

The Effects of Maternal Alcohol Use and Smoking on Children's Mental Health: Evidence from the National Longitudinal Survey of Children and Youth

Madeleine Benjamin, MA

Policy Research, Economics and Analytics

Health Care Systems Directorate, Strategic Policy Branch

Health Canada

McMaster University, Department of Economics

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OUTLINE

- Introduction
- Importance of health economic research
- Pathways of influence of maternal substance use
 - Physiological influence of prenatal exposure
 - Parental investment and postnatal exposure
- Methodology
 - NLSCY data
 - Empirical estimation strategies
- Results & limitations
- Policy Implications

INTRODUCTION

LEARNING OBJECTIVES

- Integrate clinical research with large scale economic data to assess maternal substance use may affect Canadians at the national level.
- Interpret how the results may be able to guide national policies and programs that can benefit those affected by maternal substance use.
- Recognize how econometric techniques can be used to establish a causal relationship between maternal substance use and child mental health outside of a clinical setting.

INTRODUCTION

INTRODUCTION

- This paper uses a large, national sample of mothers and children to investigate the relationship between maternal alcohol and cigarette use and child mental health.
- It examines how substance use both during and after pregnancy may affect young children's motor, social and cognitive development, as impairments in this area have been associated with the emergence of mental illness in adolescence and adulthood.

IMPORTANCE OF HEALTH ECONOMICS

WHY HEALTH ECONOMICS?

- Establish a causal relationship from micro-data by capturing non-experimental behaviour.
 - This can be a difficult in social science; unlike clinical trials, individuals cannot be randomized to treatment and control groups.
- Establishing a causal relationship with a nationally representative sample is important for policy development.
 - Realizing how the incidence of prenatal alcohol exposure fits into a national context may guide more proactive policy development.

PATHWAYS OF INFLUENCE

PHYSIOLOGICAL EFFECTS OF PRENATAL EXPOSURE

- Stress in the prenatal period can result in severe sensory impairment, cognitive problems such as attentional difficulties and psychiatric disorders.
- Numerous substances, including alcohol, tobacco, prescription and illicit drugs and environmental toxins can have dramatic effects on neurodevelopment
 - FASD is one of the most prevalent conditions that occurs from maternal alcohol consumption during pregnancy.

PATHWAYS OF INFLUENCE

PARENTAL INVESTMENT AND POSTNATAL EXPOSURE

- Social and physical experiences in post-natal environment influence key systems during sensitive times of development.
- If substance use interferes with a mother's ability to provide necessary physical and emotional inputs, it may lead to developmental delays in these areas.
 - Neglect of proper hygiene and nutrition and unsafe home environments and abuse are all common experiences of children with substance abusing parents.
 - Substance abuse can create constant stress and lack of proper attachment may lead to the development of psychiatric disorders.

METHODOLOGY

THE NLSCY DATA

- National Longitudinal Survey of Children and Youth (NLSCY) is a long-term study of Canadian children that collects information about various factors that may influence a child's development
- Survey questions about the child are answered by a Person Most Knowledgeable (PMK) who is most often the child's biological mother
 - There is also an adult component where the PMK is asked questions about themselves
- NLSCY takes direct assessments of each child's different abilities, including math tests, problem solving and literacy assessments.

