



האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM



הפקולטה לרפואה
FACULTY OF MEDICINE

Epidemiology of ASD

ד"ר רענן רז

בית הספר לבריאות הציבור
ורפואה קהילתית
של האוניברסיטה העברית והדסה
ע"ש יוסף וכלה בראון



J Autism Dev Disord (2013) 43:2295–2302

DOI 10.1007/s10803-013-1782-2

ORIGINAL PAPER

A Survey of Out-of-Pocket Expenditures for Children with Autism Spectrum Disorder in Israel

**Raanan Raz · Liat Lerner-Geva · Odelia Leon ·
Gabriel Chodick · Lidia V. Gabis**

Published online: 5 February 2013

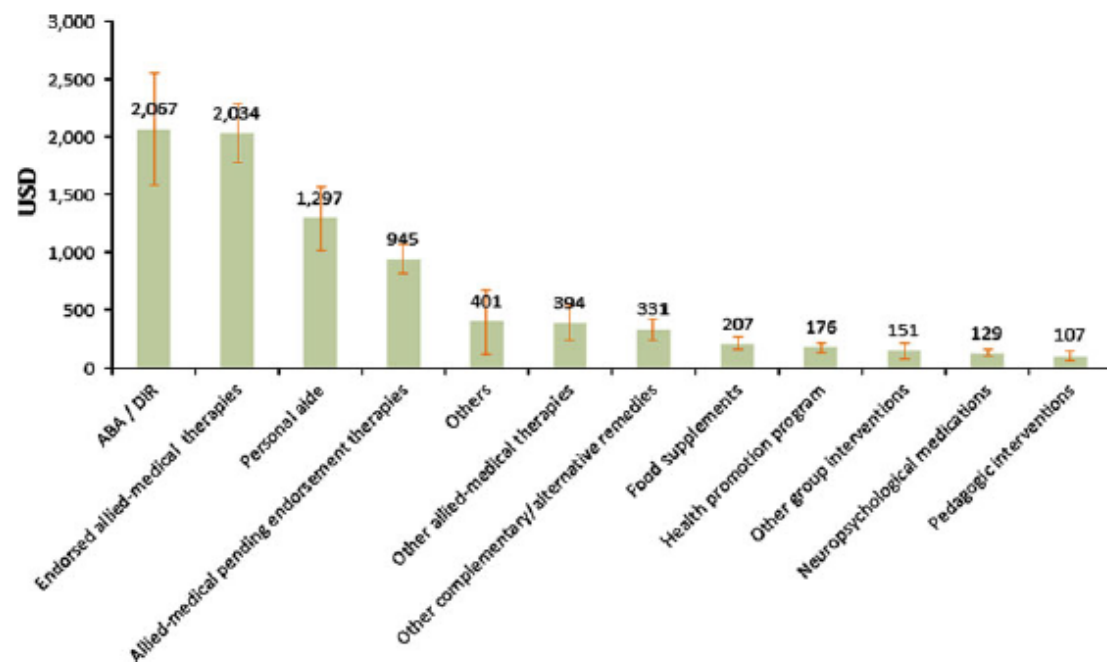
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Table 2 Treatment Utilization and Yearly Out-of-Pocket Costs (USD) by Category

Treatment category	Proportion of subjects (%)	Proportion of cost (%)	Mean	SD
ABA/DIR	17	25	2,067	6,513
Endorsed allied-medical therapies	96	25	2,034	3,403
Personal aide	42	16	1,297	3,709
Allied-medical pending endorsement therapies	90	11	945	1,655
Others	11	5	401	3,648
Other allied-medical therapies	17	5	394	2,005
Other complementary/alternative remedies	16	4	331	1,244
Food supplements	25	3	207	705
Health promotion program	10	2	176	533
Other group interventions	11	2	151	913
Neuropsychological medications	22	2	129	374
Pedagogic interventions	10	1	107	536
Total		100	8,239	11,642

ABA applied behavioral analysis, DIR developmental, individual difference, relationship-based model, SD standard deviation

Fig. 1 Average annual out-of-pocket expenditures (USD) per child, by treatment category. Error bars represent 95 % confidence interval. USD US Dollars, ABA Applied Behavioral Analysis, DIR Developmental, Individual difference, Relationship-based model



J Autism Dev Disord (2015) 45:1062–1069

DOI 10.1007/s10803-014-2262-z

ORIGINAL PAPER

Differences in Autism Spectrum Disorders Incidence by Sub-Populations in Israel 1992–2009: A Total Population Study

**Raanan Raz · Marc G. Weisskopf · Michael Davidovitch ·
Ofir Pinto · Hagai Levine**

Published online: 7 October 2014

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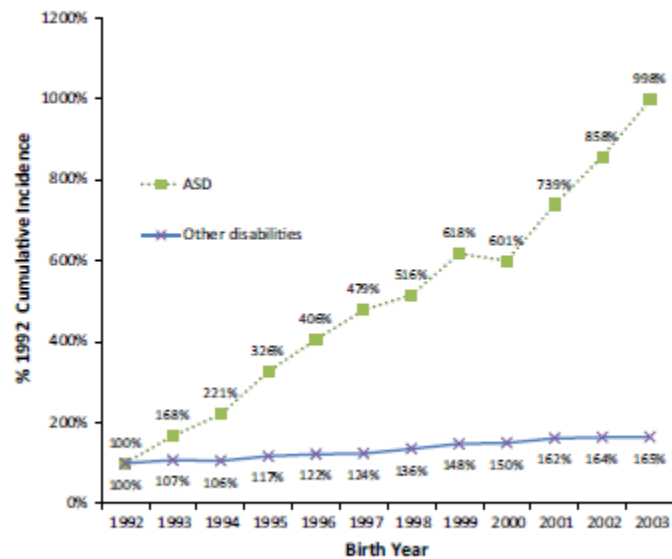


