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Parental depressive symptoms and the child labor-schooling nexus: evidence from Mexico

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Abstract

Research in psychology has suggested that parental depression translates into bad parenting and worsened behavioral outcomes for children. In this article, I look at the effect of depression on child education and labor outcomes in Mexico. Using a rich panel data set and making use of violent assault as a source of exogenous variation in depressive symptoms, I estimate the impact of a shock to parents' mental health on a series of child outcomes. The findings suggest that worsened parental mental health increases the probability of grade repetition and market work for children. The effects are not driven by those children whose parents had the worst mental health status at the onset of the survey, and are robust to alternative specifications. Given the documented extensive underutilization of mental health services in Mexico, public interventions in this domain have the potential to come with positive externalities and be cost-efficient.

JEL: D10,I10,I12,O54.
Keywords: Mental health, Parenting, Grade repetition, Child labor, Mexico.

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1 Introduction

Bad mental health is responsible for huge welfare losses around the world. Depression is now the second contributor to years lived with disability, having scaled from fourth place in 1990 and third place in 2000 (Ferrari et al. 2013). Major depressive disorder is responsible for 8.3% of years lived with disability in the world, and its large incidence and contribution to overall burden of disease are not only a feature of high-income countries. Rather, lifetime prevalence rates of depression and anxiety stand at over 10% in both high-income and low- and middle-income countries alike (Kessler et al. 2005). Yet, mental health in low- and middle-income countries receives little attention, and the attention it receives tends to be of the sensational kind. Reports of degrading and cruel treatment of individuals with mental disabilities in the developing world regularly surface, and human rights defenders such as Amnesty International continuously point out the lack of care given to persons suffering from mental disorders in many countries in the world. This not only concerns patients with severe psychiatric illnesses needing inpatient treatment: development actors such as the World Bank and the World Health Organization recently called for an upscaling of interventions targeting people with treatable mental illnesses such as anxiety and depression, but who are often left to fend for themselves (Carey 2016, April 16). A recent study published in *The Lancet* showed that interventions in said domains are likely to provide benefits outnumbering costs by a factor of 2-3 when only economic costs are considered, and 3-5.7 when the economic value of good health is taken into account (Chisholm et al. 2016).

A large share of those afflicted by mental health problems are parents, and it thus seems warranted to consider potential impacts of depressive symptoms on the family environment. The literature on family background factors as determinants of child outcomes is plentiful, and child development effects in relation to family structure (Ermisch and Francesconi 2001; Gennetian 2005; Björklund and Sundström 2006), parental work patterns (Waldfogel, Han, and Brooks-Gunn 2002; Ruhm 2004) and income (Blau 1999; Dahl and Lochner 2012) have regularly been found in countries at various stages of development. That there are effects on children from their early living circumstances comes as no surprise, since childhood and adolescence are crucial times for individuals. They correspond not only to the period in which human beings shape their personalities, but also to that in which human capital is being accumulated and most cognitive skills are formed. In addition to circumstances where revenue loss acts as the primary mediator of negative outcomes, mental health shocks might exert influence on house-

hold decisions independently of resources. The psychological literature has shown that parents with psychiatric conditions sometimes resort to maladaptive behavior with children, something that might translate into adjustment problems and hampered cognitive development. The economics literature—especially from developing country contexts—has regularly shown how various types of shocks to the household impede a range of development processes in children. However, evidence regarding the nature and scope of transmission mechanisms from bad parental mental health to child socioeconomic outcomes is lacking, particularly in low and middle income countries.

Knowledge regarding intergenerational consequences of mental illness in the context of middle income countries is important for the public debate, inasmuch as mental health outside of high-income countries by all accounts suffers from underfinancing. The 2014 World Mental Health atlas (WHO 2014) highlights the discrepancy between high-income countries and low- and middle-income countries in terms of public expenditures on mental health care: low- and middle-income countries spend less than 2$ per capita annually on mental health, while high-income countries spend almost 60$, and the USA 272.80$[1]. In the upper middle-income category, Mexico is the median spender, allocating a reported 1.96$ per capita on mental health. Upper middle-income countries in general also allocate a smaller proportion of their total health budget to mental health than high-income economies (2.4% versus 5.1%, WHO (2014)). Furthermore, while in high-income countries the amounts spent on the three service categories *mental hospitals*, *other inpatient and day care* and *outpatient and primary care* are roughly comparable, the group of upper middle-income countries allocates around 50% of their resources to mental hospitals. These facts, against a backdrop of media coverage on abuse of the mentally ill across the world, paint a picture of mental health in large parts of the world as a problem mainly concerning the indirectly affected.

This article investigates the relationship between parental depressive symptoms and child schooling and labor outcomes in Mexico, an upper middle-income country with a population of 120 million. Relying on survey data from three waves of the Mexican Family Life Survey and using assaults in the streets as a source of exogenous variation of depressive symptoms, I show that an increase in parental depressive symptoms leads to increased rates of repetition in children, and increases their probability of working. The effects are not driven by children of parents already showing strong signs of depression

[1]In shares of GDP per capita, the U.S. spent around 0.5 percent in 2014, while Mexico spent a mere 0.02 percent.

at the onset of the survey. Based on this evidence, it is likely that negative outcomes of depression are intergenerational in nature, and programs attempting to address mental health issues should take this into account.

The article is structured as follows. Section 2 reviews some the evidence on the links between parental mental illness and child outcomes. Section 3 presents the data and the state of mental health and mental health care in Mexico. Section 4 presents the theoretical background of the article and the empirical strategy being used. Section 5 shows results from the estimations, addresses robustness and discusses the mechanisms at play. The last section concludes.

2 Parental mental health and children's outcomes

Much focus has been put on childhood conditions shaping long-run outcomes in the literature on educational mobility. Very few, however, attempt to quantitatively measure the impact of parental psychological distress on children's educational progression. A notable exception includes Farahati, Marcotte, and Wilcox-Gök (2003), who, relying on data from the National Comorbidity Survey, find that parental mental illness is linked to increased probability of dropout from high school in the U.S.. The effect is stronger for young women than for young men, the largest effect being that of mothers' psychiatric illness on daughters high-school completion. Jayakody, Danziger, and Kessler (1998) also include measures of parental psychiatric status in their study of early onset mental illness and socio-economic outcomes in males, but fail to find any significant link to schooling attainment. Frank and Meara (2009) include a measure of repetition in an attempt to study the links between maternal depression and child behavioral and cognitive outcomes in the U.S., using the NLYS. They however fail to find a significant association between maternal depression and repetition or cognitive outcomes, but do find evidence of a link between maternal depression and child behavioral issues. Connecting to the above literature, I use information on parental mental illness to evaluate children's educational and work outcomes. This study however distinguishes from previous literature in at least three dimensions: firstly, by using panel data I am able to remove individual fixed effects from the estimates; secondly, I propose a new source of plausibly exogenous variation in mental health: violent assault in the street; finally, I use data from a middle-income country with strong shortcomings in public mental health services and a low use of the services that exist.

The present section reviews some of the evidence on transmission mechanisms between parental mental health, income shocks and child development. At least three mechanisms can be thought of to explain why parental mental illness would impact children's educational and labor market trajectories. First and foremost, like physical illness, mental disorder might incapacitate parents, leading to loss of job revenue, and the need for children to take up household chores or market work that parents previously handled (which has the potential side effect of slowing down school progression). Second, mental illness is linked to parenting practices, with negative mental health shocks leading to worsened parenting practices that may affect children's cognitive and behavioral development. Third, there is a large body of evidence on the inter-generational correlations of mental health in families. It could thus be that the onset of emotional trouble in parents creates emotional disturbance in children, causing them to perform less well in school, and taking up work rather than pursuing higher levels of education. The three following sub-sections review some of the literature on these mechanisms.

2.1 Income shocks and the child labor-schooling nexus

A strand of the child labor literature, starting with the seminal article of Basu and Van (1998), presents child labor as a trade-off for parents, who choose between sending children to work or to school, subject to preferences and income constraints. A central result from their paper is that below a certain consumption level, parents keep children out of school. When income increases to above subsistence level, parents put their children in school, and at a sufficiently high consumption level, they will dedicate all their children's time to schooling. In this framework, a loss of income induces parents to send their children to work or withdraw them from school as a means of compensating for the revenue loss. It nowadays seems reasonably clear that children in developing countries are being relied upon in the event of shocks. Duryea, Lam, and Levison (2007), for example, investigate household responses to economic shocks in Brazil for the period 1982 to 1998. They find that negative income shocks lead to a small decrease in the probability of girls to advance in school, and an increase in the probability to work. Gubert and Robilliard (2008) find evidence of an increased risk of school dropout upon negative agricultural shocks in Madagascar, consistent with the work-schooling trade-off operating through older rather than younger children. Grimm (2011) finds evidence that a 10% decrease in household income leads to a 2.5-3 percentage point drop in the enrolment rate in Burkina Faso, relying on disparate income evolutions for cotton and food crop farmers in the 1990s as a source of exogenous income variation. In light of

such evidence, cash transfer programs have been implemented as a coping mechanism for households facing adverse resource shocks, enabling them to keep children in school. Evidence of such positive mechanisms have for example been found for Mexico (De Janvry et al. 2006), Ecuador (Edmonds and Schady 2012) and Burkina Faso (Akresh, De Walque, and Kazianga 2013). Fitzsimons and Mesnard (2014) investigate whether or not conditional cash transfers can mitigate the effect of a father's departure from the household in Colombia, and find that this seems to be the case since the main effect of a father's departure is a liquidity-tightening income loss.

That health shocks indeed lead to important asset losses has been shown by Wu (2003) and Coile (2004), and a positive correlation between health status and home and market chores (and a negative one between health status and leisure) was found by Podor and Halliday (2012) using U.S. data. Their estimates suggest that moving from poor to good self-assessed health is associated with an additional daily 12 minutes of home production and 100 minutes in market work for men, and 25 and 45 minutes respectively for women. Zivin, Thirumurthy, and Goldstein (2009) show how the provision of antiretroviral drugs significantly improves the status of children in Western Kenya. It is however not clear whether this is due to an increase in labor supply or a pure modification of allocative behavior. Regarding mental well-being—the focus of this article—empirical evidence on the links between mental health and the labor market has shown that individuals who suffer from mental disorders are less productive when at work, and have higher rates of unemployment (Ettner, Frank, and Kessler 1997; Berndt et al. 1998; Currie and Madrian 1999; Frank and Koss 2005; Cseh 2008; Peng, Meyerhoefer, and Zuvekas 2013; Mitra and Jones 2017).

2.2 Mental health and parenting

In an investigation of children's labor supply and schooling, ignoring the interplay between parental health and the quality of parent-child interactions would be reductive, especially when depressive symptoms are concerned. As previously stated, psychological research shows that parents with mental health issues resort to maladaptive behavior. Leinonen, Solantaus, and Punamäki (2003) suggest that parents with mental health problems suffer difficulties in *parenting*. In general, depressive parents resort to coercion rather than negotiation when trying to control their children. Fathers' depressive symptoms are associated with less nurturing and more punitive parenting (McLoyd 1989),

while mothers' depressive symptoms imply a failure to monitor children (Chilcoat, Breslau, and Anthony 1996). Several studies have also highlighted the fact that depressed mothers show a more negative mood, and are more critical and rejective toward their children (Berg-Nielsen, Vikan, and Dahl 2002; Whitbeck et al. 1992; Goodman et al. 1994). Using longitudinal data from 782 families, Johnson et al. (2004) conclude that paternal psychiatric symptoms were associated with an elevated risk of maladaptive parenting behavior[2]. In particular, fathers with one psychiatric disorder were twice as likely as fathers without a psychiatric disorder to engage in at least two types of maladaptive behavior. Fathers with two or more psychiatric disorders were more than three times as likely to engage in said behavior. Smith (2004) reviews evidence from studies on parental mental health and disruptions to parenting. Quoting Berg-Nielsen, Vikan, and Dahl (2002), she suggests that the two major dimensions of disruption operating through the mental illness-parenting nexus are parental negativity and ineffective discipline practices. Other findings from the literature suggest that poor paternal mental health can lead to limited father involvement, impaired father-child interactions and parents judging children's behavior less positively (LeFrançois 2010).

2.3 Effects on children's mental and physical health

The abovementioned studies all suggest that the quality of children's environment decreases when parents are mentally distressed. This has potential consequences on children's physical, cognitive and behavioral development. Kiernan and Mensah (2009) found evidence of maternal depression negatively influencing children's cognitive development and behavior in the UK using the Millennium Cohort Study. Behavioral difficulties were correlated to maternal depression even when poverty, family status and other background factors are accounted for. The longitudinal study of Rutter and Quinton (1984) showed that children whose parents had psychiatric disorders were more likely to express emotional and behavioral disturbance. Wright et al. (2000) report that teachers of children with parents who have psychiatric disorders report those children to have higher than average levels of adjustment and behavior problems, and weaker academic performance. A negative relationship between educational performance and child behavioral traits has previously been found by Currie and Stabile (2006) and McLeod and Kaiser (2004). Reviewing studies of mentally distressed fathers, LeFrançois (2010)

[2]Behaviors listed are *frequent loud arguments with mother*, *low affection toward child*, *low amount of time spent with child*, *low assistance to child's mother*, *poor fulfillment of paternal role in family*, *poor communication with child*, *poor supervision with child*, *regular cigarette smoking in presence of child*, and *poor maintenance of home*.

quotes a negative impact on child development, poor adolescent functioning in girls, poorer functioning in the early years for boys and poorer physical health as child impacts. The results of Lewinsohn, Olino, and Klein (2005) suggest that depressed parents lead to psychosocial impairment in offspring, and suggest that further research should determine the role of these impairments as mediators in the intergenerational transmission of depression. Using a set of 1587 children from the National Longitudinal Survey of Youth, Frank and Meara (2009) attempt to identify the effect of maternal depression on child behavioral, cognitive and educational outcomes. They find no link between maternal depression and cognitive ability, but their results suggest that maternal symptoms of depression might induce child behavioral problems.

