁹ Such school-related problems may result in decreased job opportunities and increased economic and social difficulties. Third, even if nonfatal, suicide attempt may result in serious injury or disability²⁰ that prevents young people's return on education or work, leading to lost income and compromised long-term socioeconomic wellbeing. For patients without access to insurance or nationalised healthcare the financial burden may be compounded by having to pay for treatment and follow-up care. Fourth, supportive reactions of family members and peers after a suicide attempt have been linked to improved recovery.²¹ Consequently, negative reactions of significant people from these important relational environments after a young person's suicide attempt may lead to increased social problems later in life. Fifth, suicide attempt may act as a signal to the family and community about the life prospects of the individual. For example, others may stigmatize them as "weak" or "ill"²² and thus justify the withdrawal of personal and material investment, leaving them even more economically and socially exposed than before. Unfortunately, such

stereotypes are often internalized by individuals, leading to decreased help seeking behaviors. These potential mechanisms should be tested in future studies.

Our findings suggest that interventions for youth suicide attempt should also take into account that, beyond the risk of repeated suicide attempts, these young people may face socioeconomic disadvantage across adult life that further undermine psychosocial resilience and long-term health and wellbeing. As social and economic problems are known proximal risk factors for suicide in adults, addressing socioeconomic outcomes of youth who attempt suicide may reduce later risk of suicide, thus interrupting a vicious cycle between mental health and socioeconomic problems. Evidence-based psychological treatments show efficacy in reducing suicide attempt in high-risk youth,²³ and data from population-based studies shows that psychotherapy for deliberate self-harm can reduce long-term suicide risk (including mortality).²⁴ Whether these interventions affect economic and social outcomes remain unclear however. Future studies should investigate whether the economic and social disadvantages associated with youth suicide attempt are alleviated through effective psychotherapy, or whether further psychosocial interventions are needed. Furthermore, it is worth noting that because only a small proportion of suicide attempts receive healthcare attention,¹ it is likely that most of the youth who attempted suicide in our sample were not seen in Emergency departments and were never treated in hospital. By assessing suicide attempt using interviews, rather than medical records, our findings suggest that all suicide attempts – regardless of their medical severity – may have important socioeconomic consequences.

Strengths and limitations

The study strengths were the long period of prospective follow-up, use of administrative data (which reduce reporting biases that limit studies relying on self-reported earnings), large sample size, and use of structured interview to assess suicide attempt. The following limitations should be noted. First, due to attrition, information on suicide attempt was available for a subsample of the initial cohort participants, which could have biased results. However, a series of sensitivity analyses including the application of inverse probability weighting and multiple imputations suggest that these effects were minimal. Third, suicide-related outcomes vary substantially during adolescence and young adulthood, and previous studies suggest that some individuals have a high suicide attempt risk only in early adolescence, while others have a persistently high suicide attempt risk across adolescence and young adulthood.²⁵ Although economic and social outcomes may be different in these two groups, we were unable to investigate such differences due to sample size limitations. We were unable to stratify our analyses by sex for the same reason. Finally, although we controlled for most

mental disorders in youth, we were unable to control for psychotic disorders because they were not measured in our cohort.

Conclusions

Findings from this study, based on a 32-year follow-up of a population-based cohort with linked administrative data, suggest that youth who attempted suicide experience increasing economic and social marginalization across early adulthood. These outcomes undermine full participation in society and therefore the potential for full human flourishing. For young people who have attempted suicide, psychosocial interventions alongside standard care could improve long-term social and economic participation with benefits for individuals and society.

STATEMENTS

Declaration of interest

The authors declare no conflict of interest.

Funding

This study is funded by the European Union's Horizon 2020 research and innovation programme under grant agreement No 793396 awarded to MO.