Fig. 1 Cumulative incidence of ASD and non-ASD child disability benefits at NII at age 8 in the total population born in Israel 1992–2003 by birth year, as a percentage of 1992 cumulative incidence. *ASD* Autism spectrum disorders; *NII* National Insurance Institute of Israel

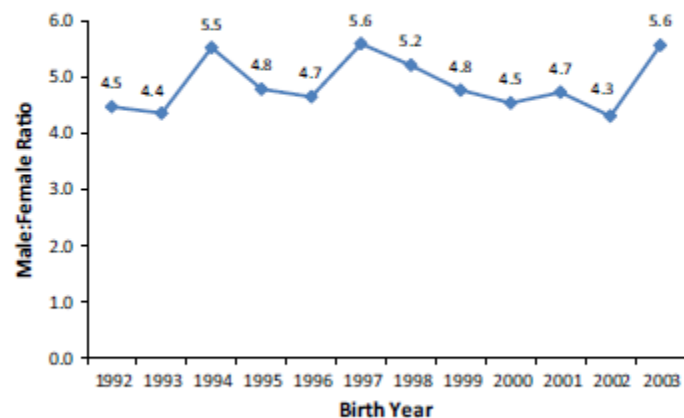


Fig. 2 Male:Female ratio of autism spectrum disorders cases at age 8, total population born in Israel, 1992–2003

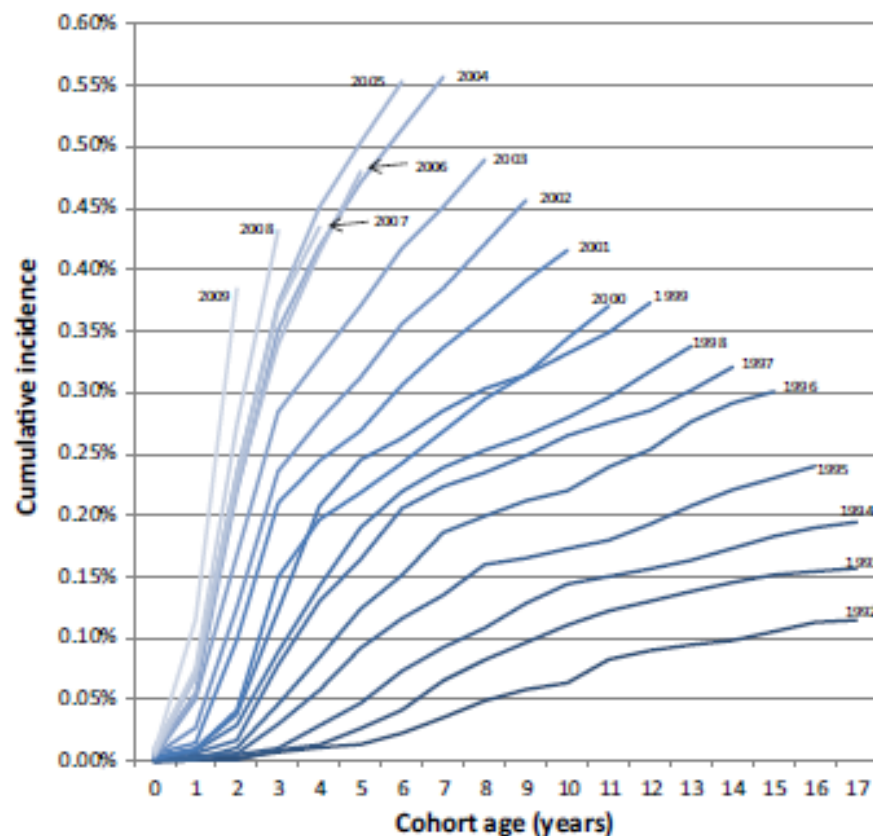
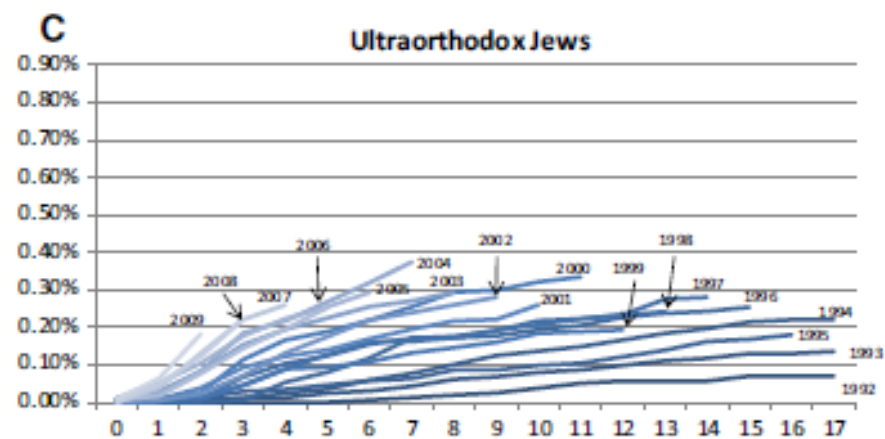
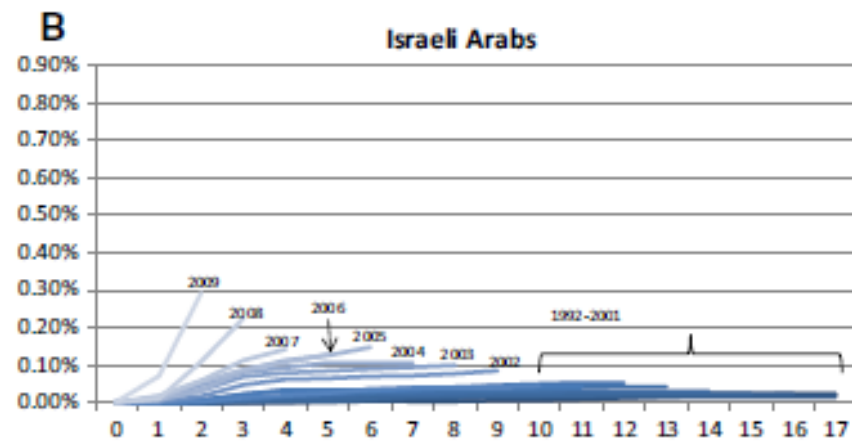
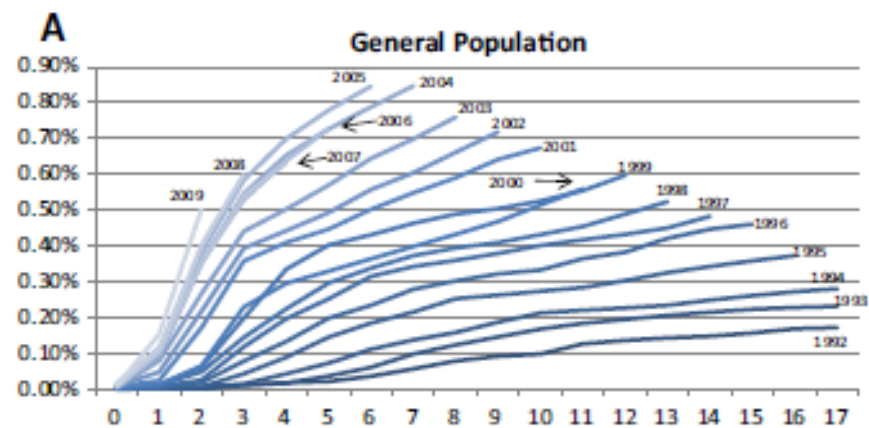


