

PREGNANCY SMOKING AND ANTI-SOCIAL BEHAVIOUR

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In the last decade there has been increasing interest and research into the associations between pregnancy smoking and antisocial behaviours.

This overview looks at the following issues:

- 1. Epidemiological evidence on the linkages between pregnancy smoking and externalising behaviours.**
- 2. Possible explanations of the findings.**
- 3. The scientific and public health implications of the evidence.**

EPIDEMIOLOGICAL STUDIES OF THE LINKAGES BETWEEN PREGNANCY SMOKING AND LATER ADJUSTMENT

There have been at least 16 studies that have examined linkages between pregnancy smoking and later adjustment. These studies have focussed on a range of outcomes that has included:

- a) Childhood problem behaviours including hyperactivity and oppositional behaviours.**
- b) Juvenile crime.**
- c) Crime in adults.**

LINKAGES BETWEEN PREGNANCY SMOKING AND LATER ADJUSTMENT

Typically these studies have used longitudinal designs in which prospectively collected measures of pregnancy have been related to later adjustment. In the majority of studies, associations between pregnancy smoking and outcome have been adjusted for potentially confounding factors.

STUDIES OF PREGNANCY SMOKING AND ANTISOCIAL BEHAVIOUR

Author	Year	N	Association	Association After Control
<u>Childhood Studies</u>				
Naeye & Peters	1984	9,024	+	+
Weitzman et al	1992	2,256	+	+
Fergusson et al	1993	1,020	+	+
Millberger et al	1998	160	+	+
Orlbeke et al	1997	1,377	+	+
Williams et al	1998	5,342	+	+
Brook et al	2000	99	+	+
Maughan et al	2001	11,467	+	+
<u>Adolescent/Young Adult Studies</u>				
Rantakallio et al	1992	5,966	+	+
Bagley et al	1992	11,465	+	+
Wakschlag et al	1997	177	+	+
Fergusson et al	1998	1,022	+	+
<u>Adult Studies</u>				
Brennan et al	1999	4,169	+	+
Rasasen et al	1999	5,636	+	+
Weissman et al	1999	147	+	+
Brennan et al	2002	8,112	+	+

OVERALL CONCLUSIONS FROM EPIDEMIOLOGICAL STUDIES

Evidence from epidemiological studies leads to two general conclusions:

1. Association:

Studies have consistently found that the offspring of women who smoke during pregnancy are at increased risks of childhood problem behaviours, juvenile and adult crime.

OVERALL CONCLUSIONS FROM EPIDEMIOLOGICAL STUDIES (Cont)

2. Resilience to Adjustment for Confounding:

These associations have persisted after control for a range of potentially confounding factors that have included family factors, social background, maternal and paternal behavioural patterns and related factors.

AN ILLUSTRATION

Findings from the Christchurch Health and Development Study (Fergusson et al 1998)

Design: In this study a birth cohort of 1,265 New Zealand children was studied to age 18. Data collection included:

- a) Pregnancy smoking assessed at birth.**
- b) Mental health assessed at 18.**
- c) Confounding , social, family and parental factors.**

RESULTS

Association:

Table 1. Rates of DSM-IV Symptom Criteria for Adolescents Aged 16 to 18 Years by the Extent of Maternal Smoking during Pregnancy

Symptoms	No. of Cigarettes Smoked Per Day				p
	0 (N = 691)	1-9 (N = 158)	10-19 (N = 98)	≥20 (N = 75)	
<u>Externalising</u>					
Conduct disorder	0.33	0.56	0.57	0.85	<.001
Alcohol abuse/dependence	0.59	0.82	0.86	1.07	<.005
Nicotine dependence	0.41	0.58	0.84	0.83	<.001
Illicit substance abuse/dependence	0.47	0.81	0.68	1.12	<.001
<u>Internalising</u>					
Major depression	2.05	2.37	2.34	2.93	<.05
Generalized anxiety	0.66	0.75	1.08	0.61	>.20

RESULTS (Cont)

Adjustment for confounding:

Table 2. Mean Rates of DSM-IV Symptom Criteria by Maternal Smoking During Pregnancy After Adjustment for Confounding and Selection Factors.

Measure	Number of Cigarettes Per Day				p
	None	1-9	10-19	20+	
<u>Externalising</u>					
Conduct disorder	0.35	0.47	0.60	0.72	<.001
Alcohol abuse/dependence	0.63	0.72	0.82	0.91	>.05
Nicotine dependence	0.48	0.51	0.54	0.57	>.50
Illicit substance abuse/dependence	0.52	0.63	0.74	0.84	>.05
<u>Internalising</u>					
Major depression	2.05	2.18	2.30	2.42	>.25
Generalized anxiety	0.68	0.70	0.71	0.73	>.75

Covariates: maternal age; maternal education; planned pregnancy; childhood sexual abuse; parental use of physical punishment; parental criminality.