A number of studies on twins have been conducted to assess the importance of genetics in transmission of depression from parents to children, results suggesting that environmental factors systematically account for the largest explanation of variance in depressive symptoms (Gatz et al. 1992; McGue and Christensen 1997; Agrawal et al. 2004). Furthermore, data from the WHO World Mental Health surveys have confirmed the correlation between parental psychiatric illness and offspring disorder using a sample of 22 countries (McLaughlin et al. 2012). There is also evidence of parental mental health influencing children's physical health. Propper, Rigg, and Burgess (2007) show that for a UK birth cohort, maternal mental health is negatively related to a number of child health outcomes, and that the effect seems to be larger than that of financial hardship.

3 Data and context

3.1 Context

Formally, history of mental health care in Mexico is long, as the first psychiatric hospital of America was established there shortly after the Spanish conquest in 1566 (Lartigue and Vives 1991). It however took until the 1950s to see a department of psychology open at the Faculty of Medicine of the National University of Mexico and since 1983 the right to receive mental health services has been present in Mexico's constitution (Lartigue and Vives 1991). Out of the budget spent on mental health, 80% is used to fund the operation of psychiatric hospitals, who are the center of gravity in Mexico's mental health system (Berenzon Gorn et al. 2013). Indeed, Berenzon Gorn et al. show that only 30% of primary care facilities have protocols for detecting and treating mental disorders. Mental hospitals, although receiving the lion's share of the mental health budget, are

generally understaffed, since the country only has 3.47 psychiatrists per 100 000 inhabitants, and 56% practice in the Federal District (Heinze et al. 2012) which holds less than 10% of the population[3]. Furthermore, the reports of cruel and degrading behavior towards the mentally ill across the developing world have not escaped Mexico. A recent report by Disability Rights International details the systematic torture and abuse of mentally disabled individuals in the country (Rodriguez et al. 2015). The report details systematic forced retention and inhumane conditions in many of the shelters—formal or informal—set up to house the mentally disabled in the country. Anecdotally, in 2014, 596 children were rescued from *La Gran Familia*, an abusive institution in the state of Michoacán. Although prominent Mexican figures leaped to the defense of 86 year-old Mama Rosa, founder of the institution, the squalor in pictures from the establishment, and the fact that one year later, the government had yet to relocate some of the institution's tenants (Rodriguez et al. 2015), bears witness to the incapacity of the country to provide mental health care to those most in need of it.

Luckily, most individuals with mental health problems do not have to experience living in shelters. However, among the non-institutionalized population, bad mental health is by all estimates an important problem. Prevalence estimates vary by type of disease, screening instrument, time scale and representativity of the sample. Medina-Mora et al. (2005) found a 12.1% 12-month prevalence of psychiatric disorder[4] in the urban population; Medina-Mora et al. (2007) estimate that 26.1% of adults above 18 years old in Mexico had at least experienced one psychiatric disorder in their life, and 36.4% of the population will eventually experience one; Benjet et al. (2016) find an 8-year incidence of psychiatric order among adolescents of 37.9%. Furthermore, neuropsychiatric diseases account for 19.6% of the global burden of disease in Mexico and is the third contributor to Disability Adjusted Life Years (DALY) (WHO 2011). In the group of adolescents studied by Benjet et al. (2016), the 8-year incidence of any anxiety disorder is at 7% and that of major depressive disorder at 12.9%. Table 1 shows the available evidence on the prevalence of those disorders which the screening instrument I use was designed to capture, namely mood and anxiety disorders. The prevalence of any anxiety disorder in the working age population stands at 14.3% and that of mood disorders at 9.2%[5]. Studies concentrating on Major Depressive Disorder such as Slone et al. (2006)

[3]This distribution does not seem to reflect differences in needs. In 2005, the Federal district had the tenth highest prevalence of depression in women, and the third lowest in men among Mexico's 32 states (Belló, Puentes-Rosas, and Medina-Mora 2005).

[4]16 disorders from the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) were used.

[5]Mood disorders contain Major Depressive disorder, Dysthymia and Bipolar disorder but is dominated

or Andrade et al. (2003), find a prevalence of around 10% (12.8 and 8.1 respectively). Studies focusing on particular segments of the population, such as adolescents (Benjet et al. 2016), older individuals (García-Peña et al. 2008) or emergency room patients (Castilla-Puentes et al. 2008) find numbers that are not strikingly different (13.2% for older individuals, 23% for emergency room patients).

While depression and anxiety seem widespread in Mexico, treatment, by all accounts, is not. A study by Borges et al. (2008) shows that treatment is far from a natural consequence of illness in Mexico, even in the relatively psychiatrist-dense Mexico City. 8.4% of adolescents between ages of 12-17 with anxiety disorder and 12.5% of those with mood disorders sought any treatment for emotional problems in 2005. They also look at predictors of treatment, finding that young women and children of educated parents have a higher probability of seeking treatment. Medina-Mora et al. (2005) study prevalence in adults using a survey representative of Mexico's urban population. Classifying psychiatric disorders as mild, moderate or severe, the percentages of individuals having sought treatment by category stood at 12.6%, 20.8% and 23.8% respectively[6]. The underfinancing of mental health in Mexico is thus mirrored in an underutilization of mental health services.

3.2 The Mexican Family Life survey

The Mexican Family Life Survey (MxFLS) is a large-scale longitudinal survey carried out by researchers from the Ibero-American University (UIA), the Center for Economic Research and Teaching (CIDE), the National Institute of Public Health (INSP), University of California, Los Angeles (UCLA) and Duke University. Three rounds of the survey have been implemented: in 2002, 2005-2006, and 2009-2011. The sample of the first round was representative at national, regional and urban/rural levels (Rubalcava and Teruel 2013), and targeted 8 400 household (35 000 individuals) in 150 communities in 16 of Mexico's 32 states. The attrition associated with the second and third waves is around 10% (Rubalcava and Teruel 2013).

All household members were interviewed, and most of the questions contained in MxFLS1 are present in the following waves, with some questions added along the way. The database is organized into 5 books, with the first two books collecting information

by the first mentioned.

[6]Note that this includes treatment of any kind, and does not imply that the individual went to see a mental health professional.

Table 1: Prevalence of depression and anxiety disorder in Mexico

Source	*Disorder*	*Estimate type*	*Estimate*	*Sample size*	*Survey year*	*Coverage*
Benjet et al. 2016	Any anxiety disorder	8-year incidence	7%	1071	2005, 2013	Adolescents in the Mexico City Metro Area
	Any mood disorder	8-year incidence	12.9%	1071	2005, 2013	Adolescents in the Mexico City Metro Area
Medina-Mora et al. 2007	Any anxiety disorder	Lifetime prevalence	14.3%	5782	2001-2002	18-65, national
	Any mood disorder	Lifetime prevalence	9.2%	5782	2001-2002	18-65, national
Castilla-Puentes et al. 2008	MDD	Prevalence	23%	313	-	Emergency Room patients above 18 years old
Slone et al. 2006	MDD	Lifetime prevalence	12.8%	2509	1999-2001	18 years or older, four Mexican cities
	MDD	Last 12 months	6.1%	2509	1999-2001	18 years or older, four Mexican cities
Andrade et al. 2003	MDD	Lifetime prevalence	8.1%	1734	1995	18-54 years old, Mexico City
	MDD	Last 12 months	4.5%	1734	1995	18-54 years old, Mexico City
Garcia-Pena et al. 200	MDD	Prevalence	13.20%	7449	2004	Adults older than 60 years, Mexico City

Source: Author's collection from various studies of the prevalence of anxiety and depressive disorders in Mexico.
Note: Garcia-Pena find this estimate after applying correction procedures on their initial data, which suggests a prevalence of 21.7%.
MDD: Major Depressive Disorder. At least five of the following symptoms present *nearly every day*: depressed mood or irritable, decreased interest and pleasure, significant weight change (5%) or change in appetite, change in sleep, change in activity, fatigue or loss of energy, guilt/worthlessness, concentration, suicidality (DSM-IV).

on consumption and production activities at the household level. Book 3 is answered by all household members aged 15 years or older and contains information on education, work history, health (including depressive symptoms), migration, victimization and other. Book 4 is answered by women in age to be fertile and contains questions on fertility and contraception. Book 5 concerns children below the age of 15, and contains information on education, employment, time allocation, health and upbringing. Furthermore, Raven's matrices are added in a cognitive module administered to all individuals above 5 years of age. Additionally, a set of anthropometric and health measures were taken from each respondent.

The bulk of the information used in the present article is compiled from the education, health, work, cognitive skills and household modules of the survey. Included respondents are those who respond to books 3 or 5, i.e. those giving detailed information about their educational, work and health status and histories. Where information was missing, it was corrected by one of two methods: either, by comparing individual or household information across waves, or through the use of information from the control book, containing the household member roster (providing some basic information on age, educational and occupational status). In case of conflict, the information given in Books 3 and 5—more thorough—was relied upon.

Table 2 shows descriptive statistics on a set of 8 359 individuals less than 18 years old and children of the household head, who were present in all three rounds. The table shows that consumption per capita in the household increases throughout the period, as does work income for both household heads and their spouses. Cognitive scores of household heads and their spouses are not strictly comparable between years since a large proportion of individuals were not questioned in rounds 2 and 3. Children's cognitive scores can neither be meaningfully compared on average, since different raven matrices were used on individuals below and above 12 years old. In the last section, this is dealt with by computing age-specific cognitive score distributions, and then using the individual's decile in a given round as an outcome variable. Finally, age, schooling and work variables increase as would be expected in a panel setting.

3.3 Measuring depressive symptoms

Several screening methods have been used to test for mental illness using survey questionnaires. Most of these scales focus on depression as the main outcome, and commonly

Table 2: Descriptive statistics on panel sample

	# Obs	Round 1	Round 2	Round 3
Age	25 077	8.71	12.00	16.34
Male	25 077	0.48	0.48	0.48
Household size	25 077	5.7	5.9	5.4
Consumption per capita	23 628	240.7	279.7	343.4
Currently in school	24 993	0.68	0.73	0.58
Attended high school	22 494	0.04	0.13	0.30
Attended college	22 494	0.00	0.02	0.08
Repeated a grade	15 696	0.21	0.23	0.26
Ever worked	21 618	0.08	0.14	0.31
Currently working	25 077	0.07	0.11	0.26
Household Head:				
Works	21 222	0.74	0.72	0.78
Work income	7 398	2369.9	3789.7	4527.8
Cognitive score	3 192	5.0	5.5	4.4
Self-assessed health	15 186	2.50	2.40	2.50
Smoking	15 183	0.16	0.13	0.14
Number of symptoms last month	14 142	2.0	1.6	1.8
Hospitalized last 12 months	15 138	0.03	0.03	0.04
Any chronic illness	14 016	0.23	0.18	0.27
Spouse of household head:				
Works	21 066	0.21	0.21	0.28
Work income	1 188	2358.3	3892.6	5443.5
Cognitive score	4 029	4.8	5.5	4.5
Self-assessed health	18 978	2.6	2.5	2.6
Smoking	18 996	0.04	0.03	0.04
Number of symptoms last month	17 589	2.5	1.9	2.3
Hospitalized last 12 months	18 921	0.10	0.05	0.05
Any chronic illness	17 355	0.29	0.23	0.32

Source: Author's calculation using panel observations of children of the household head less than 18 years old in the first round. For work income, only individuals who declared a work income in all three rounds are included.
Variable definitions are given in Table 14.

used measures include Beck's depression inventory (Beck 1961), the Zung self-rating depression scale (Zung 1965), the General Health Questionnaire (Goldberg 1972), the Center for Epidemiological Studies Depression Scale (Radloff 1977). The Mexican Family Life Survey uses a screening questionnaire developed by Calderón-Narváez (1997) to detect depression in Mexico. The questionnaire, the *Clinical Questionnaire for the Diagnosis of Depressive Syndrome* (Cuestionnario Clinico para el Diagnostico del Sindrome Depresivo (henceforth CCDSD)), contains 21 items related to the emotional well-being of individuals. Typical of screening questionnaires, answers lie on a Likert scale (Likert 1932), with a set of responses reflecting increasing intensity of symptoms felt during a reference period. In the MxFLS, the reference period is the last 4 weeks, and for each item in the questionnaire, respondents give one of four answers: *No*, *Sometimes*, *Many times* and *All the time*.

Table 16 (available in the Appendix) shows the items included in the CCDSD. 20 out of the 21 items were included in this analysis, and two alternate versions of the score were tested. In the first one, the question on the decrease of sexual desire was taken out because of the option not to respond, which was retained by a significant proportion of respondents. Instead, the question on loneliness, not part of the original score (Calderón-Narváez 1997), was inserted. The second version, which is the one retained for the remainder of the analysis, assumes that a missing answer on the question on sexual desires implies a no. This version excludes the additional question on loneliness, which is absent in the original score. For both scores twenty questions are thus included, and answers are worth 1 to 4 points depending on the intensity of the symptoms experienced (from 1 point for *No* to 4 points for *All the time*). The total psychometric score is simply the sum of the individual scores from all questions. As such, the CCDSD scale ranges from 20 to 80, 20 being the minimal level of depressive symptoms, and 80 the maximum level of depressive symptoms. Whether the modified or the original version is being used, the test score shows good signs of internal consistency. Cronbach's α[7] from the modified test score is equal to 0.92, 0.94 and 0.94 for rounds 1, 2 and 3 respectively. The α for the original score equal 0.91, 0.94 and 0.93 for rounds 1, 2 and 3. All of the main regressions have been run using both versions of the score, and results proved to be practically identical[8].

[7]The statistic is computed as follows: $\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{i=1}^{k}\sigma^2_{Y_i}}{\sigma^2_{X_i}}\right)$. A high value of α implies that the values of the different test items are strongly correlated, suggesting that they all capture some underlying concept; in this case, depressive symptoms.

[8]Results using the modified version of the score are available upon request.

The CCDSD module can be exploited in several ways. First, a cut-off point may be chosen, considering that scores above a certain level correspond to a certain clinical diagnosis. According to Calderón-Narváez (1997), a score between 20 and 35 constitutes a normal state; a score between 36-45 denotes a person with a moderate level of anxiety; 46-65 denotes average depression, and values above 65 correspond to severe depression. Second, the resulting score may be treated as a continuous variable (see structural shift versus latent index models (Ettner, Frank, and Kessler 1997)). Since the score is by nature continuous, and since the focus of this paper lies in seeing how individual outcomes are affected by increases in average depressive symptoms rather than the crossing over a (possibly quite arbitrary) clinical threshold, the latent index approach is used. Hence, the CCDSD score represents an ordinal measure of depressive symptoms ranging from 20 to 80. A low score implies that depressive symptoms are relatively absent from an individual's life, while a high score implies a strong presence of markers of depression such as anxiety, insomnia or fearfulness. In the empirical analysis below, I retain couples with children for which the score is available for both the household head and his/her spouse, and I use as an independent variable the average score of the couple.