Fig. 3 Cumulative incidence of Autism spectrum disorders in the total population born in Israel, 1992–2009. Different lines represent different birth cohorts, and are ordered from *darkest* to *brightest*. The birth cohort is noted at the end of each *line*, where the data for that year ends. The age of the children (cohort age) is indicated on the x-axis



Autism Spectrum Disorder and Particulate Matter Air Pollution before, during, and after Pregnancy: A Nested Case–Control Analysis within the Nurses' Health Study II Cohort

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BACKGROUND: Autism spectrum disorder (ASD) is a developmental disorder with increasing prevalence worldwide, yet has unclear etiology.

OBJECTIVE: We explored the association between maternal exposure to particulate matter (PM) air pollution and odds of ASD in her child.

METHODS: We conducted a nested case–control study of participants in the Nurses' Health Study II (NHS II), a prospective cohort of 116,430 U.S. female nurses recruited in 1989, followed by biennial mailed questionnaires. Subjects were NHS II participants' children born 1990–2002 with ASD ($n = 245$), and children without ASD ($n = 1,522$) randomly selected using frequency matching for birth years. Diagnosis of ASD was based on maternal report, which was validated against the Autism Diagnostic Interview–Revised in a subset. Monthly averages of PM with diameters $\leq 2.5 \mu\text{m}$ ($\text{PM}_{2.5}$) and $2.5\text{--}10 \mu\text{m}$ ($\text{PM}_{10-2.5}$) were predicted from a spatiotemporal model for the continental United States and linked to residential addresses.

RESULTS: $\text{PM}_{2.5}$ exposure during pregnancy was associated with increased odds of ASD, with an adjusted odds ratio (OR) for ASD per interquartile range (IQR) higher $\text{PM}_{2.5}$ ($4.42 \mu\text{g}/\text{m}^3$) of 1.57 (95% CI: 1.22, 2.03) among women with the same address before and after pregnancy (160 cases, 986 controls). Associations with $\text{PM}_{2.5}$ exposure 9 months before or after the pregnancy were weaker in independent models and null when all three time periods were included, whereas the association with the 9 months of pregnancy remained (OR = 1.63; 95% CI: 1.08, 2.47). The association between ASD and $\text{PM}_{2.5}$ was stronger for exposure during the third trimester (OR = 1.42 per IQR increase in $\text{PM}_{2.5}$; 95% CI: 1.09, 1.86) than during the first two trimesters (ORs = 1.06 and 1.00) when mutually adjusted. There was little association between $\text{PM}_{10-2.5}$ and ASD.