ANIMAL STUDIES

Evidence from human studies has been supported by a growing number of animal studies (rats, mice, guinea pigs) that have examined the effects of nicotine exposure under controlled conditions on locomotor activity and cognitive function (Ernst et al 2001). These studies have usually (but not invariably) found:

- i) Enhanced locomotor activities in animals exposed to prenatal nicotine.**

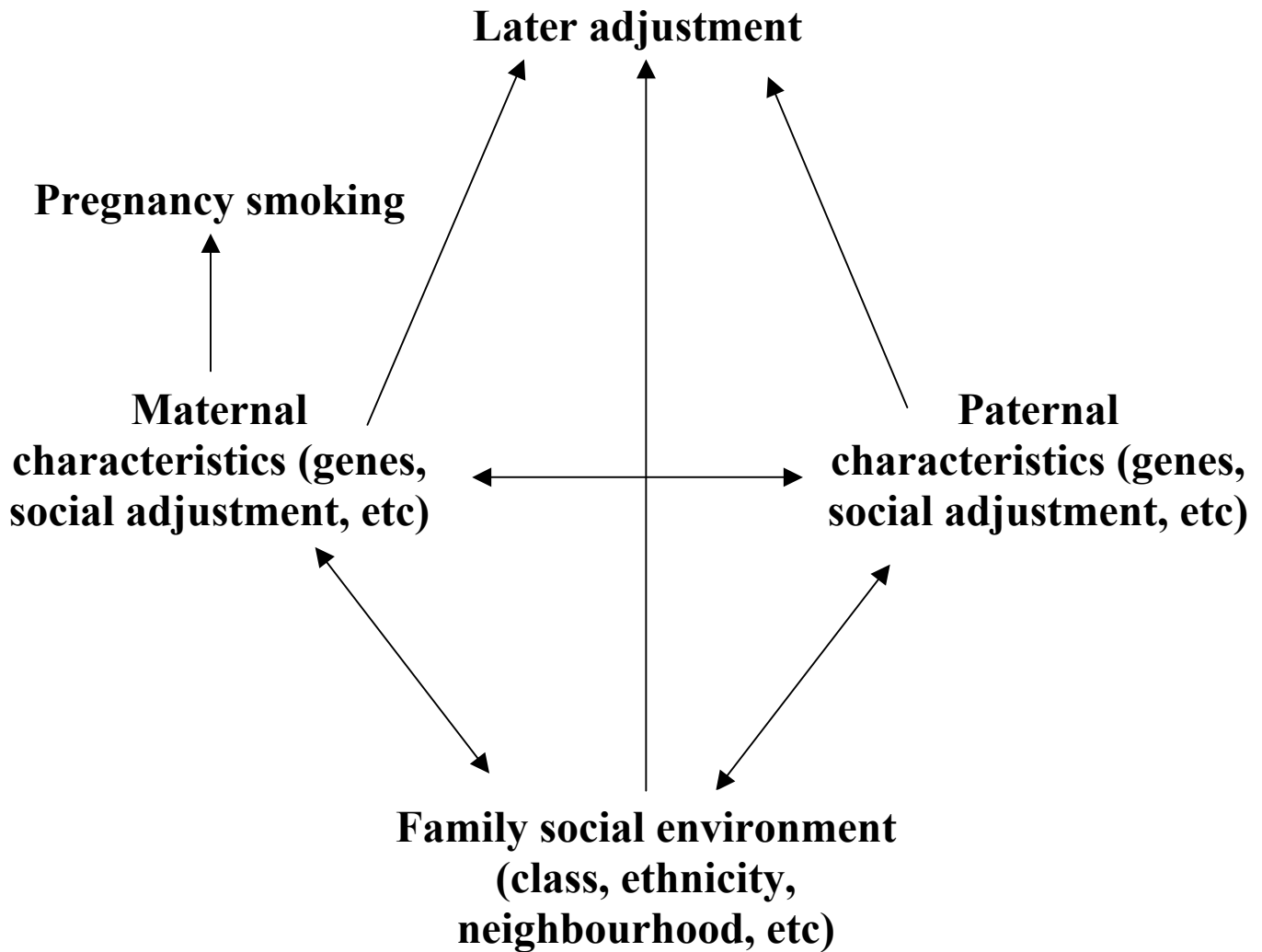
ANIMAL STUDIES (Cont)

ii) Decreased learning ability in animals exposed to prenatal nicotine.