Acknowledgement

Dr. Vergunst is funded by Canadian Institute of Health Research (CIHR) and Fonds de Recherche du Quebec Sante (FRQS) postdoctoral fellowships. Dr. Turecki holds a Canada Research Chair (Tier 1), a NARSAD Distinguished Investigator Award, and is supported by grants from the Canadian Institute of Health Research (CIHR) (FDN148374 and EGM141899). Drs Geoffroy and Turecki are supported by the Fonds de recherche du Québec—Santé (FRQS) through the Quebec Network on Suicide, Mood Disorders and Related Disorders. Dr. Geoffroy receives funding from the American Foundation for Suicide Prevention and holds a Canada Research Chair (Tier 2). Dr. Boivin holds a Canada Research Chair (Tier 1). Dr. Tremblay is funded by the Social Sciences and Humanities Research Council of Canada (SSHRC). Dr Côté is funded by CIHR and the Québec Research Funds for Society and Culture (FRQSC). Data collection for this study was funded by grants from the CIHR, the Social Sciences and Humanities Research Council of Canada, the FRQSC and the FRQS.

Contributions

MO undertook the analyses and wrote the first draft. FV contributed to data analysis. All authors substantially contributed to data interpretation and writing of the final manuscript. All authors approved the final report.

Data availability

This study is based on administrative data that are publicly available to authorized researcher via the Statistics Canada Data Research Center facilities.

REFERENCES

- 1 Hawton K, Saunders KEA, O'Connor RC. Self-harm and suicide in adolescents. *Lancet Lond Engl* 2012; **379**: 2373–82.
- 2 Orri M, Scardena S, Perret LC, Bolanis D, Temcheff C, Séguin JR, *et al.* Mental Health Problems and Risk of Suicidal Ideation and Attempts in Adolescents. *Pediatrics* 2020.
- 3 Mojtabai R, Olfson M, Han B. National Trends in the Prevalence and Treatment of Depression in Adolescents and Young Adults. *Pediatrics* 2016; **138**. doi:10.1542/peds.2016-1878.
- 4 Plemmons G, Hall M, Doupnik S, Gay J, Brown C, Browning W, *et al.* Hospitalization for Suicide Ideation or Attempt: 2008-2015. *Pediatrics* 2018; **141**. doi:10.1542/peds.2017-2426.
- 5 Owens D, Horrocks J, House A. Fatal and non-fatal repetition of self-harm. Systematic review. *Br J Psychiatry J Ment Sci* 2002; **181**: 193–9.
- 6 Bostwick JM, Pabbati C, Geske JR, McKean AJ. Suicide Attempt as a Risk Factor for Completed Suicide: Even More Lethal Than We Knew. *Am J Psychiatry* 2016; **173**: 1094–100.
- 7 Borschmann R, Becker D, Coffey C, Spry E, Moreno-Betancur M, Moran P, *et al.* 20-year outcomes in adolescents who self-harm: a population-based cohort study. *Lancet Child Adolesc Health* 2017; **1**: 195–202.
- 8 Moran P, Coffey C, Romaniuk H, Olsson C, Borschmann R, Carlin JB, *et al.* The natural history of self-harm from adolescence to young adulthood: a population-based cohort study. *Lancet Lond Engl* 2012; **379**: 236–43.
- 9 Mars B, Heron J, Crane C, Hawton K, Lewis G, Macleod J, *et al.* Clinical and social outcomes of adolescent self harm: population based birth cohort study. *BMJ* 2014; **349**: g5954.
- 10 Goldman-Mellor SJ, Caspi A, Harrington H, Hogan S, Nada-Raja S, Poulton R, *et al.* Suicide attempt in young people: a signal for long-term health care and social needs. *JAMA Psychiatry* 2014; **71**: 119–27.
- 11 Niederkrotenthaler T, Tinghög P, Alexanderson K, Dahlin M, Wang M, Beckman K, *et al.* Future risk of labour market marginalization in young suicide attempters--a population-based prospective cohort study. *Int J Epidemiol* 2014; **43**: 1520–30.
- 12 Vergunst F, Tremblay RE, Nagin D, Algan Y, Beasley E, Park J, *et al.* Association of Behavior in Boys From Low Socioeconomic Neighborhoods With Employment Earnings in Adulthood. *JAMA Pediatr* 2019; **173**: 334–41.
- 13 Rouquette A, Côté SM, Pryor LE, Carbonneau R, Vitaro F, Tremblay RE. Cohort profile: the Quebec Longitudinal Study of Kindergarten Children (QLSKC). *Int J Epidemiol* 2014; **43**: 23–33.
- 14 Vergunst F, Tremblay RE, Nagin D, Zheng Y, Galera C, Park J, *et al.* Inattention in boys from low-income backgrounds predicts welfare receipt: a 30-year prospective study. *Psychol Med* undefined/ed; : 1–9.
- 15 Lorge I, Thorndike R. *The Lorge-Thorndike Intelligence Test*. Houghton, 1950.
- 16 Veroff J, McClelland L, Marquis K. *Measuring intelligence and achievement motivation in surveys: Final report to the Department of Health, Education, and Welfare Office of Economic Opportunity*. Basic Books, 1971.
- 17 Vergunst F, Tremblay RE, Nagin D, Algan Y, Beasley E, Park J, *et al.* Association Between Childhood Behaviors and Adult Employment Earnings in Canada. *JAMA Psychiatry* 2019. doi:10.1001/jamapsychiatry.2019.1326.
- 18 Robeyns I. The Capability Approach: a theoretical survey. *J Hum Dev* 2005; **6**: 93–117.