CONCLUSIONS: Higher maternal exposure to $\text{PM}_{2.5}$ during pregnancy, particularly the third trimester, was associated with greater odds of a child having ASD.

CITATION: Raz R, Roberts AL, Lyall K, Hart JE, Just AC, Laden F, Weisskopf MG. 2015. Autism spectrum disorder and particulate matter air pollution before, during, and after pregnancy: a nested case–control analysis within the Nurses' Health Study II cohort. *Environ Health Perspect* 123:264–270; <http://dx.doi.org/10.1289/ehp.1408133>

after pregnancy, within the Nurses' Health Study II (NHS II), a large, well-defined cohort with detailed residential history. This nested case–control study includes participants from across the continental United States, and exposure was linked to monthly data on two size fractions of PM.

Methods

Participants. The study population included offspring of participants in NHS II, a prospective cohort of 116,430 U.S. female nurses 25–43 years of age when recruited in 1989, followed biennially (Solomon et al. 1997). NHS II participants originally were recruited from 14 states in all regions of the continental United States, but they now reside in all 50 states. The study was approved by the Partners Health Care Institutional Review Board and complied with all applicable U.S. regulations; return of completed questionnaires constituted consent to participate.

In 2005, NHS II participants were asked whether any of their children had been diagnosed with autism, Asperger's syndrome, or "other autism spectrum," and 839 women replied affirmatively. In 2007, we initiated a

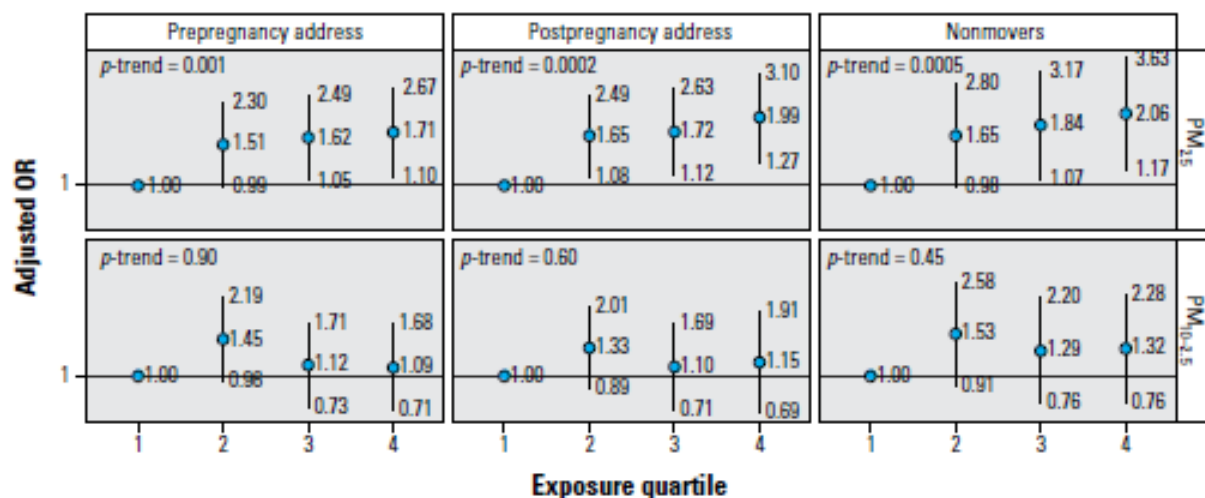


Figure 1. ORs (95% CIs) for ASD by quartile of PM exposure. ORs are adjusted for child sex, year of birth, month of birth, maternal age at birth, paternal age at birth, and census income. There were 245 cases and 1,522 controls in analyses using pre- and postpregnancy addresses. Prepregnancy address is the last known residential address before conception. Postpregnancy address is the first known residential address after birth. Nonmovers are those participants for whom prepregnancy and postpregnancy addresses were the same [cases = 160 (65%), controls = 986 (65%)]. *p*-Trend, *p*-values from models of exposures as continuous variables. The number of cases (including movers) by quartiles from low to high: 45, 66, 66, 68; controls: 397, 376, 375, 374. PM_{2.5} quartile ranges ($\mu\text{g}/\text{m}^3$): 5.24–12.3, 12.4–14.5, 14.6–16.7, 16.7–30.8; PM_{10-2.5} quartile ranges ($\mu\text{g}/\text{m}^3$): 1.9–6.7, 6.8–8.9, 9–11.9, 12–49.4.