4 Methodological approach

4.1 Theoretical considerations

In order to formalize the problem at hand, it helps to place the child labor-schooling decision problem in a theoretical framework, as in Soares, Kruger, and Berthelon (2012). Their model, alike that of Basu, Das, and Dutta (2010), focuses on a one parent-one child static problem, where the parent is assumed to make the decisions concerning the child. The present model draws heavily on theirs. A distinguishing feature is the addition of productivity parameters for parent and child, which are assumed to depend on mental health status, as suggested by the literature on mental health and work productivity (e.g. Ettner, Frank, and Kessler (1997) and Cseh (2008)). The child's productivity parameter further depends on parental productivity, as to capture the intergenerational transmission of mental health status abundantly shown in the literature. It may also be considered to capture the fact that parents provide inputs to the child human capital acquisition function, and that the quality of these inputs is decreasing in the parental

Table 3: CCDSD score by round and population

Variable	Round 1 (2002)	Round 2 (2005-2006)	Round 3 (2009-2011)
All	26.8	25.6	25.8
Male	24.8	24.2	24.3
Female	28.3	26.6	26.9
Urban	26.5	25.6	26.0
Rural	27.1	25.6	25.5
Center-Northeast	25.7	24.5	25.5
Central Region-West	27.8	26.4	27.0
Central Country Region	27.2	26.7	26.3
Northwest Region	26.7	25.5	24.6
South-Southeast Region	26.4	24.8	25.4
Consumption per capita deciles			
d1	27.0	26.2	25.7
d2	26.7	25.6	25.8
d3	27.3	25.5	26.0
d4	26.9	25.6	25.9
d5	26.8	25.5	25.6
d6	27.0	25.6	26.0
d7	26.7	25.4	25.7
d8	26.9	25.7	25.7
d9	26.5	25.3	25.8
d10	26.0	25.4	25.5
Calderon classification:			
Normal person	86.2%	88.4%	88.3%
Moderate anxiety	11.7%	9.7%	9.5%
Average depression	2.0%	1.7%	1.9%
Severe depression	0.1%	0.3%	0.4%
Total	100%	100%	100%

Source: Author's calculations using 63 645 observations from MxFLS1-3.

efficiency parameter[9]. Parental efficiency thus acts on the child labor-schooling nexus in two ways: through its direct link to household income, and through its indirect role in the child's human capital acquisition. More precisely, parental mental health affects human capital acquisition through a deterioration in the child's own efficiency, corresponding to a transfer of negative mental health onto the child, but it may also act negatively on human capital acquisition through lessened parental input (in quantity or quality). In Soares, Kruger, and Berthelon (2012), the household utility function is equal to:

$$U(c,h) = \frac{c^{\sigma}}{\sigma} + \beta h \tag{1}$$

Where σ and β are constant parameters, with $0 < \sigma < 1$ and $\beta > 0$. c and h denote consumption and child human capital. Wages for adults and children are taken as determined. The representative parent is assumed to dedicate all his/her time to work, and earns an income depending on an exogenous wage and on a productivity parameter θ_p, related to (among other things) his/her mental health status. The child's time is divided between labor and human capital acquisition. Furthermore, the child wage is fixed, and does not depend on θ_c[10]. The full income constraint is thus equal to $c + w_c(1 - l_c) \leq w_p \theta_p t_p + w_c t_c$, with $t_c = t_p = 1$. Human capital is accumulated through a human capital acquisition function, increasing in θ_c, the child's productivity parameter, $1 - l_c$ the time the child spends in school and in v_c a set of individual time-invariant characteristics. To account for the correlation in mental health between members of the same family, let the child's efficiency parameter θ_c depend on the adult's mental health, with $\theta_c = \theta_c(\theta_p)$, and $\theta_c' > 0$. Finally, let $h()$, the human capital acquisition function, be equal to:

$$h(\theta_c(\theta_p), 1 - l_c, v_c) = \theta_c(\theta_p)(1 - l_c)\exp(v_c) \tag{2}$$

[9] I choose not to specify how this effect operates for now. Let us however note that it is compatible with a number of psycho-social transmission mechanisms: lowered quality of parental assistance, lowered child cognitive and behavioral development, and worsened child physical or mental health.

[10] This assumption might seem unrealistic. However, it is likely that the work available to children [at least those of relatively low ages] often takes place informally, in the household, and relies little on mental acuity. Relaxing this constraint implies that the predictions of the model become less straightforward. Notably, the impact of a decrease in θ_p on child labor will depend on the levels of parental and child productivity.

This implies that human capital accumulation is a function of time spent in school (1-l_c), and of efficiency of converting that time into human capital. I here assume that the efficiency is divisible into a component related to productivity, θ_c (influenced by parental depression symptoms), and a residual containing all other factors affecting human capital accumulation, v_c. The associated first order conditions with respect to c and l_c are:

$$\begin{cases} c^{\sigma-1} = \lambda \\ \beta\theta_c(\theta_p)\exp(v_c) = \lambda w_c \end{cases} \tag{3}$$

Any interior solution thus satisfies:

$$\beta\theta_c(\theta_p)\exp(v_c) = c^{\sigma-1}w_c \tag{4}$$

Thus, parents will divide child time between schooling and labor as to equalize marginal utility derived from an increase in human capital acquisition with marginal utility derived from the increase in consumption derived from child labor. A *no schooling* corner solution arises when the marginal gain from investing in schooling is less than the marginal loss in terms of child contribution to household income. Conversely, a *no child labor* corner solution exists when the opposite is true, i.e. when investing in education always generates a higher utility return than having the child work.

At the optimum, a parent will choose to have his child work more whenever the left-hand side of equation (4) decreases with respect to the right-hand side, displacing the optimum choice towards more child labor and less schooling. That is, when the marginal return to investment in education decreases more than the marginal return to child labor. Our interest lies in how a change in parental mental health might impact this decision. Recognizing the fact that $c = w_p\theta_p + w_c l_c$, we get:

$$w_c l_c^* = [\frac{\beta\theta_c(\theta_p)\exp(v_c)}{w_c}]^{\frac{1}{\sigma-1}} - w_p\theta_p \tag{5}$$

Developing this and differentiating l_c^* with respect to θ_p gives:

$$\frac{\delta l_c^*}{\delta \theta_p} = \frac{\theta_c' \theta_c (\theta_p)^{\frac{2-\sigma}{\sigma-1}}}{(\sigma-1)w_c} \left[\frac{\beta exp(v_c)}{w_c}\right]^{\frac{1}{\sigma-1}} - \frac{w_p}{w_c} < 0 \tag{6}$$

From this setup, the positive (negative) impact on child labor (schooling) from a decrease in parental productivity parameter θ_p becomes unambiguous[11]. The effect applies via two mechanisms. First, a decrease in parental income increases the amount of child labor, as child and parental labor are substitutes. Second, a mental health shock also lowers the productivity of the child's human capital acquisition, making it less worthwhile to direct resources to schooling. We thus expect that increases in depressive symptoms in parents will lead to an increased probability of children working, and to a lower school attainment (quantity or quality-wise).

4.2 Empirical strategy

The empirical strategy relies on using linear probability models with individual fixed effects. Since the MxFLS is a panel survey with low attrition rates, a relatively large sample of individuals present in all three waves is available. It is thus possible to estimate individual fixed effects models, thereby controlling for possible unobserved heterogeneity between individuals that might confound identification. As a corollary, using fixed effects models also implies that I estimate the impact of transitory variations of mental health, rather than the impact of its genetic or "lifetime" component. This being said, one might worry that parental mental health might be correlated with the unobserved error term in the structural models (even though individual fixed effects are present), with an unknown direction of bias. Concerning school presence, for example, a child leaving home for school might increase the feeling of loneliness in parents staying at home, or parents working hard to finance children's schooling might result in worse mental health, biasing the coefficient upwards. Conversely, a child's failure in school (such as repeating a grade, or dropping out of school to work) might deteriorate the mental health of parents, biasing coefficients downwards. Furthermore, unobserved events might simultaneously affect mental health and schooling (bullying, for example, may lead parents to withdraw their children from school, while at the same time deteriorate their emotional status). Finally, as acknowledged by Ettner, Frank, and Kessler (1997), mental health

[11] Since σ is defined as strictly bounded by 0 and 1.

is likely to be jointly determined with income and employment, and basically with any other labor market decision. It can be improved on by investing in formal or informal treatment[12], and intrinsic characteristics of employment might influence mental health with an unknown direction of bias: stigma and stress, modified social network and self-esteem are all plausible outcomes of a change in labor market status.

Splitting the individual effect term v_c into an observable, time variant ($X_{i,t}$) and an unobservable time-invariant component (δ_i), I estimate the following specification:

$$P(Outcome = 1)_{i,t} = \alpha + \beta_1 CCDSD_{i,t} + \beta_2 X_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \tag{7}$$

Where $P(Outcome = 1)$ is the probability of occurrence of a set of child labor and schooling related outcomes, $CCDSD$ is the average parental depression score discussed above, our main variable of interest (proxying for θ_p). $X_{i,t}$ is a set of time-variant individual and household level characteristics, and δ_i a set of time-invariant characteristics of the child. To deal with the main endogenous regressor, the parental CCDSD score, I resort to IV estimation, using the Limited Information Maximum Likelihood (LIML) estimator[13]. In the literature, instruments for mental health captured in survey data include parental mental health (Ettner, Frank, and Kessler 1997), genetic markers (Fletcher and Lehrer 2011) physical activity (Hamilton, Merrigan, and Dufresne 1997), daylight (Tefft 2012), death of a close friend (Frijters, Johnston, and Shields 2010), long-term non-acute illnesses (Hamilton, Merrigan, and Dufresne 1997), lagged or past mental health (Ettner, Frank, and Kessler 1997; Chatterji et al. 2007), religiosity (French and Alexandre 2001). Genetic markers and parental mental health are probably statically linked to child mental health, but a dynamic relationship is difficult to argue, so their use as instruments for transitory mental health shocks in a panel setting is limited. The use of lagged variables to avoid simultaneity bias has recently been questioned, evidence showing that even when used as instruments, lagged variables need to satisfy strong assumptions to achieve causality (Bellemare, Masaki, and Pepinsky 2015; Reed 2015). In particular, identification requires that there are no dynamics either in the error term, or in the outcome variable. This is a questionable assumption in the present case. It is likely that depressive symptoms, when non addressed, progresses steadily. It is also

[12] Although arguably with less certainty than regarding physical health.

[13] Some of the regressions raise concerns for weak instruments, which are more efficiently handled by LIML (Angrist and Krueger 2001).

likely that people displaying high rates of symptoms (such as the severely depressed) in one round seek treatment, and will appear with lower scores in the next round. Instead of using lags, I thus propose an instrument that is time variant, strongly correlated with current mental health, and uncorrelated with the error term. This is having been assaulted in the street.

Table 4: Descriptive statistics from victimization module, 2002-2005-2009

	Round 1 (2002)	Round 2 (2005-2006)	Round 3 (2009-2011)
	[%]	[%]	[%]
Compared to 5 years ago, do you feel..			
Safer	20.9	15.2	10.8
The same	53.1	59.2	55.6
Less safe	26.0	25.6	33.7
	100	100	100
Ever assaulted outside home/plot/business			
Yes	11.6	12.9	14.2
No	88.4	87.1	85.8
	100	100	100
Assaulted last 3 years			
Yes	5.4	3.9	4.7
No	94.6	96.1	95.3
	100	100	100
	CCDSD Score	CCDSD Score	CCDSD Score
Ever assaulted outside home/plot/business			
Yes	27.0	26.3	26.6
No	26.7	25.5	25.6
Difference	0.3**	0.9***	1.0 ***
Assaulted last 3 years			
Yes	27.1	27.3	27.1
No	26.7	25.5	25.7
Difference	0.4**	1.8***	1.4***
Frequency	19 390	20 517	23 427

Source: Author's calculations using 63 334 observations of respondents >14 years old, from MxFLS1-3.
Stars represent significant differences at the *< 10%, **<5% and ***<1% levels.

The link between violence and mental health is firmly established in the literature. Among others, Kilpatrick et al. (1985) show increased mental health problems after victimization in a group of 2000 adult women in South Carolina. Pastore, Fisher, and Friedman (1996) show that youth reporting having witnessed a stabbing or who knew someone who had been murdered were twice and three times as likely to have suicidal tendencies. Romito and Grassi (2007) find evidence of a relationship between mental health and exposure to violence among university students in Italy. Sulemana (2015)

finds, using data from the Afrobarometer surveys, that physical assault decreases subjective well-being among men and women in Africa, and Ribeiro et al. (2013) show a link between violent assault and 10 common psychiatric disorders in Rio de Janeiro and Sao Paolo, Brazil.

The MxFLS contains a module on individual victimization, detailing both current and perceived future trends of safety, as well as information on incidents that happened in the past. In order to construct the instrument, question VLI05 is used, namely "Have you ever been assaulted, robbed or have you been a victim of any violence outside your household, plot or business?". The module further details time, age at incident, whether or not weapons were used, if the incident was reported, and if death or other physical injury resulted from the incident. Table 4 shows some summary statistics of respondents to the victimization module. It appears that according to public perception at least, Mexico has become a less safe place. Looking at the percentage of persons ever assaulted, it increases. This result might indicate increasing violence; however, since a large proportion of the sample is composed of panel respondents, this might indicate nothing more than an age effect. Indeed, when looking at the percentage of individuals assaulted in the last three years, the number drops from 2002 to 2005, to increase again between 2005 and 2009. Finally, most of the assaults reported are termed robberies by the respondents. In MXFLS3, of the 2020 reported incidents for which there is information on the nature of the incident, 91.6% were declared as robberies or assaults, 4.2% as fights, 1.3% as sexual assaults, 1% as kidnappings, and 1.8% as *other*.