- 19 Plemmons G, Hall M, Doupnik S, Gay J, Brown C, Browning W, *et al.* Hospitalization for Suicide Ideation or Attempt: 2008–2015. *Pediatrics* 2018; **141**. doi:10.1542/peds.2017-2426.
- 20 Nohl A, Ohmann T, Kamp O, Waydhas C, Schildhauer TA, Dudda M, *et al.* Major trauma due to suicide attempt: increased workload but not mortality. *Eur J Trauma Emerg Surg* 2020. doi:10.1007/s00068-020-01436-8.
- 21 Orri M, Paduanello M, Lachal J, Falissard B, Sibeoni J, Revah-Levy A. Qualitative Approach to Attempted Suicide by Adolescents and Young Adults: The (Neglected) Role of Revenge. *PLoS ONE* 2014; **9**: e96716.
- 22 Corrigan PW, Sheehan L, Al-Khouja MA, Stigma of Suicide Research Team. Making Sense of the Public Stigma of Suicide. *Crisis* 2017; **38**: 351–9.
- 23 Fox KR, Huang X, Guzmán EM, Funsch KM, Cha CB, Ribeiro JD, *et al.* Interventions for suicide and self-injury: A meta-analysis of randomized controlled trials across nearly 50 years of research. *Psychol Bull* 2020; **146**: 1117–45.
- 24 Erlangsen A, Lind BD, Stuart EA, Qin P, Stenager E, Larsen KJ, *et al.* Short-term and long-term effects of psychosocial therapy for people after deliberate self-harm: a register-based, nationwide multicentre study using propensity score matching. *Lancet Psychiatry* 2015; **2**: 49–58.
- 25 Geoffroy M-C, Orri M, Girard A, Perret LC, Turecki G. Trajectories of suicide attempts from early adolescence to emerging adulthood: prospective 11-year follow-up of a Canadian cohort. *Psychol Med* 2020; : 1–11.

Table 1. Sociodemographic characteristics of the sample

	Whole sample (N=2140)	By suicide attempt		Difference (<i>P</i>)
		Yes (n=210)	No (n=1930)	
Sample (representative)	1460 (68.5)	130 (61.9)	1330 (68.8)	0.241
Sex (male)	1060 (49.5)	70 (33.3)	990 (51.8)	<0.001
Low birth weight (< 2.5 kg)	120 (5.6)	20 (9.5)	100 (5.2)	0.002
Verbal IQ, age 13 years (mean, SD)	9.82 (1.53)	9.72 (1.68)	9.83 (1.52)	0.322
Family socioeconomic adversity (mean, SD)	0.30 (0.25)	0.34 (0.27)	0.29 (0.25)	0.006
Maternal history of mood/anxiety disorders	410 (19.2)	60 (28.6)	350 (18.1)	0.003
Paternal history of mood/anxiety disorders	150 (7.0)	20 (9.5)	140 (7.3)	<0.001
Family history of suicidal behavior	90 (4.2)	20 (9.5)	70 (3.6)	<0.001
Mental disorders by age 22 years	980 (45.8)	150 (71.4)	830 (43.0)	<0.001
High alcohol use by age 22 years	710 (38.3)	80 (38.9)	800 (37.5)	0.348
Cannabis use by age 22 years	1580 (74.1)	190 (91.7)	1380 (72.5)	0.002
Illicit drugs use by age 22 years	620 (32.8)	130 (61.3)	750 (35.5)	<0.001