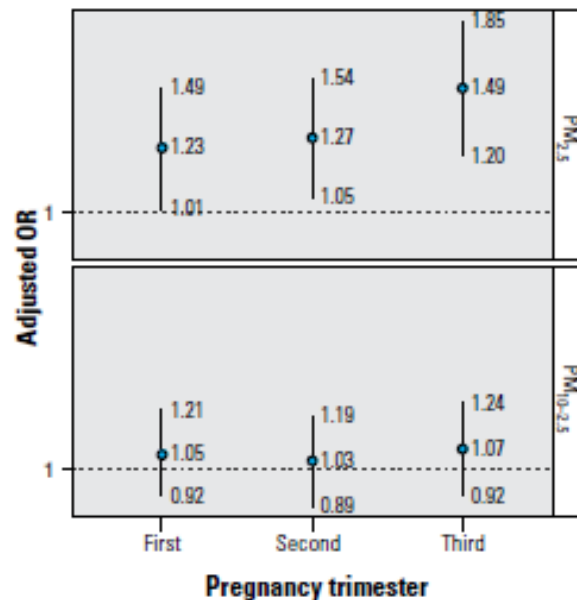


Figure 2. ORs for ASD with exposure to particulate matter during pregnancy trimesters. ORs are adjusted for child sex, year of birth, month of birth, maternal age at birth, paternal age at birth, and census income. The analyses are limited to nonmovers only (i.e., those for whom prepregnancy and postpregnancy addresses were the same). Cases, $n = 160$, controls $n = 986$.



American Journal of Epidemiology

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Vol. 186, No. 7

DOI: 10.1093/aje/kwx158

Advance Access publication:

May 19, 2017

Original Contribution

Geographic Patterns of Autism Spectrum Disorder Among Children of Participants in Nurses' Health Study II

Kate Hoffman, Marc G. Weisskopf, Andrea L. Roberts, Raanan Raz, Jaime E. Hart, Kristen Lyall, Elin M. Hoffman, Francine Laden, and Verónica M. Vieira*

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Initially submitted July 11, 2016; accepted for publication November 22, 2016.

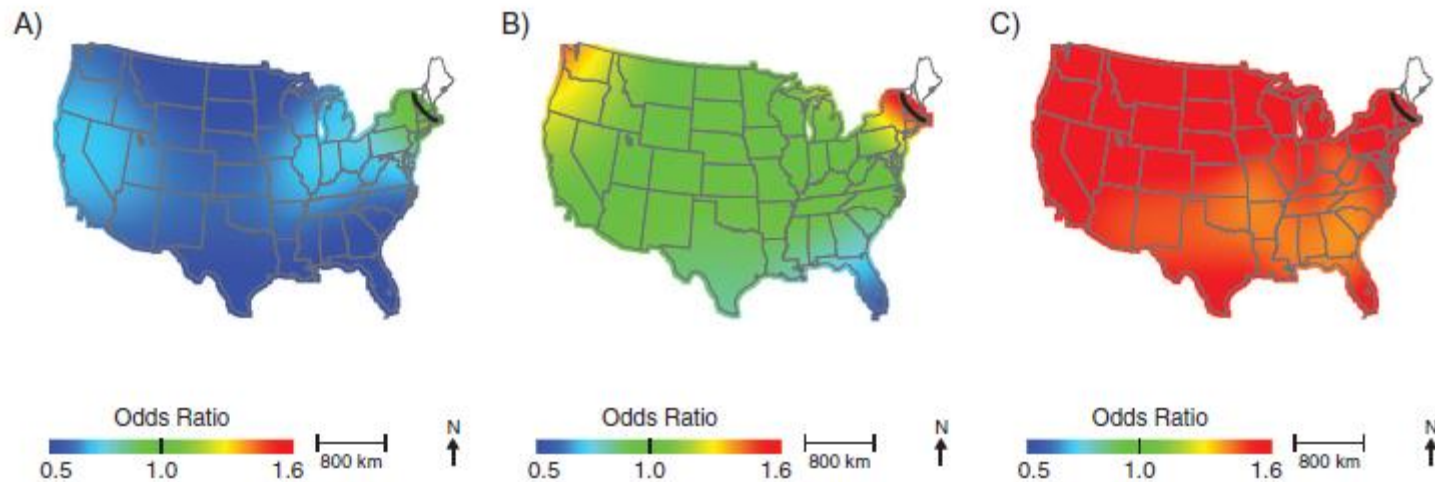


Figure 2. Geographic distribution of the risk of diagnosis with autism spectrum disorder at birth addresses across the continental United States for children born to women participating in Nurses' Health Study II, 1989–1999. The figure shows lower confidence estimates (A), point estimates (B), and upper confidence estimates (C), adjusted for child's sex, mother's age at child's birth, birth year, and census-tract median income, using optimal span size of 0.70. Black contour bands indicate statistically significant areas of increased or decreased risk.



American Journal of Epidemiology

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Vol. 187, No. 4

DOI: 10.1093/aje/kwx294

Advance Access publication:

August 17, 2017

Original Contribution

Traffic-Related Air Pollution and Autism Spectrum Disorder: A Population-Based Nested Case-Control Study in Israel

Raanan Raz*, Hagai Levine, Ofir Pinto, David M. Broday, Yuval, and Marc G. Weisskopf

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Initially submitted March 31, 2017; accepted for publication August 2, 2017.