As can be seen from Table 4, there is a significant correlation between assault and score on the CCDSD depression scale. Table 15 shows these and additional statistics on a sample of household heads and their spouses present in all three waves. It confirms the picture of less perceived safety in Mexico. It also confirms that while most assaults are being judged as serious, weapons being involved more often than not, few (6%-8%) lead to any bodily harm of the respondent. Since the MxFLS is a rich dataset, it is possible to control for a set of time-varying potential confounding factors that might question the exogeneity of the instrument. Finally, through using individual fixed effects, those household unobservables that are time-invariant are effectively withdrawn.

5 Results

5.1 Main outcomes of parental depressive symptoms

Table 5 shows two-sample t-tests over our main outcomes, related to work and schooling of children. They largely confirm the predictions from the theoretical model, that increased parental depressive symptoms are associated with less schooling and more child labor. As such, not being in school, not having attended higher levels of schooling and having repeated one or more grades are all associated with higher parental CCDSD scores, implying more depressive symptoms. Currently working, whether in schooling or not, or having worked at some point, are also significantly associated with higher parental depression symptoms. Finally, being inactive also seems to be associated with a higher parental CCDSD.

Table 5: Two-sample t-tests on main outcomes

	Yes	No	
	Parental CCDSD score		Difference
Currently in school	25.7	26.2	-0.5†
Attended high school	25.4	26	-0.6†
Attended college	24.7	25.9	-1.2†
Ever repeated	26.6	25.8	0.9†
Ever worked	26.6	25.7	0.9†
Currently working	26.5	25.8	0.7†
Inactive	26.4	25.8	0.6†
Combining work & schooling	27.1	25.8	1.2†

Population: 16 967 panel respondents under the age of 18 in 2002.
† P<0.001

The impacts of variations in parents' depressive symptoms on four child outcomes (school presence; grade repetition; having ever worked; combining work and schooling) are shown in tables 6-9. Estimates from regressions on four more outcomes (ever gone to high school; ever gone to college; currently working; inactivity) are shown in appendix tables 17-20. All regressions were also run with indicator variables for state and parental education, but since these are fairly time-consistent and did not show up significant they were dropped from the estimations, which did not change the results. All regressions were run with both random effects and individual fixed effects, and standard errors were clustered at the individual level in all models. The IV regressions were estimated using Limited Information Maximum Likelihood, and first-stage statistics are shown for each estimation[14] at the bottom of the tables. A Kleibergen-Paap rank test (Kleibergen and

[14]The full first-stage regression results are available from the author upon request.

Paap 2006) was used to test for underidentification, which is rejected at conventional levels for all regressions except *Attended college*, where the sample is greatly reduced. The Hansen J-test for overidentifying restrictions is also provided, and indicates that our instruments are correctly excluded. Finally, weak instruments may be a cause for concern. Stock and Yogo (2005) provide critical values for the LIML estimator, based on the Cragg-Donald Wald F statistic. In our case however, the assumption of identically and independently distributed errors is violated since the errors are clustered at the individual level. The Kleibergen-Paap Wald rk F is thus added, since it is robust to a violation of the iid assumption. Comparing it to Stock & Yogo's critical values suggests limited bias. Finally, weak-instrument robust tests were performed using **weakiv**, a user-written Stata command developed by Finlay, Magnusson, and Schaffer (2013). A conditional likelihood ratio test, robust to clustered standard errors, is provided along with the other test statistics. Under the null hypothesis, the coefficient of parental depressive symptoms is equal to zero.

The results regarding education appear less clear than in the simple correlations above. Table 6 shows the probability of being in school as a function of parental depression symptoms and a set of exogenous variables. The random effects coefficient is negative and significant, indicating that individuals with more depressed parents are less likely to be in school. When controlling for individual fixed effects, however, the coefficient is no longer significant and when instrumented, it becomes positive and significant, suggesting that a parental depressive episode is associated with a higher probability of presence in school. This might not be as counter-intuitive as it seems. Two separate mechanisms account for presence in school: 1) the choice to pursue education at higher levels, which should intuitively be positively associated with income and health of the family, and 2) grade repetition, implying longer school presence at a given level of education. The presence of both effects make the interpretation less straightforward. Schooling is mandatory in Mexico up until grade 9, and it could be for example that depressive symptoms imply a longer presence in school for relatively young children, who are still in primary school (repeating grades), while they imply a negative effect on older children who are less likely to enter higher educational cycles. It will be shown in the next section—when decomposing the effect by age—that the results are consistent with this interpretation. The coefficient from "Very bad health" stands out. It is odd to find that individuals in very bad health would be more present in school. This, however, could be explained if worsened health leads to repetition (as Table 7 suggests). Furthermore, extremely few individuals report having a very bad health in the sample

Table 6: Parental CCDSD impact on the probability of being in school

	RE		FE		FE-IV	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Parental CCDSD	-0.003***	(0.001)	-0.000	(0.001)	0.039**	(0.018)
Round 2 dummy	0.034***	(0.010)	-0.136***	(0.009)	-0.118***	(0.014)
Round 3 dummy	-0.033*	(0.019)	-0.431***	(0.012)	-0.395***	(0.021)
Child characteristics:						
Age (in years)	-0.053***	(0.002)				
Sex	0.009	(0.010)				
Good health	-0.015	(0.015)	0.006	(0.018)	-0.002	(0.021)
Regular health	-0.054***	(0.017)	-0.011	(0.021)	-0.043	(0.028)
Bad health	-0.130**	(0.055)	-0.052	(0.059)	-0.077	(0.064)
Very bad health	0.377***	(0.061)	0.483***	(0.087)	0.495***	(0.137)
Ref: Very good health						
Per capita consumption	0.000***	(0.000)	0.000	(0.000)	0.000	(0.000)
Household head and spouse characteristics:						
HH age	-0.003***	(0.001)				
Spouse age	0.001	(0.001)				
HH works	0.004	(0.021)	0.007	(0.027)	-0.010	(0.031)
Spouse works	0.022	(0.023)	-0.015	(0.029)	-0.023	(0.032)
HH working*income	0.000***	(0.000)	-0.000	(0.000)	-0.000	(0.000)
Spouse working*income	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
HH working*hours worked	-0.001*	(0.000)	-0.000	(0.000)	0.000	(0.001)
Spouse working*hours worked	0.001	(0.001)	0.001	(0.001)	0.001	(0.001)
HH hospitalized	-0.014	(0.030)	-0.044	(0.035)	-0.109**	(0.052)
Spouse hospitalized	-0.007	(0.020)	-0.027	(0.025)	-0.037	(0.026)
HH chronic illnesses	0.023**	(0.012)	-0.001	(0.016)	-0.066*	(0.034)
Spouse chronic illnesses	0.002	(0.010)	-0.011	(0.014)	-0.044**	(0.022)
Constant	1.645***	(0.040)	0.955***	(0.038)		
First-stage statistics						P-value
Cragg-Donald Wald F					12.6	
Kleibergen-Paap rk LM χ^2					17.0	0.000
Kleibergen-Paap Wald rk F					10.6	
Hansen J					0.645	0.422
Conditional Likelihood ratio					4.97	0.03
Observations	5 799		5 799		5 799	
Number of individuals	1 933		1 933		1 933	

Sample: Panel individuals more than 5 and less than 16 years old in 2002.
Standard errors are clustered on individuals.
*** p<0.01, ** p<0.05, * p<0.10

Table 7: Parental CCDSD impact on the probability of having repeated a grade

	RE		FE		FE-IV	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Parental CCDSD	0.003***	(0.001)	0.003**	(0.001)	0.038**	(0.019)
Round 2 dummy	-0.042***	(0.014)	0.018**	(0.009)	0.033**	(0.013)
Round 3 dummy	-0.080***	(0.025)	0.055***	(0.008)	0.087***	(0.020)
Child characteristics:						
Age (in years)	0.014***	(0.003)				
Sex	-0.074***	(0.016)				
Good health	0.012	(0.015)	0.010	(0.016)	0.002	(0.018)
Regular health	0.028*	(0.016)	0.026	(0.017)	-0.005	(0.025)
Bad health	0.075*	(0.046)	0.066	(0.043)	0.053	(0.051)
Very bad health	0.322*	(0.176)	0.292	(0.181)	0.303**	(0.144)
Ref: Very good health						
Per capita consumption	-0.000	(0.000)	0.000	(0.000)	-0.000	(0.000)
Household head and spouse characteristics:						
HH age	0.002	(0.001)				
Spouse age	0.003*	(0.002)				
HH works	-0.025	(0.018)	-0.029	(0.020)	-0.047*	(0.028)
Spouse works	0.016	(0.019)	0.024	(0.019)	0.017	(0.023)
HH working*income	0.000	(0.000)	0.000	(0.000)	0.001	(0.001)
Spouse working*income	-0.000	(0.000)	-0.000	(0.000)	0.000	(0.001)
HH working*hours worked	-0.000*	(0.000)	0.000	(0.000)	-0.000	(0.000)
Spouse working*hours worked	-0.000***	(0.000)	-0.000	(0.000)	-0.000	(0.000)
HH hospitalized	-0.004	(0.021)	0.004	(0.022)	-0.051	(0.039)
Spouse hospitalized	-0.028	(0.017)	-0.014	(0.019)	-0.025	(0.022)
HH chronic illnesses	-0.014	(0.011)	-0.011	(0.012)	-0.066**	(0.033)
Spouse chronic illnesses	0.005	(0.010)	0.012	(0.011)	-0.014	(0.019)
Constant	-0.201***	(0.053)	0.111***	(0.033)		
First-stage statistics						P-value
Cragg-Donald Wald F					7.0	
Kleibergen-Paap rk LM χ^2					11.5	0.003
Kleibergen-Paap Wald rk F					6.8	
Hansen J					0.494	0.482
Conditional Likelihood ratio					5.70	0.022
Observations	5 286		5 286		5 286	
Number of individuals	1 762		1 762		1 762	

Sample: Panel individuals aged more than 5 and less than 16 years old in 2002.
Standard errors are clustered on individuals.
*** p<0.01, ** p<0.05, * p<0.10

Table 8: Parental CCDSD impact on the probability of having ever worked

	RE		FE		FE-IV	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Parental CCDSD	0.004***	(0.001)	0.003**	(0.001)	0.035*	(0.019)
Round 2 dummy	-0.049***	(0.011)	0.089***	(0.009)	0.103***	(0.014)
Round 3 dummy	0.000	(0.019)	0.321***	(0.012)	0.351***	(0.022)
Child characteristics:						
Age (in years)	0.043***	(0.002)				
Sex	-0.132***	(0.010)				
Good health	0.000	(0.016)	-0.010	(0.019)	-0.018	(0.020)
Regular health	0.030*	(0.018)	0.016	(0.022)	-0.012	(0.028)
Bad health	0.028	(0.051)	0.026	(0.060)	0.004	(0.067)
Very bad health	0.063	(0.183)	-0.030	(0.184)	-0.022	(0.225)
Ref: Very good health						
Per capita consumption	-0.000	(0.000)	0.000	(0.000)	-0.000	(0.000)
Household head and spouse characteristics:						
HH age	0.005***	(0.001)				
Spouse age	-0.004***	(0.001)				
HH works	-0.043**	(0.021)	-0.040	(0.027)	-0.053*	(0.030)
Spouse works	-0.010	(0.025)	0.024	(0.032)	0.015	(0.033)
HH working*income	0.001***	(0.000)	0.001	(0.001)	0.001**	(0.001)
Spouse working*income	0.000	(0.001)	-0.000	(0.001)	-0.000	(0.001)
HH working*hours worked	-0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Spouse working*hours worked	-0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
HH hospitalized	0.005	(0.029)	0.015	(0.035)	-0.041	(0.051)
Spouse hospitalized	-0.008	(0.018)	-0.011	(0.022)	-0.016	(0.024)
HH chronic illnesses	0.010	(0.013)	0.009	(0.016)	-0.044	(0.035)
Spouse chronic illnesses	0.038***	(0.011)	0.044***	(0.014)	0.016	(0.022)
Constant	-0.463***	(0.040)	-0.026	(0.038)		
First-stage statistics						P-value
Cragg-Donald Wald F					13.2	
Kleibergen-Paap rk LM χ^2					17.6	0.0002
Kleibergen-Paap Wald rk F					11.2	
Hansen J					1.52	0.218
Conditional Likelihood ratio					5.0	0.029
Observations	5 757		5 757		5 757	
Number of individuals	1 919		1 919		1 919	

Sample: Panel individuals aged more than 5 and less than 16 years old in 2002.
Standard errors are clustered on individuals.
*** p<0.01, ** p<0.05, * p<0.10

Table 9: Parental CCDSD impact on the probability of combining school and work

	RE		FE		FE-IV	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Parental CCDSD	0.002***	(0.001)	0.002**	(0.001)	0.037**	(0.017)
Round 2 dummy	0.001	(0.008)	0.010	(0.007)	0.026**	(0.012)
Round 3 dummy	-0.011	(0.012)	0.008	(0.007)	0.042**	(0.018)
Child characteristics:						
Age (in years)	0.003**	(0.001)				
Sex	-0.030***	(0.006)				
Good health	-0.001	(0.009)	0.002	(0.012)	-0.008	(0.015)
Regular health	0.010	(0.011)	0.018	(0.014)	-0.014	(0.022)
Bad health	0.004	(0.034)	0.031	(0.039)	0.028	(0.049)
Very bad health	-0.049***	(0.012)	-0.192	(0.175)	-0.183	(0.212)
Ref: Very good health						
Per capita consumption	0.000**	(0.000)	0.000**	(0.000)	0.000	(0.000)
Household head and spouse characteristics:						
HH age	0.001**	(0.001)				
Spouse age	-0.001*	(0.001)				
HH works	-0.001	(0.012)	0.010	(0.017)	-0.013	(0.024)
Spouse works	0.008	(0.017)	0.016	(0.022)	0.002	(0.026)
HH working*income	0.000	(0.000)	-0.000	(0.000)	-0.000*	(0.000)
Spouse working*income	0.000	(0.000)	-0.000	(0.001)	0.000	(0.000)
HH working*hours worked	-0.000***	(0.000)	-0.000	(0.000)	0.001	(0.000)
Spouse working*hours worked	-0.000	(0.000)	0.000	(0.000)	0.000	(0.001)
HH hospitalized	-0.004	(0.019)	0.004	(0.023)	-0.053	(0.040)
Spouse hospitalized	-0.018*	(0.010)	-0.011	(0.012)	-0.018	(0.017)
HH chronic illnesses	0.015*	(0.008)	0.016	(0.010)	-0.038	(0.027)
Spouse chronic illnesses	0.010	(0.007)	0.012	(0.009)	-0.015	(0.016)
Constant	-0.040*	(0.023)	-0.029	(0.024)		
First-stage statistics						P-value
Cragg-Donald Wald F					7.1	
Kleibergen-Paap rk LM χ^2					11.8	0.003
Kleibergen-Paap Wald rk F					7.31	
Hansen J					0.02	0.891
Conditional Likelihood ratio					8.53	0.005
Observations	5 310		5 310		5 310	
Number of individuals	1 770		1 770		1 770	

Sample: Panel individuals aged more than 5 and less than 16 years old in 2002.
Standard errors are clustered on individuals.
*** p<0.01, ** p<0.05, * p<0.10

(0.06% of individuals less than 18 years old in 2002). In the Table 6 sample, only two individuals move to a very bad health between rounds 1 and 2.