All variables are described as count (%) if not otherwise specified. *P*-values are based on chi-square or t-tests. Count variables are rounded to base 10 according to Statistics Canada data protection regulations

Table 2. Descriptive statistics for the economic and social outcomes in adulthood in the study sample

	Whole sample	By suicide attempt	
	(N=2140)	Yes (n=210)	No (n=1930)
Economic outcomes			
Annual earnings, mean (SD) ^a	29,600 (23,509)	21,400 (19,400)	21,400 (19,400)
Annual retirement savings, mean (SD) ^a	3,800 (5,500)	2,500 (4,200)	4,100 (5,600)
Welfare, mean (SD) ^b	1.12 (2.99)	1.98 (3.63)	0.88 (2.59)
Bankruptcy, count (%) ^c	180 (8.2)	30 (13.1)	150 (7.7)
Social outcomes			
Partnership, mean (SD) ^b	7.24 (5.30)	5.82 (5.2)	7.64 (5.24)
Divorce/separation, count (%) ^c	390 (18.2)	50 (23.8)	340 (17.6)
Number of children, mean (SD) ^d	1.27 (1.13)	1.21 (1.19)	1.35 (1.12)

^a Average of the last 5 available years (ages 32 to 37 years), in US dollars

^b Average count across the whole follow-up period (ages 22 to 37 years)

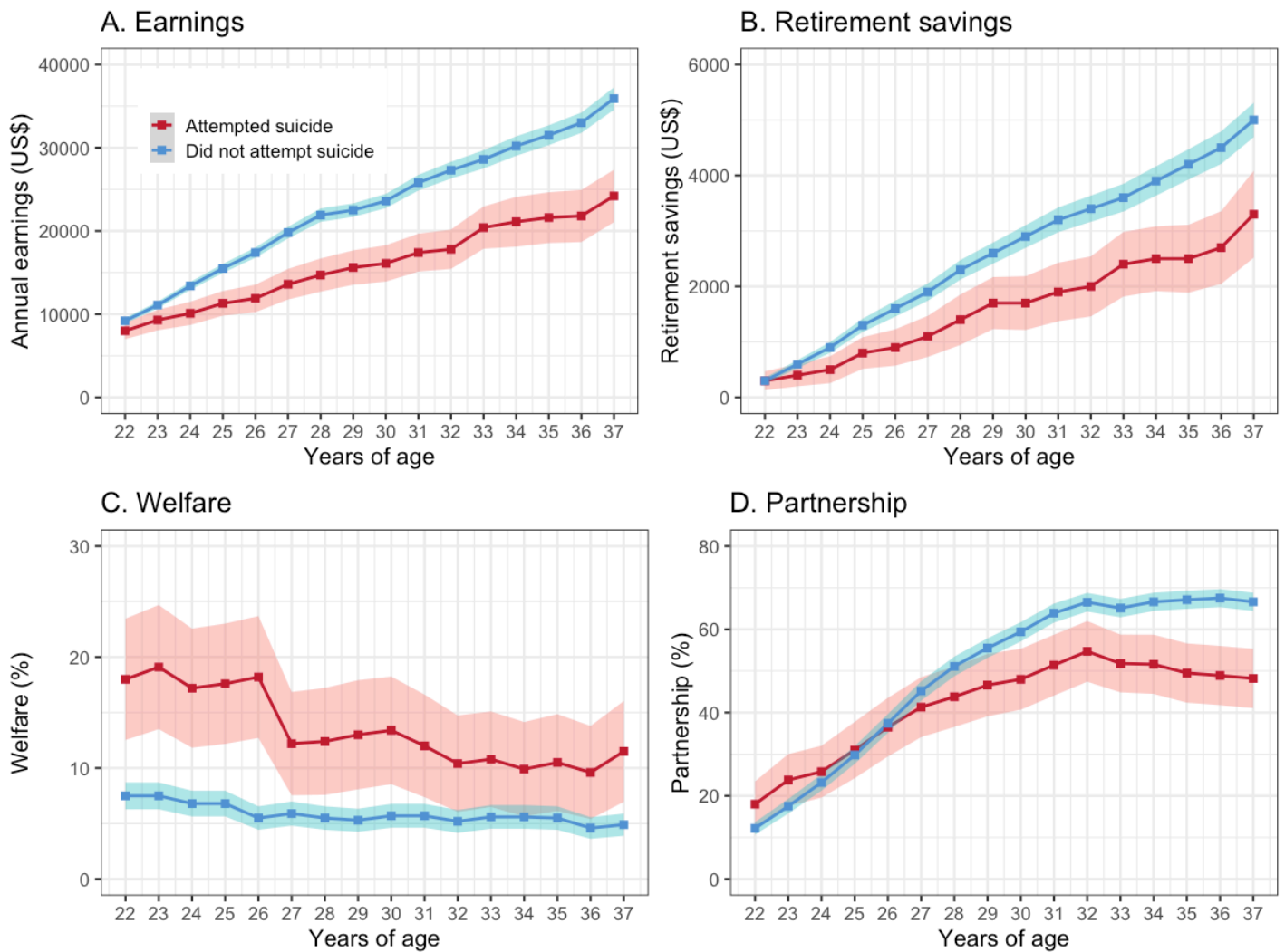
^c Experienced divorce/separation at least once across follow-up (ages 22 to 37 years)