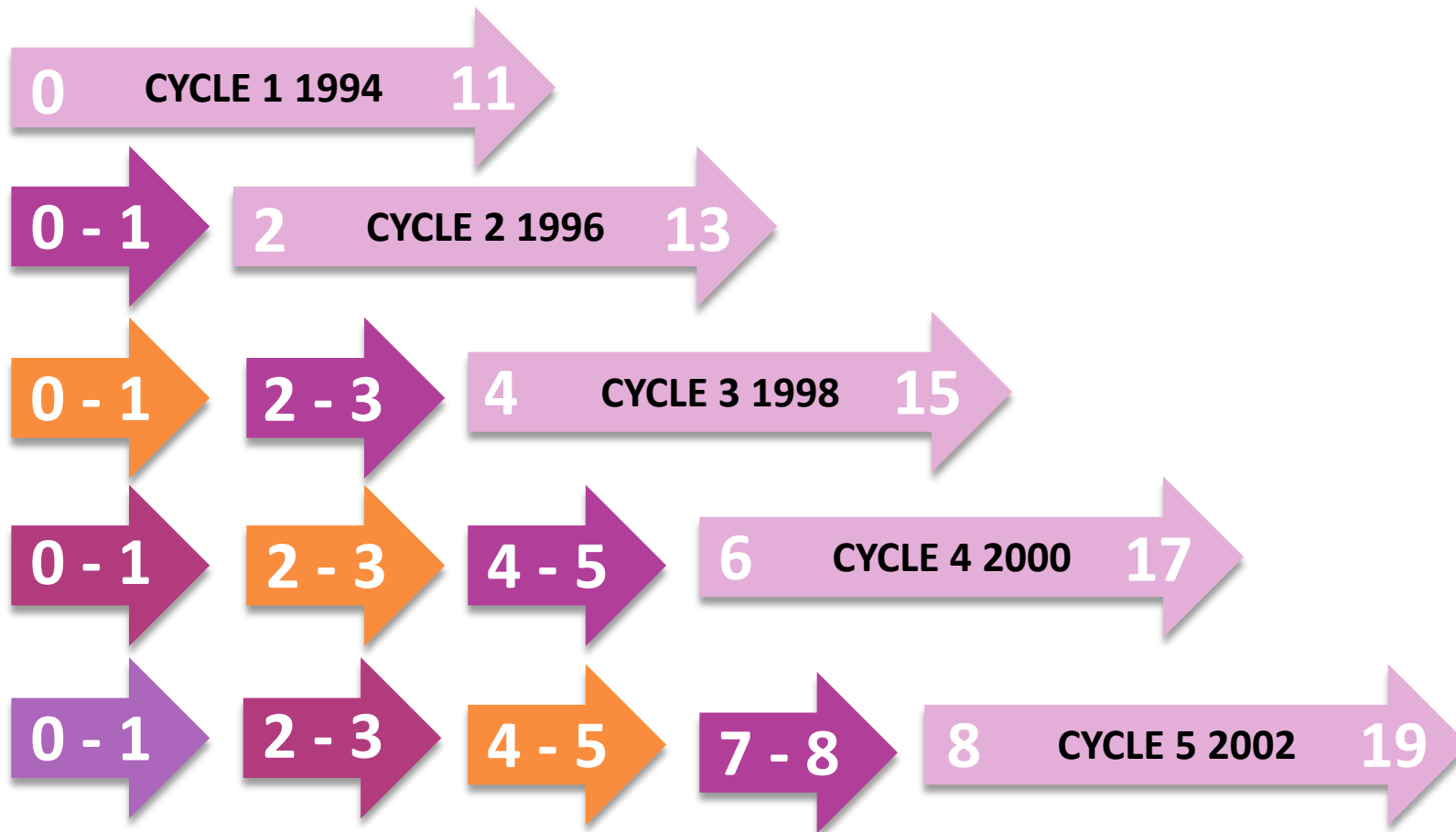
METHODOLOGY

THE NLSCY DATA (2)

- Motor and social development score (MSD) is completed for children aged 0 to 3. The objective of this section is to measure the motor, social and cognitive development of young children.
- This analysis uses cycle 3 of the NLSCY (1998-1999)
 - Sample is restricted to children who's PMK was the biological mother, to ensure consistent and accurate answers to prenatal questions
 - As the Motor and Social Development Section was done only on children aged 0 to 23 months in this cycle, the sample is further restricted to children under the age of 2 who had a development score
- The final sample size is 6,125 children that are representative of the Canadian population of children aged 0-2.

METHODOLOGY

THE NLSCY DATA - STRUCTURE



METHODOLOGY

EMPIRICAL ESTIMATION - MODEL

- Hypothesis: prenatal and postnatal alcohol and cigarette use decrease motor and cognitive development in young children, controlling for endogeneity.

$$MSD_i = \beta_1 SU_i + \beta_2 X_i + e_i$$

- MSD_i motor and social development score for child 'i', SU_i is a vector of binary indicators for prenatal and postnatal substance use (equal to 1 if the substance use occurs and 0 if not), and X_i is a vector of other observable characteristics that may affect the child's motor and social development.
- Lower values of MSD correspond with lower development scores, thus slower motor and cognitive development in the child.
 - Impairments in neuromotor and social development are associated with the development of psychological disorders later in life

METHODOLOGY

SUMMARY STATISTICS

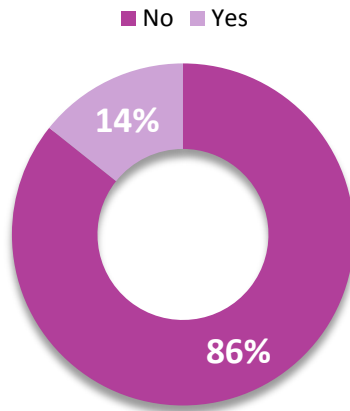
Table 1: Cycle 3 (1998-1999) means and standard deviations