From the results in the appendix (Tables 17-18) it can be seen that parents' CCDSD scores do not significantly influence the choice to continue on to high school or college[15], bearing in mind that these results should be interpreted with caution since the instrument is weakly correlated with depressive symptoms. Depressive symptoms do however significantly increase the probability of grade repetition, as seen in Table 7. The size of the coefficient is rather small, 0.003, and implies that a change of one standard deviation (5.9 points on the score) in parents' CCDSD score would increase the predicted probability of a child having repeated a grade by around 2 percentage points (5.9*0.003). It also implies that a child in a family where one parent goes from 20 to 46 on the CCDSD scale—that is, from perfect mental health to average depression—sees its probability of repeating a grade increase by 4 percentage points (13*0.003). However, as previously discussed, endogeneity is likely to bias the coefficient in an *a priori* unknown direction. Measurement error is one such likely bias: if parents are incoherent in their ways of responding to the emotional well-being module in time, or if the screening device is simply imperfect, then measurement error of the underlying true depressive symptoms is likely to bias coefficients towards zero. Another potential downward bias is if the amount and quality of extra-curricular help provided by parents negatively influences their emotional well-being, through extra work or stressful behavior for example. Column 3 shows the same regression run with instrumental variables. The result is similar, but the size of the coefficient on parental mental health is now more than 10 times larger. In the IV estimates, an increase of one standard deviation of parental CCDSD implies a change in the probability of repetition of 24 percentage points. For the previous example, of one parent with no symptoms of negative affect who develops average depression, the associated probability increase is of 52 percentage points.

Tables 8 and 19 show the results of regressions pertaining to work outcomes. In all specifications but one (fixed effects, currently working), parental CCDSD is positively associated with currently working or having worked at one time. As such, according to the fixed effect estimation, one standard deviation increase in parental CCDSD corresponds to an increase of 1.8 percentage points in the probability of the child having ever worked, while the coefficient of currently working is not significant in fixed effects. Again, the IV estimates are sensibly higher, with a one standard deviation increase in

[15]Compulsory education in Mexico ends after lower secondary school, at 15 years of age.

parental CCDSD equal to a 20.7 (5.9*0.035) percentage point increase in the probability of having worked, and a 17.1 (5.9*0.027) percentage point increase in the probability of currently working. While the finding of higher grade repetition speaks rather clearly, the fact that individuals work more might not necessarily reflect a constraint. Work could, indeed, be a very positive outcome if it occurs after graduation and pleases the young person under consideration. If, for the sake of argument one deliberately takes the (counter-intuitive) stand that individuals whose parents' mental health deteriorates are more likely to find a job upon graduation, and that this is what is being picked up in the previous estimates, then this should be reflected in a lower probability to be inactive. Yet, table 20 shows that increasing parental negative affect is not correlated with decreasing rates of inactivity within individuals. On the contrary, the coefficient is positive in both regressions, but not significant when IV is used. The plausibility of estimates reflecting increased success on the job market is thus low. On the contrary, what we seem to be picking up is an increased probability of combining work and schooling (see Table 9, consistent with the mechanism of revenue loss leading to work uptake extensively described in the literature on household income shocks and children's school and work decisions (e.g. Fitzsimons and Mesnard (2014)). Another interpretation consistent with my framework is simply that the work-schooling ratio increases due to decreasing benefits from education (reflected in the presence of parameter θ_p in the child's human capital acquisition function.

5.2 Considerations on vulnerability

The previous results show that an exogenous increase in mental health is associated with increased work and school repetition in children. While informative in itself, in order to draw policy conclusions it would be even more important to know whether the relationships uncovered originate from a particular segment of the population. If an increase of negative affect provokes the abovementioned outcomes independently of parents initial mental health, or whether already vulnerable parents are those who drive the results, matters in terms of the possibility of identifying cost-beneficial strategies to counter school failure and premature work.

Table 10 shows marginal effects from regressions run with the added interaction term Parental CCDSD * Parental CCDSD_{2002}. Here, I thus allow depressive symptoms to have differential effects according to the initial (first wave) level of depressive symptoms. The marginal effects are evaluated at the scores denoting the boundaries of Calderon's classification. The coefficients all tell us the same story: while mental health shocks have impacts on child schooling and work outcomes, these results are not driven by the "extremes", i.e. those parents who were already at high levels of distress in 2002. On the contrary, the marginal effects at higher levels of initial depressive symptoms are rather negative, but not significant. A potential explanation for negative results at the higher end tail could be that pre-existing high morbidity, when accentuated, triggers help interventions by local government or friends and family, effectively taking care of children when parents are unable to. Table 24 shows three alternative specifications of the CCDSD score (linear, squared and cubic) and presents marginal effects by steps of 10. The results are consistent with the below table: higher scores are significantly correlated with child outcomes at initial values of 20 and 30, but not above[16].

The literature on early childhood effects on future outcomes provides another source of potential heterogeneity in the estimated coefficients. If children exhibit varying sensibilities to parental depression depending on their age, this should be reflected as age-specific differences in the impact of parental illness on child outcomes. However, we only have knowledge of parental mental health at three points in time, and we do not know the duration of symptoms or the time at which they started. We thus risk to be confronted with noisy estimates when running the above regressions adding interactions

[16]Note that since this is the average score, it could still correspond to a couple where one of the two is moderately anxious (with a CCDSD of say, 40), and the other one in perfect mental health

Table 10: Marginal effects of parental CCDSD, at levels of 2002 CCDSD.

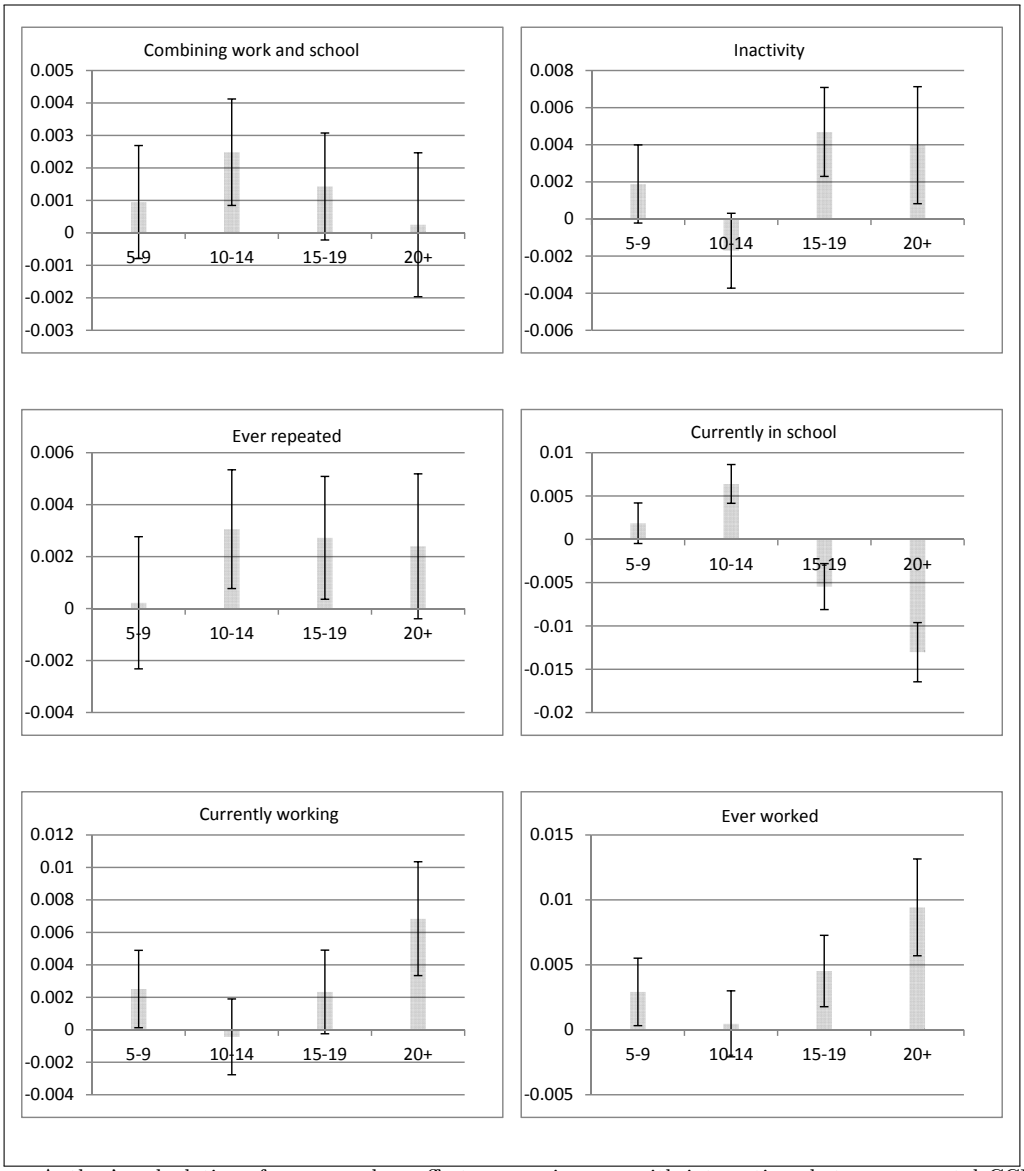
2002 score	Currently in school		Ever repeated		Ever worked	
20	-0.0015	(0.0019)	0.0062***	(0.0018)	0.0040**	(0.0018)
35	-0.0005	(0.0016)	0.0008	(0.0015)	0.0014	(0.0016)
45	0.00022	(0.0031)	-0.0028	(0.0029)	-0.0004	(0.0029)
65	0.0016	(0.0063)	-0.0099	(0.0061)	-0.0039	(0.0059)
	Currently work		Inactive		Working in school	
20	0.0028*	(0.0017)	0.0044***	(0.0017)	0.0018*	(0.0010)
35	0.0000	(0.0015)	0.0012	(0.0013)	0.0005	(0.0009)
45	-0.0017	(0.0026)	-0.0010	(0.0024)	-0.0003	(0.0015)
65	-0.0054	(0.0054)	-0.0054	(0.0049)	-0.0020	(0.0030)

Marginal effects from a random effects model run with interactions between CCDSD score and 2002 CCDSD score. *<0.1, **<0.05, ***<0.01.
Standard errors are clustered on individuals.

between parental CCDSD and age group indicators. Furthermore, the relatively short time span of the data reduces the possibility of comparing effects on children at different ages, since some outcomes are age-specific. In other words, if parental mental health only affects children in their early childhood (say between 0 to 5 years of age), then we will not pick up an effect on high school and college enrollment. These caveats having been mentioned, Figure 1 shows marginal effects from a fixed effect regression by age group for six outcomes.

The results provide some interesting insights. Bearing in mind that the actual effects might have occurred in between waves, it seems that older offspring (above 15 years old) are both at higher risk of working and at higher risk of inactivity. Furthermore, they are less likely to be in school; most likely a sign that they are less likely to continue to high school and college. The impact of parental depressive symptoms thus seems to be hindering progression into higher levels of education, adding an important nuance to what the full sample estimates of the previous subsection showed. The ever repeated graph show that effects on learning do not seem to intervene in the first years of schooling, although this might be due to the fact that we are picking up effects with a time delay, and that 9 years is too low an age for repetition to start becoming an issue. Looking

Figure 1: Marginal effects of parental CCDSD for different age groups



Source: Author's calculations from a random effects regression run with interactions between parental CCDSD and child age groups. Bounded vertical lines show 95% confidence intervals.

at the work-school combination, it is significant for 10-14 years old, i.e. at lower secondary school age. This is coherent with income loss as a primary driver of parents' decision to send children to work, since school is compulsory to the age of 15. Past that age, income-constrained parents can choose not to send their children to high school, which contrary to previous educational cycles is not free and mostly found in urban areas.

Finally, it makes sense, given findings from the psychological literature, to try to distinguish impacts from the mother from impacts from the father. This is done in tables 21 and 22, where all regressions are run with the two CCDSD scores of fathers and mothers respectively entered as two separate variables. The fixed effect specifications shows that fathers' symptoms seem to be of higher importance in terms of outcomes, mothers symptoms being non significant in all regressions except 'Inactive'. However, while instrumented mothers' symptoms are significantly associated with all of the previously significant outcomes, fathers' symptoms are not. The reason fathers' symptoms are not significant most likely stems from the fact that the instrument is very weakly correlated with fathers' depressive symptoms.

5.3 Robustness checks

Identifying the above impacts as impacts of mental health implies excluding possible confounding factors, and involves examining the exclusion criteria of the proposed instrument. First, assaults should not provoke any other consequences relevant for children's outcomes than those on mental health. Two other outcomes come to mind; a physical health shock, and an income shock. Although physical violence is relatively rare in the assaults picked up in the data, and parental physical health is controlled for in the estimations through the number of chronic symptoms and having been hospitalized in the last 12 months or not, a cause for worry could be that estimates are picking up the effects of a deterioration in physical health. To see if this is the case, we exclude from our estimates those individuals whose parents were hurt during the latest assault. From the looks of table 11, this does not much impact the results. Another imaginable consequence of assault might be revenue loss. Although the question refers to assaults taking place in the street, outside of the workplace and home, it could be that individuals carry valuables such as weekly sales revenue or bonuses, or are being robbed of their vehicles. To see whether this revenue loss, rather than resulting mental illness, interferes with our results we exclude from the estimations all individuals who suffered a prejudice higher than 20000 Mexican pesos, i.e. about 1000 euro. At such

high levels, the transitory income shock, that we may not be perfectly capturing through the *per capita* consumption variable, might induce long-term behavioral changes in the household that are unrelated to mental health. As can be seen from table 11, the results do not change upon the exclusion of these observations[17].