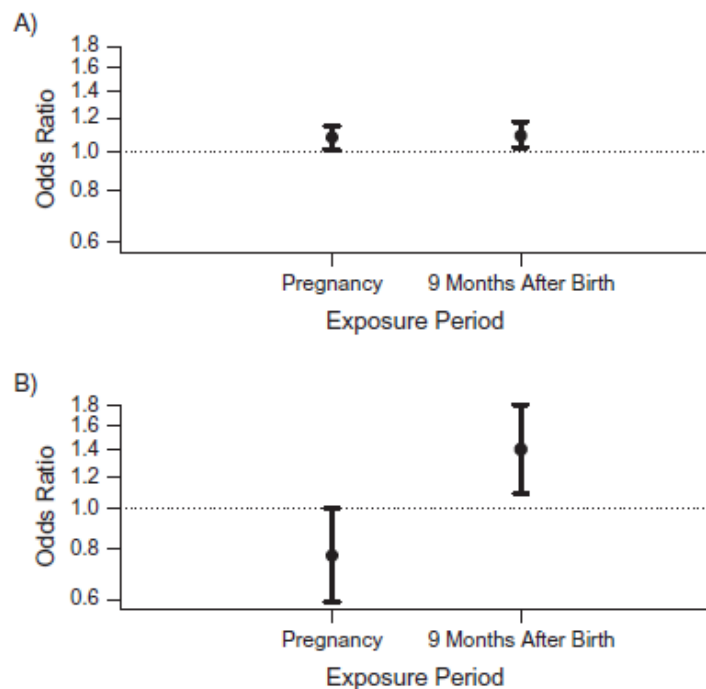


Figure 1. Associations between exposure to nitrogen dioxide during pregnancy and during the 9 months after birth and risk of autism spectrum disorder among children born in central coastal Israel during 2005–2009. Odds ratios show the risk of autism spectrum disorder per interquartile-range increment (5.85 ppb) in nitrogen dioxide exposure. A) Results from 2 separate models, each adjusted for year of birth, calendar month of birth, population group, paternal age, and census poverty index. B) Results from 1 model, with mutual adjustment for both exposure periods in addition to all of the covariates listed above. Bars, 95% confidence intervals.

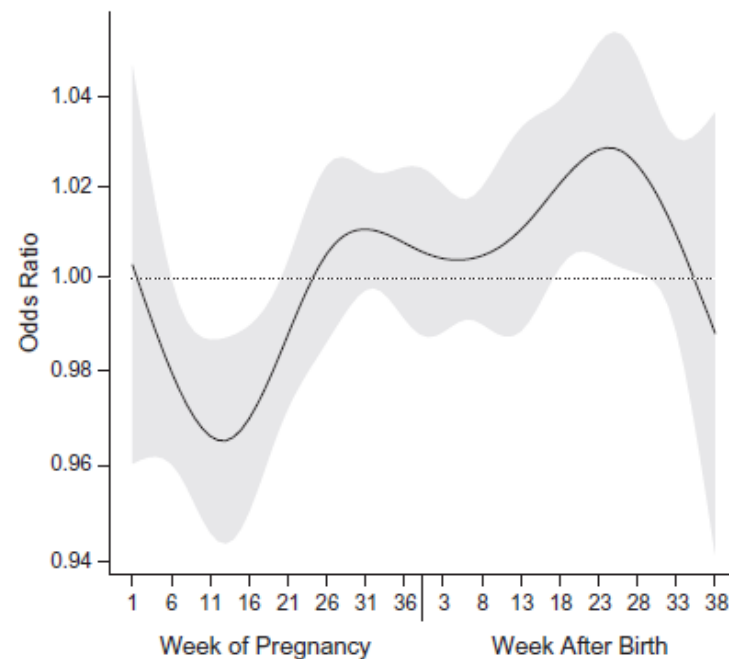


Figure 2. Results from a distributed-lag model representing polynomial time-dependent associations between weekly nitrogen dioxide exposure and risk of autism spectrum disorder among children born in central coastal Israel during 2005–2009. The black line represents the time-varying function estimating risk of autism spectrum disorder with weekly exposures during 38 weeks of pregnancy (left) and the first 38 weeks of life (right), and the gray area around it represents its 95% confidence interval. These results are from a nonlinear distributed-lag model with 7 degrees of freedom. A linear association was assumed between the exposure and the outcome at each time point. Results were adjusted for year of birth, calendar month of birth, population group, paternal age, and census poverty index.



American Journal of Epidemiology
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Vol. 187, No. 11
DOI: 10.1093/aje/kwy172
Advance Access publication:
August 7, 2018