Variable	Mean	S.D
Child Development		
MSD score	100.618	14.621
Maternal Substance use		
Drinks while pregnant	0.143	0.350
Drinks more than once per week	0.056	0.230
Smokes while pregnant	0.165	0.370
Smoked in the past 12 months	0.306	0.461
Child Characteristics		
Child is female	0.492	0.499
Child age (years)	0.523	0.499
Birthweight < 2.5Kg	0.066	0.248
Mother Characteristics		
Age at child's birth (years)	29.718	4.983
No postsecondary education	0.262	0.439
Income adequacy	3.742	0.885

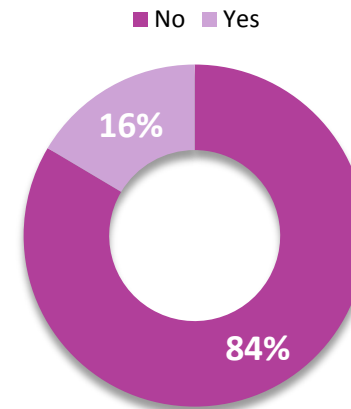
METHODOLOGY

FREQUENCY OF INDICATOR VARIABLES

Mother drinks while pregnant

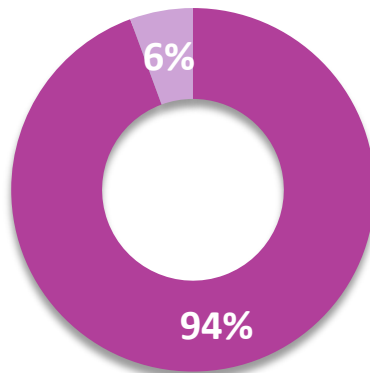


Mother smokes while pregnant



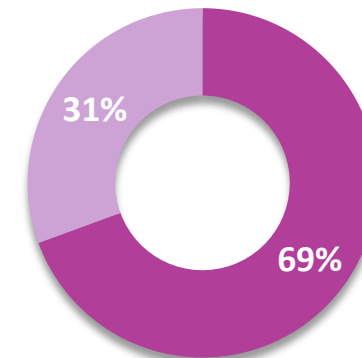
Post-natal drinking

■ Once per week or less ■ > once per week



Post-natal smoking

■ No ■ Yes

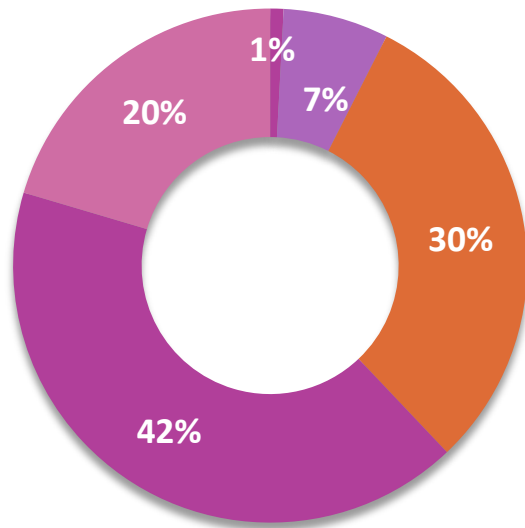


METHODOLOGY

FREQUENCY OF INDICATOR VARIABLES (2)