These findings clearly suggest the potential for prenatal exposure to nicotine to modify later behaviour and cognitive functioning. Such evidence is consistent with the view that pregnancy smoking may exert a causal effect on later behaviour in humans.

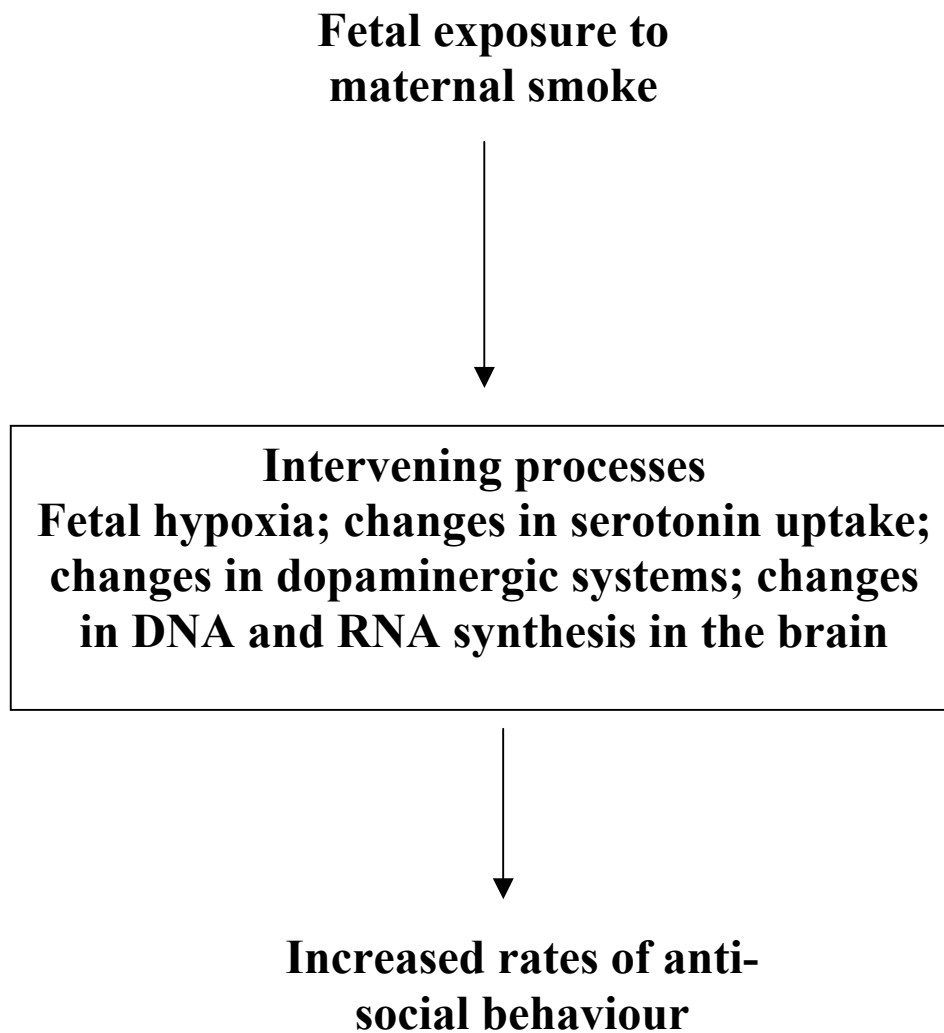
POSSIBLE EXPLANATIONS

1. Omitted Confounding Factors:



POSSIBLE EXPLANATIONS (Cont)

2. Causal processes:



PUBLIC HEALTH AND SCIENTIFIC SIGNIFICANCE

- 1. The Public Health significance of these findings is relatively low given the well established linkages between pregnancy smoking and: spontaneous abortion; low birthweight; increased perinatal risks; child intelligence. The adverse health effects of smoking during pregnancy are now so well established that adding a further risk (increased rates of antisocial behaviour) is unlikely to change professional or public attitudes to pregnancy smoking in any way.**

PUBLIC HEALTH AND SCIENTIFIC SIGNIFICANCE (Cont)

2. **The Scientific significance** is potentially far greater. In particular, if it does prove that pregnancy smoking is a cause of antisocial behaviour, the implications are fascinating since they suggest that biochemical events in pregnancy may shape the direction of later social behaviours. Such evidence may shed new light on the biological foundations of anti-social behaviour.