Commentary

Live-Birth Bias and Observed Associations Between Air Pollution and Autism

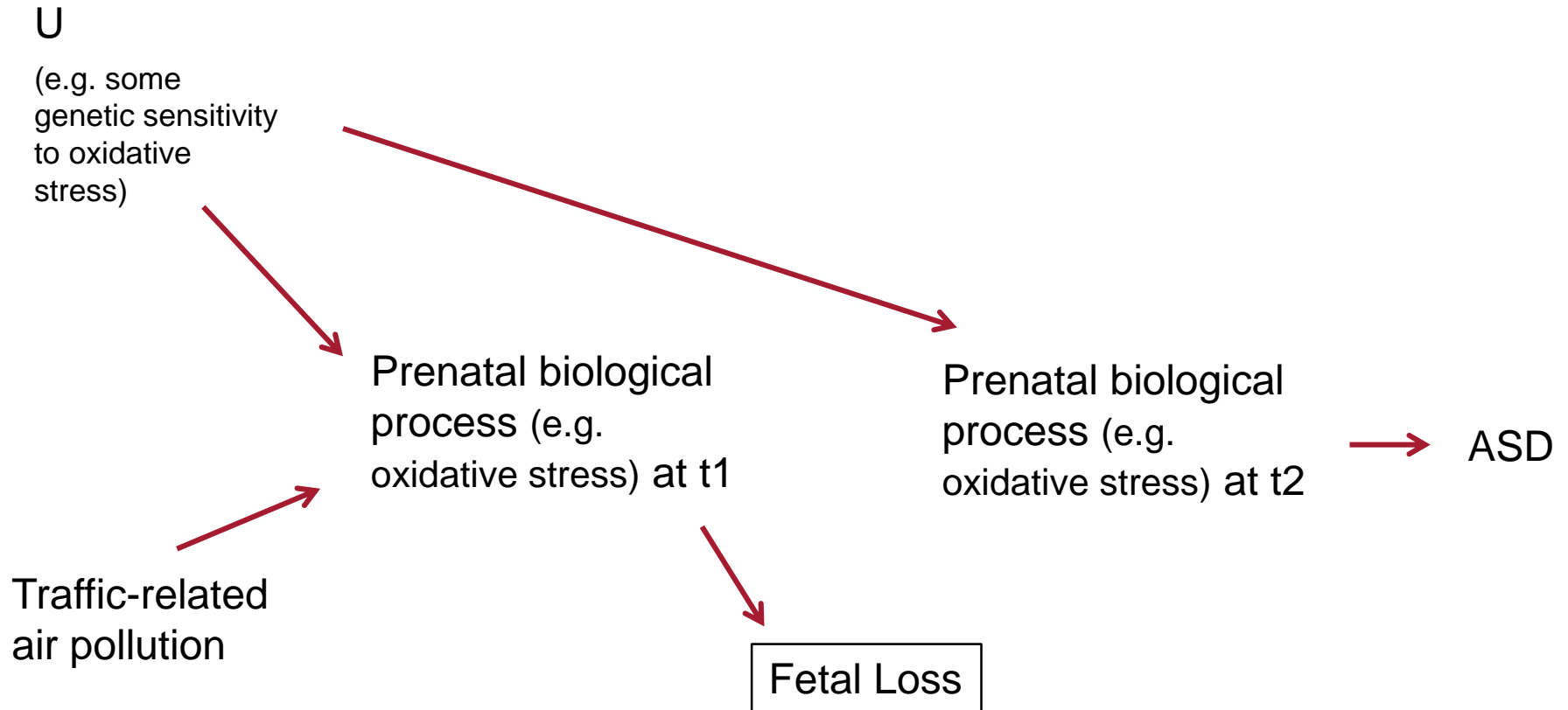
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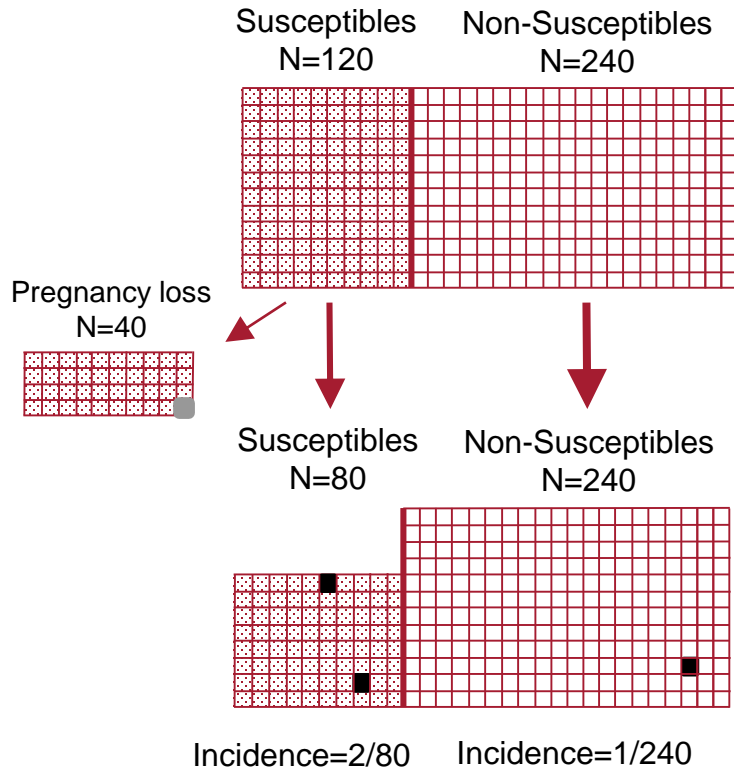
Initially submitted April 10, 2018; accepted for publication August 1, 2018.