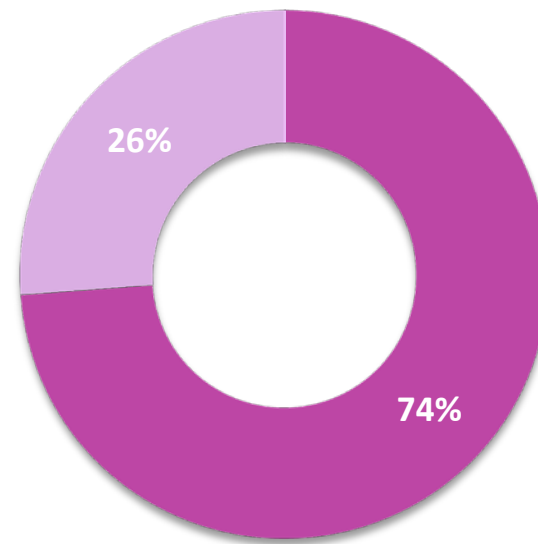
Income Adequacy

■ Lowest ■ Lower middle ■ Middle ■ Upper middle ■ Highest



Maternal Post-secondary education

■ Yes ■ No



METHODOLOGY

OLS REGRESSION

- Ordinary Least Squares (OLS) is used to estimate the relative effects of maternal substance use on MSD, while controlling for observed maternal characteristics.
 - Maternal education, household income, maternal age and child sex are included in the controls
- Due to the high likelihood of the presence of unobservable characteristics in the error term that are correlated with both the treatment and the outcome, these OLS estimates are likely biased and inconsistent.
- To correct this, propensity score matching is implemented to achieve stronger casual inference.

METHODOLOGY

PROPENSITY SCORE MATCHING

- A propensity score is an estimated probability of the observation receiving the treatment given the observed covariates.
- The propensity scores are used to match observations into a treatment and a control group so that their observational characteristics are equivalent; the only thing that differs between them is whether or not they received the treatment.
- **Strong assumption:** Since observations are equivalent in observable characteristics, they should also be in unobservable characteristics, isolating the effect of the treatment alone.

METHODOLOGY

PROPENSITY SCORE MATCHING (2)

- In this analysis, mothers are matched based on the full set of covariates used in the initial linear regression model so that the only difference in the presence of substance use, either prenatally or postnatally.
- The model is also weighted to reflect the true Canadian population.
 - Sample represents approximately 500,000 mother-child pairs.

RESULTS

RESULTS

Table 2: Propensity score matching results

Treatment (Received vs. did not receive)	PSM
Mother drank while pregnant	-0.809*** (0.0629)
Mother smoked while pregnant	1.504*** (0.0580)
Mother drinks more than once per week	-0.267*** (0.0698)
Mother smokes	0.577*** (0.0580)
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1	

- Prenatal drinking decreases MSD score by 0.8 points while postnatal drinking decreases it by 0.2 points.
- Smoking both during and after pregnancy has a statistically significant and positive impact on MSD score with prenatal increasing the score by 1.5 points and postnatal increasing it by approximately 0.5 points.

RESULTS

RESULTS (2)

- While the magnitude of the results is small, there is a significant negative relationship between maternal alcohol use and child MSD scores.
 - Alcohol consumption during and after pregnancy **both** had negative effects on MSD.
 - These children may be more susceptible to developing mental health disorders in adolescence and adulthood due to their impairments early in life.
- Positive results from smoking are consistent with other literature that finds inconclusive results.
 - Positive relationship may be spurious
 - Construction of the variable: Does not include individuals who stopped smoking mid-way through pregnancy

RESULTS

LIMITATIONS

- Since substance use during pregnancy carries negative connotations in society, some mothers may not answer survey questions truthfully.
- Non-response bias: Mothers who do not answer questions regarding prenatal substance abuse may be systematically different than those who do.
- This particular sample is heavily skewed to higher income cohorts: results could be different if a higher proportion of lower income individuals were included, particularly if these individuals are more likely to abuse substances.

POLICY IMPLICATIONS

PREVENTION

- Providing a range of social and economic supports that help women who may use alcohol during pregnancy make informed decisions about their health.
- Performing screening for problematic alcohol use among girls and women, which may signal alcohol use during pregnancies.
- Improving access to reliable and affordable contraceptives to prevent unwanted pregnancies in women abusing alcohol.

POLICY IMPLICATIONS

TREATMENT

- Providing priority substance abuse treatment to pregnant women
- Ensuring that pharmaceuticals and treatment programs for both mothers and children are more affordable/available, through initiatives such as subsidized treatment for low income families.
- Investing in early and accurate diagnoses of FASD to help individuals manage their diagnosis and potential comorbid disorders.

POLICY IMPLICATIONS

FUNDING

- Increasing funding for diagnostic clinics and expanding substance abuse treatments for pregnant women.
- Providing specialized training in FASD and PAE to clinicians and caregivers so they can better understand the needs of their patients.
- Investing in parent education to help parents of children with FASD learn the best parenting practices to improve the lives of their children.

CONCLUSIONS

CONCLUSIONS

- The results of this study present evidence of a causal relationship between maternal alcohol abuse and decreased motor, social and cognitive development in their children, on a national level.
- Given the association between poor development and mental health problems, these children will likely be more susceptible to developing mental disorders later in childhood and in adulthood
- Future research could follow the cohort through time to see how outcomes in young adulthood are affected by maternal substance use.