Second, in our regressions we are assuming that assault is orthogonal to the error term in the structural equation. This is violated if individuals with particular characteristics are at different risks of assault. Even though individual fixed effects are added to the estimation, and all time-invariant characteristics of the individual are thus controlled for, an infinite number of time-variant unobservable characteristics (behavioral ones, primarily) could explain why an individual is at the same time at a high risk of exposure to violent assault and has children experiencing difficulties in school, or having to do market work. Individuals starting to use drugs, for example, will most certainly find themselves at higher risks of assault while at the same being less productive at work and in assisting offspring with scholarly tasks. While not all of the plausible confounding characteristics can be captured in the data, information on self-assessed probability of being assaulted is present and available for use as a proxy variable for risky behavior. This variable resumes private information from the individual on risk factors or preventive behavior making him or her more exposed to assault, which may be correlated with the error term, and is thus a way of minimizing the possibility that $Cov(Z_{i,t}, u_{i,t}) \neq 0$. As shown in Table 11, all the main results hold upon the introduction of this variable. Additionally, in a separate regression (not shown), smoking and alcohol habits were added as additional controls. This proved not to modify the signs, significances or approximate magnitudes of the estimated coefficients.

[17] A relate—not shown—robustness check was carried out where the value of robbed items was introduced as an explanatory variable in the regressions. This turned out to not affect the results.

Table 11: Alternative samples and specifications (robustness checks)

		Curr school	Attended high school	Attended college	Ever repeat	Ever work	Currently work	Inactivity	Working while in school
Panel A: Removing all hurt individuals	FE	0.0001	0.0015	-0.0014	0.0027**	0.0029**	0.0015	0.0020*	0.0017**
		(0.0013)	(0.0018)	(0.0015)	(0.0012)	(0.0013)	(0.0012)	(0.0012)	(0.0008)
	FE-IV	0.065**	0.035	0.10	0.053	0.053**	0.048**	-0.042	0.064**
		(0.028)	(0.042)	(0.17)	(0.033)	(0.025)	(0.024)	(0.032)	(0.030)
	No. Obs.	5 616	3 057	1 584	5 121	5 574	5 616	5 205	5 133
Panel B: Removing individuals with large financial losses	FE	<0.0001	0.0009	-0.0015	0.0026**	0.0030**	0.0016	0.0020*	0.0016**
		(0.0013)	(0.0017)	(0.0015)	(0.0012)	(0.0013)	(0.0012)	(0.0011)	(0.0008)
	FE-IV	0.034**	-0.005	0.041	0.036**	0.032**	0.028*	-0.014	0.038***
		(0.016)	(0.025)	(0.06)	(0.017)	(0.015)	(0.015)	(0.017)	(0.015)
	No. Obs.	5 769	3 129	1 611	5 256	5 727	5 769	5 352	5 280
Panel C: Including probability of being assaulted	FE	-0.0003	0.0012	-0.001	0.0026**	0.0026**	0.0012	0.0021*	0.0014*
		(0.0013)	(0.0018)	(0.0015)	(0.0012)	(0.0013)	(0.0012)	(0.0012)	(0.0008)
	FE-IV	0.048**	0.012	0.09	0.049*	0.034*	0.030	-0.025	0.047**
		(0.022)	(0.033)	(0.10)	(0.026)	(0.019)	(0.019)	(0.026)	(0.022)
	No. Obs.	5 805	3 159	1 614	5 292	5 763	5 805	5 388	5 316

Standard errors clustered on individuals. *<0.1, **<0.05,***<0.01.

Lastly, Mexico's "drug war" implies fluctuating security and sudden outbursts of violence in various regions of the country, as regional groups extend or defend their territories. It could be that a shift in the local political setting induced by such power struggles acts simultaneously on the likelihood to be assaulted in the street, and on the local labor markets. This might modify the relative wages of parents and children and induce an endogenous shift of the optimal schooling and labor decision. To attempt to control for such an effect, and to allow for a flexible specification of state-level heterogeneity in general, a state × year interaction is introduced. A final cause for concern might be panel attrition, inducing bias if non-respondents in follow-up rounds are different from those who remain in the sample. Table 23 shows a few statistics on the main sample versus attrited individuals. The attrited are more often male, older and never having worked than those who remain in the sample. This would be consistent with migration as a way out of inactivity in low-employment areas. In terms of parental CCDSD, however, differences between attrited and in-sample individuals are small. A way of checking if attrition plays a major role in the previous results would be to run all the regression on an unbalanced sample. This was done (results available upon request). The one change in the results that emerges from this exercise is that the previously significant effects on inactivity in the Random effects and Fixed effects model are no longer significant. In light of the results from this section, using assault in the street as a plausibly exogenous source of variation in mental health seems warranted.

5.4 Transmission mechanisms

The previous sections have shown that increased depressive symptoms in parents lead to children more often having to work, and performing less well in school. I will now—based on the previous literature review—examine the evidence for the various plausible mechanisms at hand.

A sizable literature on the labor market effects of mental illness exists, and has generally shown negative effects of poor mental health on employment and labor market participation (Berndt et al. 1998; Chatterji et al. 2007; Kessler 1997; Cseh 2008; Mitra and Jones 2017). Table 12 shows coefficients from a set of regressions run on work, inactivity and the number of hours worked in a general week for household heads. They show a negative relationship between work and depressive symptoms, and between depressive symptoms and inactivity, when an individual fixed effects model is used. However, simultaneity concerns are warranted, since unemployment and inactivity could for various

reasons lead to worsened psychological status. Indeed, the coefficients are no longer significant when depressive symptoms are instrumented. The negative effect found might thus not primarily come from a revenue constraint, but rather from a change in the quality of parent-child interactions, or more generally through the transmission of negative emotional well-being. These mechanisms are hard to test, as information on parent-child interactions is absent from the longitudinal data, and depressive symptoms are only known for children who are 15 years or older. Table 13 however presents regressions run on three outcomes of interest; children's physical health, the relative cognitive capacity of children, and the CCDSD score of children older than 14 years.

The correlations between parental depressive symptoms and those of children are highly significant, even when instrumented. Thus, exogenous shocks to depressive symptoms trigger emotional reactions in children which may deteriorate their educational productivity, leading to increased repetition rates and an increased probability to take up work. Previous literature has investigated whether cognitive development of children is affected when parents are under mental distress, with varying results. In line with Frank and Meara (2009), I find no effects of parental depressive symptoms on the relative cognitive skills of affected children[18]. However, an impact can be found on children's health, as measured by an indicator giving the number of physical symptoms experienced by individuals in the last 4 weeks. The symptoms refer to common health problems (see table 13 for the list of symptoms), and the coefficients found are all positive and significant. It thus seems that another outcome on children is a deterioration in their health, which in itself can have multiple causes. One such cause is if taking up work leads to worsened health outcomes. A separate regression (not shown) was run where child work was added as an additional explanatory variable. The coefficients were all significant, suggesting that worsened health may be a by-product of the increased propensity to work with increased parental depressive symptoms. However, parental CCDSD remained significant as well, including when instrumenting, suggesting that additional transmission mechanisms, such as parental disengagement, account for worsened health outcomes.

[18]It should be noted, though, that most of the evolutions in the sample concern mild depressive symptoms.

Table 12: Effect of depressive symptoms on work-related outcomes (HH)

	Works				Inactive				Work hours			
	FE		FE-IV		FE		FE-IV		FE		FE-IV	
CCDSD	-0.003***	(0.001)	-0.001	(0.017)	0.002***	(0.001)	0.011	(0.015)	-0.046	(0.048)	2.355	(1.784)
Round 2 dummy	-0.023***	(0.009)	-0.022	(0.017)	0.024***	(0.008)	0.031**	(0.015)	-0.270	(0.513)	1.241	(1.319)
Round 2 dummy	-0.032***	(0.009)	-0.030**	(0.015)	0.028***	(0.008)	0.034**	(0.013)	-0.785	(0.505)	0.223	(1.013)
Household size	-0.003	(0.004)	-0.003	(0.004)	-0.001	(0.004)	-0.001	(0.004)	0.070	(0.262)	0.038	(0.355)
Rural	0.011	(0.024)	0.011	(0.025)	0.003	(0.021)	0.001	(0.022)	-2.213	(1.374)	-3.472*	(2.077)
Separated	0.054*	(0.030)	0.051	(0.045)	-0.045*	(0.027)	-0.061	(0.040)	2.907	(2.038)	-0.065	(3.527)
Divorced	0.124***	(0.044)	0.122**	(0.050)	-0.142***	(0.039)	-0.154***	(0.045)	4.781*	(2.852)	1.365	(4.611)
Widow	0.083*	(0.050)	0.077	(0.089)	-0.064	(0.044)	-0.100	(0.079)	-0.638	(3.412)	-8.564	(7.475)
Married	0.006	(0.022)	0.006	(0.023)	-0.005	(0.019)	-0.009	(0.021)	3.111**	(1.309)	2.978*	(1.770)
Single	0.094***	(0.036)	0.094***	(0.036)	-0.105***	(0.032)	-0.105***	(0.032)	1.872	(2.438)	1.620	(3.297)
Chronic diseases	-0.003	(0.012)	-0.006	(0.035)	0.006	(0.011)	-0.010	(0.031)	0.062	(0.725)	-4.104	(3.246)
Hospitalized	-0.120***	(0.025)	-0.123***	(0.038)	0.105***	(0.022)	0.090***	(0.034)	0.688	(1.720)	-3.307	(3.767)
First-stage F-stat			8.1				8.1			4.0		
Observations	6,249		6,249		6,249		6,249		4,620		4,620	
Number of individuals	2,083		2,083		2,083		2,083		1,540		1,540	

Sample: Household heads present in all three rounds. Standard errors are clustered on individuals. *:p<0.1, **:p<0.05, ***:p<0.01.

Table 13: Potential transmission mechanisms between parental CCDSD and child outcomes

	Parental CCDSD				HH CCDSD				Spouse CCDSD			
	FE		FE-IV		FE		FE-IV		FE		FE-IV	
Child CCDSD												
Coefficient	0.428***	(0.036)	0.727*	(0.438)	0.242***	(0.032)	0.699*	(0.394)	0.266***	(0.026)	0.449	(0.382)
Observations	5 043		5 043		5 043		5 043		5 043		5 043	
Number of individuals	1 681		1 681		1 681		1 681		1 681		1 681	
Cognitive deciles												
Coefficient	0.007	(0.009)	-0.013	(0.1)	-0.007	(0.008)	-0.20	(0.157)	0.011*	(0.006)	0.033	(0.070)
Observations	6 144		6 144		6 144		6 144		6 144		6 144	
Number of individuals	2 048		2 048		2 048		2 048		2 048		2 048	
Number of symptoms												
Coefficient	0.022***	(0.005)	0.168**	(0.074)	0.014***	(0.005)	0.209*	(0.107)	0.013***	(0.003)	0.119**	(0.055)
Observations	8 034		8 034		8 034		8 034		8 034		8 034	
Number of individuals	2 678		2 678		2 678		2 678		2 678		2 678	

Child CCDSD: *Sample:* children of the household head between 15 and 29 years old in 2002.
Cognitive deciles: *Sample:* number of children between ages of 5 and 17 in 2002.
Number of symptoms: number of the following symptoms experienced the last 4 weeks: tooth ache, headache, stomach pain, flu, breathing difficulties, cough, fever, nausea, diarrhea, infected eyes. *Sample:* number of children between ages of 5 and 17 in 2002.
All regressions contain the explanatory variables from regressions 6-9.
Standard errors are clustered at the individual level.

6 Conclusion

I have above shown evidence on the causal impact of parental depressive symptoms on children's educational and labor outcomes in Mexico. The results show that an increase in parental depression symptoms leads to an increased probability of grade repetition, but is not significantly associated with high school or college attendance (although this might be caused by weak instruments). Furthermore, parental depression does lead to increased work rates (including when in school). I then attempt to disentangle the transmission mechanisms involved. The evidence does not support revenue loss as a primary mechanism driving the above results, suggesting that the negative impacts on children stem primarily from worsened parent-child interactions. This is confirmed looking at the intergenerational transmission of depressive symptoms. An exogenous increase of parental depressive symptoms leads to a significant increase in depressive symptoms and to a decrease of physical health in children, as measured in the numbers of symptoms shown in the last 4 weeks.

Using assaults in the street as a source of exogenous variation in mental distress, I conclude that an increase of one standard deviation in parents' average depressive symptoms leads to an increase of 15-25 percentage points in the probability of repeating a grade and carrying out (or having carried out) market work, respectively. Results are robust to alternative samples and specifications. Based on these results, I conclude that the consequences of mental illness should be of primary concern to policy makers in the area of public health if they are looking to address intergenerational sources of inequality. Given the low cost of generic anti-depressants, and the massive under-utilization of mental health services in Mexico, there seems to be ample space for cost-effective interventions, which apart from healing the suffering, come with positive externalities at the family level.