^d Average number living in the household during the last available year (age 37 years)

Count variables are rounded to base 10 and dollar amounts to base 100 according to Statistics Canada data protection regulations

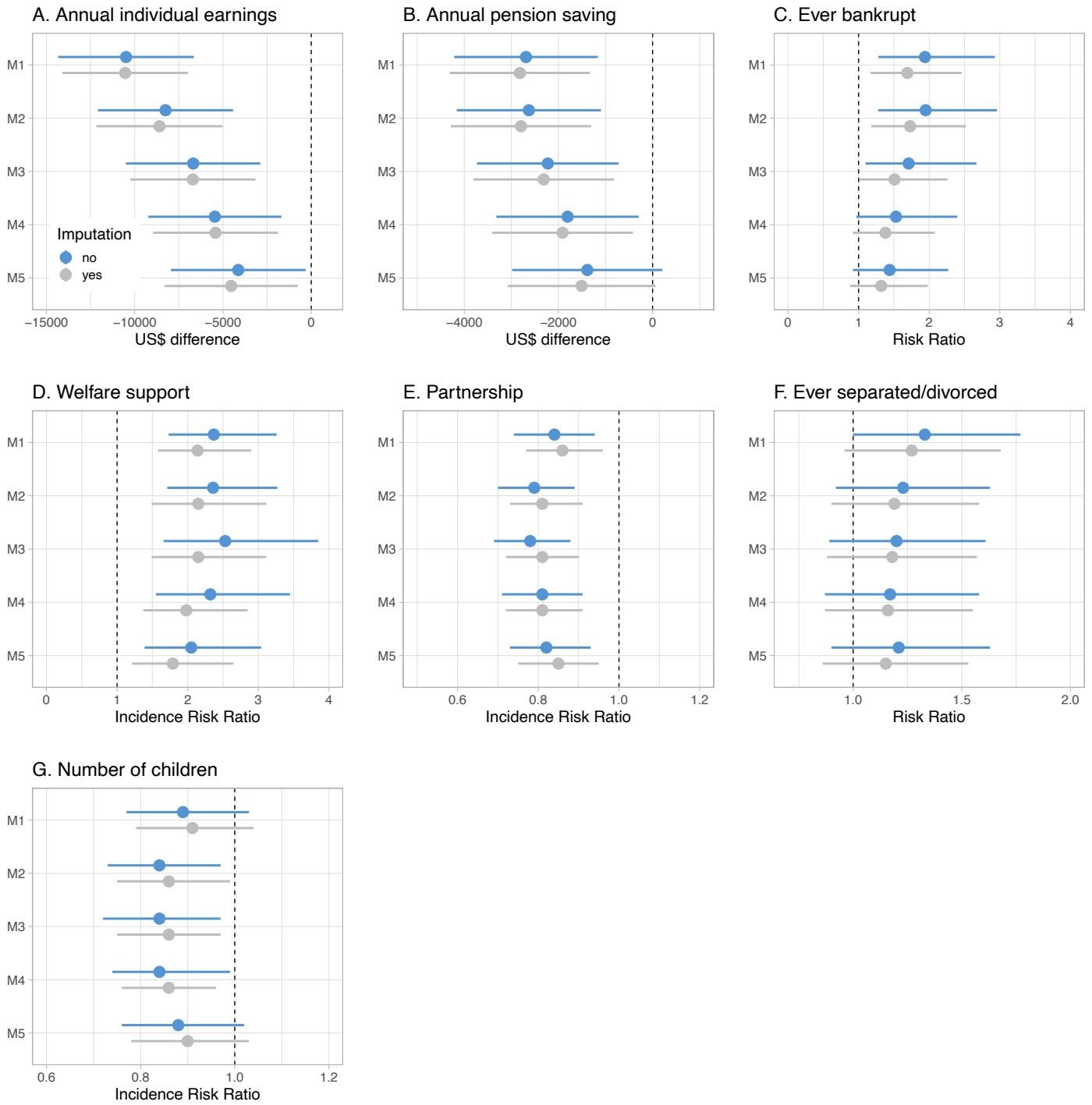
FIGURES

Figure 1. Descriptive statistics for the economic and social outcomes from 22 to 37 years of age by suicide attempt



The figure shows the observed increase in annual earning (A, y-axis) and retirement savings (B, y-axis), and the probability of receiving welfare (C, y-axis) and of marriage/cohabitation (D, y-axis) by year (x-axis) for the entire follow up period.

Figure 2. Association between suicide attempt and adult economic outcomes



Estimates are beta coefficients for Tobit regression (A, B), and Risk Ratios for Negative binomial (C, F) and Poisson (D, E, G) regressions, with 95% confidence intervals. Estimates are reported for the analysis sample (N=2140; blue) and the multiple-imputed sample (N=3020; gray).
M1, unadjusted: model adjusted for the variable “sample” (representative vs. disruptive) and child age at enrollment in the cohort ; M2 adjusted for child sex; M3 additionally adjusted for family socioeconomic status, low birth weight, child verbal IQ, family history of suicide, maternal and paternal mental disorders; M4 additionally adjusted for adolescent mental disorders; M5 additionally adjusted for adolescent substance use