A shared mechanism leading to depletion of susceptibles

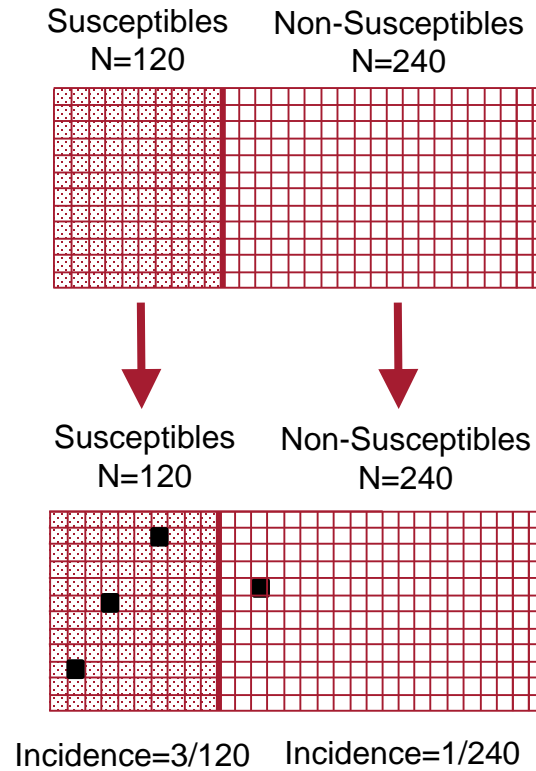
Directed Acyclic Graph (DAG)



High air pollution



Low air pollution



All conceptions

Pregnancies

Live births

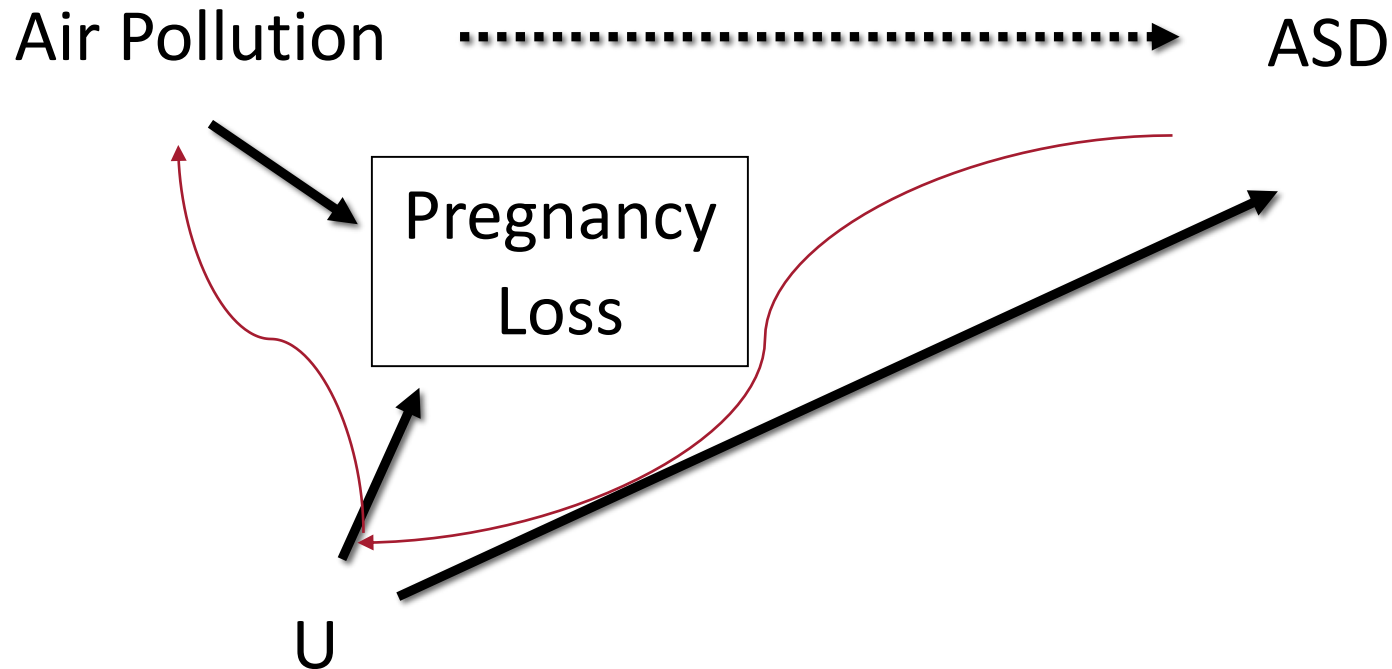
ASD diagnoses

How plausible are the assumptions?
The role of oxidative stress

	No ASD	ASD	Total
Low air pollution	356	4	360
High air pollution	317	3	320
Total	673	7	680

$$\text{Relative Risk} = \frac{\frac{3}{320}}{\frac{4}{360}} = 0.84$$

Scenario 2: Conditioning on a collider



- How plausible are the assumptions?
- What can U be?

פרויקטים נוספים בעבודה בהקשר ל- ASD

- משקל לידה ושבוע הריון בלידה כמנבאים ל- ASD
- שיעורי היארעות מעודכנים בישראל, לפי קבוצות אוכלוסייה, והקשר להכנסת ההורים
- התפלגות מרחבית של ASD בישראל
- שינוי בהכנסות ההורים לאחר אבחון ASD
- השפעה של חשיפה לסטרס במהלך מלחמת לבנון השנייה על היארעות אוטיזם
- זיהום אוויר ואוטיזם – חומר חלקיקי (PM)

תודה רבה