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7 Appendix

Table 14: Description of variables used

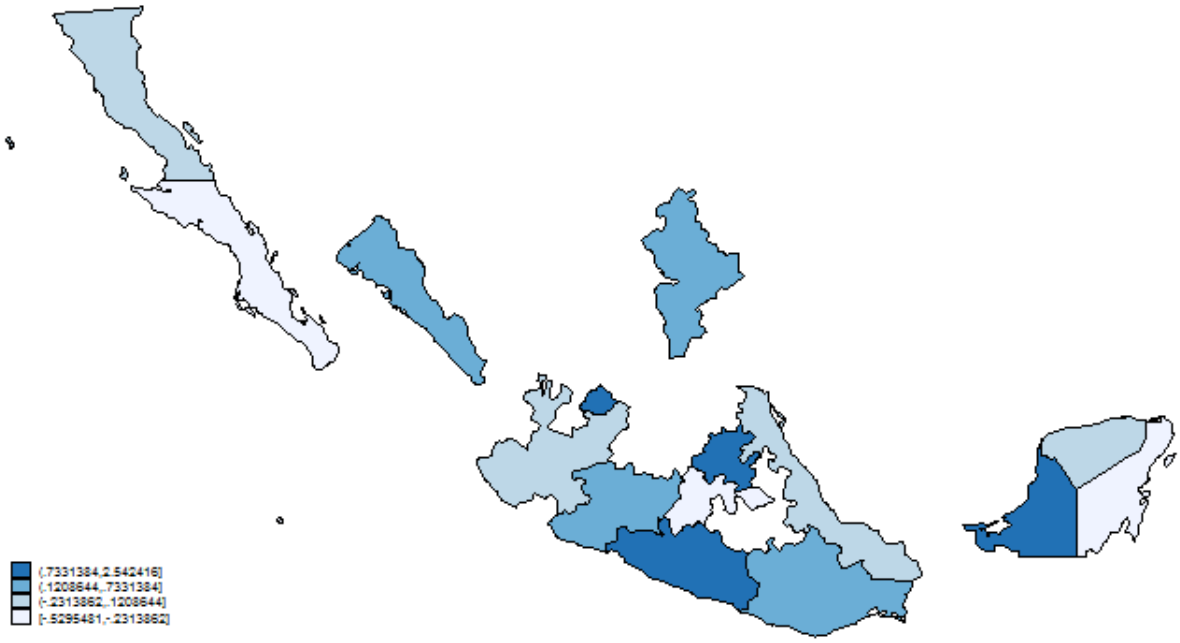
Age	Age in years
Male	Being a male
Household size	Number of household members currently living in the household
Consumption per capita	Weekly per capita household consumption of non-durables and durables
Self-assessed health	Likert scale: 1) Very good health - 5) Very bad health
Currently in school	Currently enrolled and attending school
Attended high school	Once attended high school (but did not necessarily complete the cycle)
Attended college	Once attended college (but did not necessarily complete the cycle)
Repeated a grade	Ever repeated a grade, regardless of cycle. Defined for those above 4 years old who once entered school.
Ever worked	Ever contributed to household expenditure.
Currently working	Currently contributing to household expenditure.
Inactive	Out of the labor force.
Work & in school	Currently working, and enrolled.
Parents:	
Works	Employed (ILO definition)
Work income	Income last month from main job
Work hours	Hours worked last week in main job
Cognitive score	Based on answers to 10 Raven's matrices
Self-assessed health	Likert scale: 1) Very good health - 5) Very bad health
Symptoms last 4 weeks	Number of the following symptoms experienced last 4 weeks: Flu, Cough, Difficulty breathing, Strong stomach pain, Nausea/vomit, Diarrhea, Swollen joints, Welts/irritation, Irritated/red eyes, Molar/teeth pain, Headache, Temperature/fever, Body ache, Pain in left side of chest (pneumonia), other symptoms.
Hospitalized last 12 months	Received patient care at any type of hospital in the last year, including (but rarely) offices or houses of private doctors.
Any chronic illness	Any of the following declared illnesses/conditions: Diabetes, Hypertension, Heart disease, Cancer, Arthritis/rheumatism, Gastric ulcer, Migraine, Other illness.

Table 15: Descriptive statistics from Victimization module, 2002-2005-2009

	Round 1 (2002)	Round 2 (2005-2006)	Round 3 (2009-2011)
	[%]	[%]	[%]
Compared to 5 years ago, do you feel..			
Safer	17.5	12.7	8.5
The same	55.6	61.0	56.4
Less safe	26.9	26.3	35.1
Total	100	100	100
Ever assaulted outside home/plot/business			
Yes	10.7	14.3	16.8
No	89.3	85.7	83.2
Total	100	100	100
Assaulted last 3 years			
Yes	3.9	3.4	3.1
No	96.1	96.6	96.9
Last incident: somebody hurt?			
Myself	4.8	6.6	5.1
Myself & other people	1.3	1.6	1.5
Other people	3.2	2.9	5.1
Nobody	90.6	88.9	88.3
Total	100	100	100
Last incident: serious?			
Very serious	38.6	39.9	40.9
Serious	24.9	30.0	31.4
A little serious	26.8	25.1	23.0
Not serious	9.6	4.9	4.7
Total	100	100	100
Last incident: weapons used?			
Yes	55.5	47.7	51.1
No	28.4	31.3	33.9
Don't know	16.1	21.0	15.0
Total	100	100	100
Last incident: reported?			
Yes	23.9	23.5	35.8
No	76.1	76.5	64.2
Total	100	100	100
Frequency	9 056	9 056	9 056

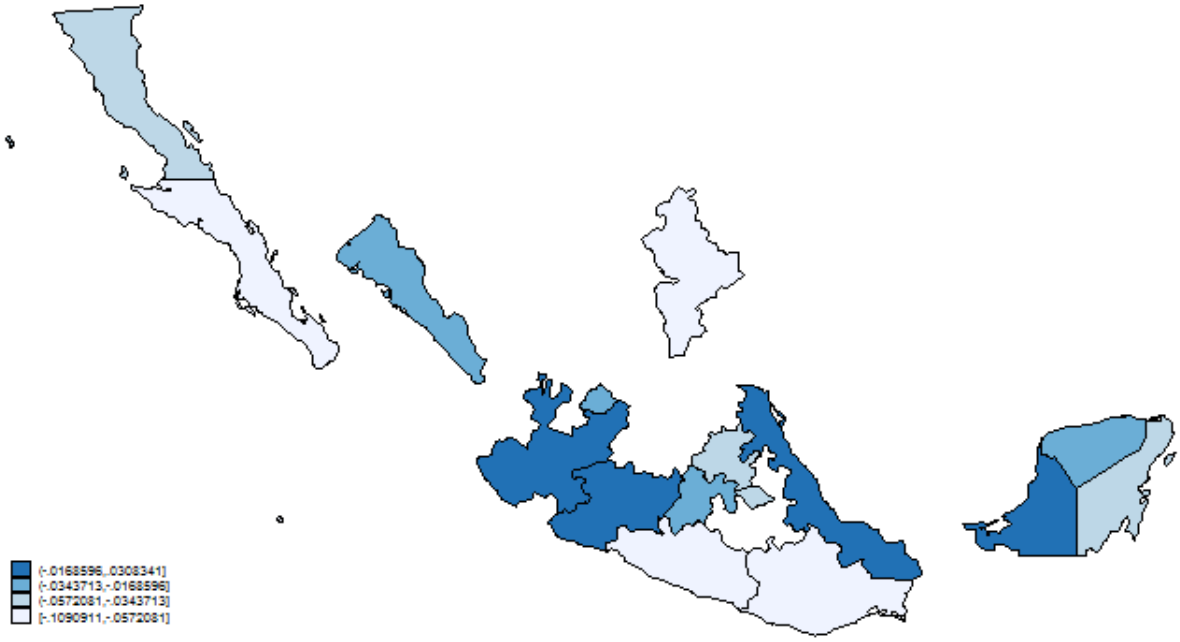
Source: Author's calculations using 29 574 observations from MxFLS1-3.
Population: Household heads or their spouses present in all three waves.

Figure 2: Evolution of homicides by federal entity (16 states), 2002-2009



Source: Compiled by author using data from Secretariado Ejecutiva del Sistema Nacional de Seguridad Pública.

Figure 3: Evolution of CCDSD score by federal entity (16 states), 2002-2009



Source: Compiled by author using data from three rounds of the Mexican Family Life Survey.

Table 16: Cuestionnario Clinico para el Diagnostico del Sindrome Depresivo

In the last 4 weeks...	Pooled distribution of answers [%]			
	No	Yes		
		Sometimes	Most of the time	All the time
...have you felt sad or sorrowful?	62.0	33.2	3.4	1.4
...have you cried or felt like crying?	66.3	29.3	3.4	1.1
...have you slept poorly at night?	63.6	31.7	3.4	1.3
...have you woken up depressed (due to lack of energy or fear)?	68.7	28.0	2.4	0.9
...have you had difficulties focusing on your daily activities?	76.1	21.3	1.8	0.8
...has your appetite diminished?	79.8	17.7	1.8	0.7
...have you felt obsessive or repetitive?	77.0	19.7	2.2	1.1
...has your sexual desire decreased?	83.7	8.0	3.5	4.9
...do you consider that your performance in your daily activities/job has diminished?	73.6	22.4	2.4	1.6
...have you felt pressure in your chest?	82.5	15.1	1.5	0.9
...have you felt nervous, anguished, anxious or eager more than normal?	66.7	29.5	2.8	1.1
...have you felt more tired or more discouraged than normal?	64.0	31.8	3.1	1.1
...have you felt pessimistic or have you thought things will go wrong?	75.9	21.5	1.7	0.9
...have you had frequent headaches or felt pain in the nape?	70.8	25.3	2.8	1.1
...have you felt more irritated or angry than normal?	71.3	25.2	2.6	0.9
...have you felt insecure or with lack of confidence in yourself?	77.8	19.8	1.7	0.8
...have you felt useless to your family?	80.6	16.5	1.9	1.0
...have you felt fear of some things, as if you were waiting for something serious to happen to you?	75.3	22.0	1.9	0.8
...have you wished to die?	90.4	7.9	0.9	0.8
...have you lost interest in things?	86.3	11.7	1.2	0.8
...have you felt lonely?	75.6	20.1	2.8	1.6

Source: http://www.ennvih-mxfls.org/ennhiv-2.html, *accessed on August 1, 2016.*
The last question is not part of the original CCDSD score (Calderón-Narváez 1997) and was thus excluded.
Non-respondents on question 8 (Sexual desire) were considered as responding no.

Table 17: Parental CCDSD impact on the probability of having attended high school

	RE		FE		FE-IV	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Parental CCDSD	-0.002*	(0.001)	0.002	(0.002)	0.006	(0.029)
Round 2 dummy	0.113***	(0.017)	0.269***	(0.014)	0.271***	(0.017)
Round 3 dummy	0.174***	(0.037)	0.554***	(0.016)	0.559***	(0.033)
Child characteristics:						
Age (in years)	0.051***	(0.005)				
Sex	0.030*	(0.016)				
Good health	-0.015	(0.024)	0.020	(0.027)	0.020	(0.028)
Regular health	-0.040	(0.027)	0.027	(0.030)	0.024	(0.034)
Bad health	-0.092	(0.075)	0.059	(0.086)	0.062	(0.088)
Very bad health	-0.119	(0.140)	0.065	(0.163)	0.067	(0.155)
Ref: Very good health						
Per capita consumption	0.000**	(0.000)	0.000*	(0.000)	0.000	(0.000)
Household head and spouse characteristics:						
HH age	-0.001	(0.001)				
Spouse age	-0.002	(0.002)				
HH works	0.029	(0.031)	0.013	(0.037)	0.009	(0.044)
Spouse works	-0.004	(0.033)	-0.056	(0.038)	-0.057	(0.041)
HH working*income	0.000***	(0.000)	0.000	(0.000)	0.001	(0.001)
Spouse working*income	0.000***	(0.000)	0.000*	(0.000)	0.001	(0.001)
HH working*hours worked	-0.000	(0.001)	0.001	(0.001)	0.000	(0.000)
Spouse working*hours worked	0.000	(0.001)	0.001	(0.001)	0.000	(0.000)
HH hospitalized	0.056	(0.041)	0.008	(0.049)	0.000	(0.069)
Spouse hospitalized	0.087***	(0.030)	0.041	(0.035)	0.039	(0.037)
HH chronic illnesses	0.017	(0.017)	-0.010	(0.022)	-0.018	(0.052)
Spouse chronic illnesses	-0.016	(0.016)	-0.039*	(0.020)	-0.042	(0.028)
Constant	-0.458***	(0.079)	-0.053	(0.053)		
First-stage statistics						P-value
Cragg-Donald Wald F					4.59	
Kleibergen-Paap rk LM χ^2					3.32	0.19
Kleibergen-Paap Wald rk F					2.1	
Hansen J					0.057	0.811
Conditional Likelihood ratio					0.05	0.85
Observations	3 156		3 156		3 156	
Number of individuals	1 052		1 052		1 052	

Sample: Panel individuals aged more than 9 and less than 16 years old in 2002.
Standard errors are clustered on individuals.
*** p<0.01, ** p<0.05, * p<0.10

Table 18: Parental CCDSD impact on the probability of having attended college

	RE		FE		FE-IV	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Parental CCDSD	-0.002	(0.001)	-0.001	(0.001)	0.085	(0.094)
Round 2 dummy	0.103***	(0.021)	0.125***	(0.016)	0.148***	(0.040)
Round 3 dummy	0.164***	(0.035)	0.208***	(0.019)	0.286***	(0.091)
Child characteristics:						
Age (in years)	0.003	(0.004)				
Sex	0.001	(0.022)				
Regular health	-0.103***	(0.035)	-0.065*	(0.034)	-0.052	(0.057)
Bad health	-0.144***	(0.035)	-0.075**	(0.034)	-0.126	(0.080)
Very bad health	-0.180***	(0.051)	-0.079	(0.067)	-0.183	(0.215)
Ref: Very good health						
Per capita consumption	0.000***	(0.000)	0.000	(0.000)	0.000	(0.000)
Household head and spouse characteristics:						
HH age	-0.000	(0.002)				
Spouse age	0.000	(0.002)				
HH works	-0.096***	(0.037)	-0.080**	(0.040)	-0.161	(0.116)
Spouse works	0.004	(0.048)	0.014	(0.053)	0.054	(0.092)
HH working*income	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Spouse working*income	0.000	(0.000)	-0.000	(0.000)	-0.000	(0.000)
HH working*hours worked	0.001	(0.001)	0.001	(0.001)	0.002	(0.002)
Spouse working*hours worked	0.000	(0.001)	-0.000	(0.001)	0.003	(0.004)
HH hospitalized	0.075	(0.049)	0.071	(0.047)	-0.018	(0.136)
Spouse hospitalized	-0.015	(0.032)	0.008	(0.037)	-0.036	(0.076)
HH chronic illnesses	0.032*	(0.019)	0.001	(0.022)	-0.088	(0.103)
Spouse chronic illnesses	0.000	(0.017)	0.011	(0.021)	-0.116	(0.145)
Constant	0.134	(0.101)	0.145***	(0.053)		
First-stage statistics						P-value
Cragg-Donald Wald F					0.66	
Kleibergen-Paap rk LM χ^2					1.51	0.469
Kleibergen-Paap Wald rk F					0.84	
Hansen J					0.05	0.823
Conditional Likelihood ratio					2.09	0.26
Observations	1 605		1 605		1 605	
Number of individuals	535		535		535	