SUPPLEMENTARY MATERIAL

Table S1. Association between suicide attempt and adult economic outcomes

Outcomes	M1 unadjusted	M2 adjusted for sex	M3 adjusted for background	M4 adjusted for mental health	M5 adjusted for substance use
Analysis sample (N=2140)					
Individual earnings ^a	-10491.69 (-14331.53 to -6651.85)	-8254.81 (-12083.01 to -4426.61)	-6689.639 (-10491.35 to -2887.93)	-5459.065 (-9228.41 to -1689.72)	-4133.791 (-7950.23 to -317.35)
Retirement savings ^a	-2689.28 (-4215.04 to -1163.52)	-2629.017 (-4159.99 to -1098.05)	-2226.94 (-3729.51 to -724.37)	-1806.64 (-3318.64 to -294.64)	-1386.71 (-2982.18 to 208.76)
Welfare ^b	2.37 (1.73 to 3.26)	2.36 (1.71 to 3.27)	2.53 (1.66 to 3.85)	2.32 (1.55 to 3.45)	2.05 (1.39 to 3.04)
Bankruptcy ^c	1.94 (1.28 to 2.93)	1.95 (1.28 to 2.96)	1.71 (1.1 to 2.67)	1.53 (0.97 to 2.4)	1.44 (0.92 to 2.27)
Partnership ^b	0.84 (0.74 to 0.94)	0.79 (0.7 to 0.89)	0.78 (0.69 to 0.88)	0.81 (0.71 to 0.91)	0.82 (0.73 to 0.93)
Separation/divorce ^c	1.33 (1.00 to 1.77)	1.23 (0.92 to 1.63)	1.20 (0.89 to 1.61)	1.17 (0.87 to 1.58)	1.21 (0.90 to 1.63)
No. of children in household ^c	0.89 (0.77 to 1.03)	0.84 (0.73 to 0.97)	0.84 (0.72 to 0.97)	0.84 (0.74 to 0.99)	0.88 (0.76 to 1.02)
Imputed sample (N=3020)					
Individual earnings ^a	-10541.41 (-14101.66 to -6981.17)	-8597.88 (-12175.41 to -5020.36)	-6707.22 (-10254.14 to -3160.29)	-5427.46 (-8963.06 to -1891.86)	-4537.98 (-8309.24 to -766.67)
Retirement savings ^a	-2819.99 (-4308.60 to -1331.40)	-2795.87 (-4288.63 to -1303.10)	-2312.08 (-3807.23 to -816.93)	-1911.10 (-3405.94 to -416.26)	-1506.91 (-3077.46 to 63.63)
Welfare ^b	2.14 (1.58 to 2.90)	2.15 (1.49 to 3.11)	2.15 (1.49 to 3.11)	1.98 (1.37 to 2.85)	2.05 (1.39 to 3.04)
Bankruptcy ^c	1.69 (1.17 to 2.46)	1.73 (1.18 to 2.52)	1.51 (1.01 to 2.26)	1.38 (0.92 to 2.08)	1.44 (0.92 to 2.27)
Partnership ^b	0.86 (0.77 to 0.96)	0.81 (0.73 to 0.91)	0.81 (0.72 to 0.90)	0.81 (0.72 to 0.91)	0.82 (0.73 to 0.93)
Separation/divorce ^c	1.27 (0.96 to 1.68)	1.19 (0.90 to 1.58)	1.18 (0.88 to 1.57)	1.16 (0.87 to 1.55)	1.21 (0.90 to 1.63)
No. of children in household ^c	0.91 (0.79 to 1.04)	0.86 (0.75 to 0.99)	0.86 (0.75 to 0.98)	0.86 (0.76 to 0.99)	0.88 (0.76 to 1.02)

Estimates are ^abeta coefficients for Tobit regression and Risk Ratios for ^bNegative binomial and ^cPoisson regressions, with 95% confidence intervals.

M1, unadjusted: model adjusted for the variable “sample” (representative vs. disruptive) and child age at enrollment in the cohort; M2 adjusted for child sex; M3 additionally adjusted for family socioeconomic status, low birth weight, child verbal IQ, family history of suicide, maternal and paternal mental disorders; M4 additionally adjusted for adolescent mental disorders; M5 additionally adjusted for adolescent substance use

Table S2. Models adjusted for internalizing and externalizing disorders, and for number of disorders

Outcomes	Model M5.1	Model M5.2
Analysis sample (N=2140)		
Individual earnings ^a	-3819.30 (-7626.40 to -12.20)	-5361.91 (-9142.17 to -1581.65)
Retirement savings ^a	-1302.30 (-2898.31 to 293.71)	-1839.82 (-3413.04 to -266.60)
Welfare ^b	1.91 (1.31 to 2.78)	2.24 (1.47 to 3.40)
Bankruptcy ^c	1.34 (0.85 to 2.11)	1.45 (0.92 to 2.31)
Partnership ^b	0.82 (0.73 to 0.93)	0.81 (0.71 to 0.91)
Separation/divorce ^c	1.17 (0.87 to 1.58)	1.20 (0.89 to 1.61)
No. of children in household ^c	0.88 (0.75 to 1.02)	0.85 (0.73 to 0.99)

Estimates are ^a beta coefficients for Tobit regression and Risk Ratios for ^b Negative binomial and ^c Poisson regressions, with 95% confidence intervals.

Both models are adjusted for the variable “sample” (representative vs. disruptive), child age at enrollment in the cohort, child sex, family socioeconomic status, low birth weight, child verbal IQ, family history of suicide, maternal and paternal mental disorders

M5.1 is additionally adjusted for adolescent internalizing disorders, externalizing disorders, cannabis use, alcohol use, and hard drug use, while M5.2 is additionally adjusted for a count variable indicating the number of mental disorders among the previously listed ones.