Sample: Panel individuals aged more than 14 and less than 20 years old in 2002.
Standard errors are clustered on individuals.
*** p<0.01, ** p<0.05, * p<0.10

Table 19: Parental CCDSD impact on the probability of currently working

	RE		FE		FE-IV	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Parental CCDSD	0.003***	(0.001)	0.001	(0.001)	0.030*	(0.017)
Round 2 dummy	-0.035***	(0.009)	0.079***	(0.008)	0.092***	(0.012)
Round 3 dummy	0.011	(0.017)	0.277***	(0.012)	0.303***	(0.020)
Child characteristics:						
Age (in years)	0.036***	(0.002)				
Sex	-0.132***	(0.009)				
Good health	0.005	(0.015)	0.010	(0.018)	0.005	(0.019)
Regular health	0.032*	(0.017)	0.031	(0.021)	0.008	(0.026)
Bad health	0.011	(0.047)	0.004	(0.055)	-0.014	(0.063)
Very bad health	-0.268***	(0.039)	-0.292	(0.205)	-0.283	(0.230)
Ref: Very good health						
Per capita consumption	-0.000	(0.000)	0.000	(0.000)	-0.000	(0.000)
Household head and spouse characteristics:						
HH age	0.004***	(0.001)				
Spouse age	-0.004***	(0.001)				
HH works	-0.031	(0.019)	-0.020	(0.025)	-0.032	(0.027)
Spouse works	-0.010	(0.023)	0.019	(0.029)	0.013	(0.030)
HH working*income	0.001**	(0.000)	0.001	(0.000)	-0.000	(0.000)
Spouse working*income	0.000	(0.001)	-0.001	(0.001)	0.000	(0.000)
HH working*hours worked	-0.000**	(0.000)	-0.000	(0.000)	0.001*	(0.001)
Spouse working*hours worked	-0.000	(0.000)	0.000	(0.000)	-0.000	(0.001)
HH hospitalized	0.018	(0.029)	0.027	(0.034)	-0.020	(0.046)
Spouse hospitalized	-0.017	(0.017)	-0.018	(0.021)	-0.025	(0.023)
HH chronic illnesses	0.012	(0.012)	0.020	(0.015)	-0.027	(0.031)
Spouse chronic illnesses	0.023**	(0.010)	0.034***	(0.013)	0.010	(0.020)
Constant	-0.362***	(0.038)	-0.023	(0.036)		
First-stage statistics						P-value
Cragg-Donald Wald F					12.6	
Kleibergen-Paap rk LM χ^2					17.0	0.0002
Kleibergen-Paap Wald rk F					10.6	
Hansen J					0.189	0.664
Conditional Likelihood ratio					3.80	0.058
Observations	5 799		5 799		5 799	
Number of individuals	1 933		1 933		1 933	

Sample: Panel individuals aged more than 5 and less than 16 years old in 2002.
Standard errors are clustered on individuals.
*** p<0.01, ** p<0.05, * p<0.10

Table 20: Parental CCDSD impact on the probability of currently being inactive

	RE		FE		FE-IV	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Parental CCDSD	0.002**	(0.001)	0.002*	(0.001)	-0.019	(0.021)
Round 2 dummy	0.001	(0.007)	0.086***	(0.007)	0.076***	(0.013)
Round 3 dummy	0.043***	(0.015)	0.239***	(0.011)	0.219***	(0.023)
Child characteristics:						
Age (in years)	0.026***	(0.002)				
Sex	0.096***	(0.008)				
Good health	0.006	(0.013)	-0.014	(0.015)	-0.008	(0.017)
Regular health	0.030**	(0.015)	0.008	(0.018)	0.028	(0.027)
Bad health	0.003	(0.046)	-0.041	(0.048)	-0.040	(0.049)
Very bad health	0.019	(0.149)	-0.106	(0.117)	-0.111	(0.096)
Ref: Very good health						
Per capita consumption	-0.000**	(0.000)	-0.000	(0.000)	0.000	(0.000)
Household head and spouse characteristics:						
HH age	-0.001	(0.001)				
Spouse age	0.002*	(0.001)				
HH works	0.013	(0.019)	0.014	(0.024)	0.028	(0.029)
Spouse works	-0.003	(0.018)	0.025	(0.024)	0.031	(0.025)
HH working*income	-0.000	(0.000)	-0.000	(0.000)	0.000	(0.000)
Spouse working*income	-0.000**	(0.000)	-0.000**	(0.000)	-0.000**	(0.000)
HH working*hours worked	-0.000	(0.000)	-0.000	(0.000)	-0.001	(0.001)
Spouse working*hours worked	-0.001	(0.000)	-0.001	(0.001)	-0.001*	(0.001)
HH hospitalized	-0.005	(0.026)	0.006	(0.029)	0.039	(0.046)
Spouse hospitalized	-0.021	(0.015)	0.001	(0.020)	0.006	(0.021)
HH chronic illnesses	-0.012	(0.010)	-0.000	(0.014)	0.031	(0.034)
Spouse chronic illnesses	-0.002	(0.009)	0.007	(0.013)	0.023	(0.022)
Constant	-0.364***	(0.036)	-0.036	(0.034)		
First-stage statistics						P-value
Cragg-Donald Wald F					6.80	
Kleibergen-Paap rk LM χ^2					11.3	0.004
Kleibergen-Paap Wald rk F					6.92	
Hansen J					2.03	0.154
Conditional Likelihood ratio					1.31	0.273
Observations	5 382		5 382		5 382	
Number of individuals	1 794		1 794		1 794	

Sample: Panel individuals aged more than 5 and less than 16 years old in 2002.
Standard errors are clustered on individuals.
*** p<0.01, ** p<0.05, * p<0.10

Table 21: Household heads and spouses depressive symptoms and child outcomes

	Currently in school	Attended high school	Attended college	Ever repeat	Ever work	Currently work	Inactive	Work and schooling
Fixed effects								
HH CCDSD	0.0004	0.0037**	0.0004	0.0016*	0.0016	0.0004	0.0003	0.0014**
	(0.0012)	(0.0016)	(0.0012)	(0.0009)	(0.0010)	(0.001)	(0.001)	(0.0007)
Spouse CCDSD	-0.0002	-0.0012	-0.0014	0.0011	0.0013	0.0009	0.0016*	0.0004
	(0.0009)	(0.0012)	(0.0012)	(0.0008)	(0.0009)	(0.0009)	(0.0008)	(0.0006)
Fixed effects IV								
HH CCDSD	0.056	0.01	0.030	0.046	0.077*	0.060	-0.0018	0.049
	(0.043)	(0.027)	(0.025)	(0.036)	(0.045)	(0.043)	(0.03)	(0.030)
F-Statistic	2.1	3.32	2.62	1.78	2.55	2.14	2.13	2.2
CLR	5.24	0.13	2.4	4.45	6.41	3.91	0.02	8.1
CLR P-value	0.038	0.74	0.16	0.061	0.019	0.075	0.917	0.009
Spouse CCDSD	0.031**	0.0001	-0.038	0.032*	0.022*	0.021*	-0.020	0.031**
	(0.014)	(0.02)	(0.061)	(0.016)	(0.013)	(0.012)	(0.016)	(0.015)
F-Statistic	10.2	3.84	0.4	4.8	10.0	10.2	4.8	4.7
CLR	6.93	0.00	2.4	6.0	4.19	3.64	1.92	8.7
CLR P-value	0.01	0.98	0.25	0.019	0.045	0.063	0.19	0.005
Observations	5 799	3 156	1 605	5 286	5 757	5 799	5 382	5 310

Standard errors are clustered at the individual level in the fixed effects specification. The fixed effects specification contains both the head's and the spouse's score. The FE-IV estimations instrument separately the head's and the spouse's CCDSD, controlling each time for the remaining member's score.

Table 22: Father/mother depressive symptoms and child outcomes

	Currently in school	Attended high school	Attended college	Ever repeat	Ever work	Currently work	Inactive	Work and schooling
Fixed effects								
Father CCDSD	0.0006	0.003*	0.00018	0.0020**	0.0018*	0.0007	0.0001	0.0017***
	(0.0012)	(0.0016)	(0.0012)	(0.0009)	(0.0011)	(0.001)	(0.001)	(0.0007)
Mother CCDSD	-0.0003	-0.0013	-0.0016	0.0006	0.0015	0.0011	0.0015*	0.0007
	(0.0009)	(0.0012)	(0.0012)	(0.0008)	(0.0009)	(0.0010)	(0.0008)	(0.0006)
Fixed effects IV								
Father CCDSD	0.062	0.008	0.088	0.047	0.088	0.064	0.0018	0.063
	(0.05)	(0.028)	(0.088)	(0.041)	(0.055)	(0.049)	(0.032)	(0.041)
F-stat	1.73	2.98	0.63	1.38	2.0	1.73	1.67	1.68
CLR	7.25	0.09	4.2	3.66	6.63	3.75	0.27	10.17
CLR P-value	0.0145	0.787	0.094	0.101	0.0192	0.0882	0.672	0.0035
Mother CCDSD	0.029***	0.0011	0.012	0.024*	0.017*	0.017*	-0.019	0.030**
	(0.011)	(0.019)	(0.062)	(0.013)	(0.010)	(0.010)	(0.014)	(0.013)
F-stat	15.34	4.35	0.25	6.33	15.3	15.4	6.39	6.26
CLR	9.0	0.00	3.66	4.77	3.46	3.50	2.42	10.62
CLR P-value	0.003	0.96	0.142	0.035	0.067	0.0658	0.1343	0.0016
Observations	5 934	3 237	1 650	5 400	5 886	5 934	5 514	5 445

Standard errors are clustered at the individual level in the fixed effects specification. The fixed effects specification contains both the father's and the mother's score. The FE-IV estimations instrument separately the father's and the mother's CCDSD, controlling each time for the remaining member's score.

Table 23: Summary statistics by panel round presence

	Present in all rounds	Attrited in 2005	Attrited in 2009
Age	26.7	26.6	32
Female	0.54	0.5	0.44
Married	0.5	0.47	0.38
Ever work	0.53	0.48	0.43
Currently work	0.31	0.27	0.32
Work income	2406.9	3275.4	2702.4
Currently in school	0.3	0.3	0.29
Ever repeated	0.3	0.24	0.29
Cons per cap	297	417.2	339.9
Attended high school	0.14	0.25	0.21
Attended college	0.05	0.11	0.08
CCDSD	26.9	26.3	26.6
Observations	24 495	2 223	7 684

Source: Author's calculations. Summary statistics at first round, by panel presence.

Table 24: Polynomials of CCDSD score and marginal effects on grade repetition at first round CCDSD score value

Ever repeat	(1)	(2)	(3)
$CCDSD$	0.013***	0.013*	0.05***
	(0.005)	(0.0072)	(0.015)
$CCDSD^2$		-0.00001	-0.0012***
		(0.00014)	(0.0004)
$CCDSD^3$			0.000011***
			(0.000003)
$CCDSD_{2002}$	0.011**	0.012**	0.0054
	(0.005)	(0.0055)	(0.0052)
$CCDSD_{2002} \times CCDSD$	-0.00035**	-0.00035*	-0.00014
	(0.00016)	(0.00019)	(0.00018)
Dummies	*All previous*	*All previous*	*All previous*
	Marginal effects of CCDSD at 2002 values		
$CCDSD_{2002}$			
20	0.0062***	0.0062	0.0060***
	(0.0018)	(0.0075)	(0.0017)
30	0.0027**	0.003	0.0045***
	(0.0011)	(0.0083)	(0.0014)
40	-0.0008	-0.00079	0.0031
	(0.0022)	(0.0094)	(0.0028)
50	-0.0044	-0.0043	0.0016
	(0.0037)	(0.011)	(0.0044)
60	-0.0079	-0.0078	0.0002
	(0.0053)	(0.012)	(0.0062)
Observations	5 286	5 286	5 286

Standard errors are clustered on individuals. Columns 1, 2 and 3 represent random effects regressions run with all dummies included in the main regressions.
*:p<0.1, **:p<0.05,***:p<0.01.

Figure 4: The impact of θ_p on the child's labor supply

The condition for an interior solution is:

$$w_c l_c^* = [\frac{\beta\theta_c(\theta_p)\exp(v_c)}{w_c}]^{\frac{1}{\sigma-1}} - w_p\theta_p \tag{8}$$

Some algebraic development gives:

$$l_c^* = \frac{1}{w_c^{\frac{\sigma}{\sigma-1}}}\left[\beta\theta_c(\theta_p)\exp(v_c)\right]^{\frac{1}{\sigma-1}} - \frac{w_p\theta_p}{w_c} \tag{9}$$

Differentiating with respect to θ_p gives:

$$\frac{\delta l_c^*}{\delta\theta_p} = \frac{\theta_c'\theta_c(\theta_p)^{\frac{2-\sigma}{\sigma-1}}}{(\sigma-1)w_c}\left[\frac{\beta exp(v_c)}{w_c}\right]^{\frac{1}{\sigma-1}} - \frac{w_p}{w_c} < 0 \tag{10}$$

Now suppose instead that the child's wage w_c is increasing in θ_c, such that the full income constraint is equal to $c + w_c\theta_c(1-l_c) \leq w_p\theta_p t_p + w_c\theta_c t_c$. This implies the following condition for an interior solution:

$$w_c\theta_c(\theta_p)l_c^* = [\frac{\beta\exp(v_c)}{w_c}]^{\frac{1}{\sigma-1}} - w_p\theta_p \tag{11}$$

Developing gives:

$$l_c^* = \frac{1}{\theta_c(\theta_p)}\frac{1}{w_c^{\frac{\sigma}{\sigma-1}}}\left[\beta\exp(v_c)\right]^{\frac{1}{\sigma-1}} - \frac{w_p\theta_p}{w_c\theta_c(\theta_p)} \tag{12}$$

Differentiating with respect to θ_p now gives:

$$\frac{\delta l_c^*}{\delta\theta_p} = -\frac{\theta_c'}{\theta_c^2 w_c^{\frac{\sigma}{\sigma-1}}}\left[\beta\exp(v_c)\right]^{\frac{1}{\sigma-1}} - \frac{w_p}{w_c\theta_c(\theta_p)} + \frac{w_p\theta_p\theta_c'}{(w_c\theta_c(\theta_p))^2} \lessgtr 0 \tag{13}$$