Does the social environment have a role to play in ADHD?

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Does the social environment have a role to play in the causes of ADHD?

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THE SOCIAL ECOLOGY OF HUMAN DEVELOPMENT

MACROSYSTEM
- Broad ideology, laws, & customs of one's culture, subculture or social class

EXOSYSTEM
- Extended family
- Friends or family
- Mass media
- Places of worship
- Workplace
- Community health & welfare services

MESOSYSTEM
- Neighbourhood play area
- School
- Doctor's office
- Legal services
- School board

MICROSYSTEM
- Family
- Child
- Day-care centre
- Peers
- Neighbours

CHRONOSYSTEM
- Changes in person or environment over time
Does the family environment have a role to play in the causes of ADHD?

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BUT WHAT IS A FAMILY?
Does the rearing environment have a role to play in the causes of ADHD?

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ADHD is familial - shared G not shared rearing E.

So why is ADHD linked to family adversity?
- Same G drive both E and child ADHD? Passive GE correlation.

Rearing experiences may still be important in combination with G.

Beyond heritability
- Extraordinary non-family Es can cause ADHD.
- Can extraordinary therapeutic Es heal?
ADHD RUNS IN FAMILIES

But why?
PARENTS PASS ON G AND CREATE REARING E

Both are correlated with ADHD
Both are correlated with ADHD
20,183 CASES 35,191 CONTROLS, 8,151,190 GENETIC MARKERS

12 genome-wide significant loci

All risk markers = 40% ADHD variance
ADHD IS MORE PREVALENT IN THOSE FAMILIES

EDUCATIONAL UNDERACHIEVEMENT

DISCHORD & BREAKDOWN

DISORGANISED HOUSEHOLD

SOCIAL DISADVANTAGE

FAMILY STRESS

LESS HEALTHY LIFESTYLE

POOR MENTAL HEALTH

PARENTING CHALLENGES

There is no simple story about what drives what?
ADHD IS MORE PREVALENT IN THOSE FAMILIES

- Educational Underachievement
- Social Disadvantage
- Less Healthy Lifestyle
- Dischord & Breakdown
- Poor Mental Health
- Parenting Challenges
- Disorganised Household
- Family Stress

Small and non-deterministic and reciprocal associations.
PARENTS PASS ON G AND CREATE REARING E

How can we know which is causing ADHD?
COMPARISON OF IDENTICAL AND NON-IDENTICAL TWINS

MZ & DZ both share 100% of E but DZ share only 50% G.

Burt, 2009
G SEEMS THE MOST IMPORTANT

But we still have those correlations with E to explain.
EXPLAINING ADHD – REARING E CORRELATIONS
If true controlling for G should remove the correlation with E.
EXAMPLE 1

Maternal smoking during pregnancy is correlated with ADHD

PARENTAL LIFESTYLE – SMOKING DURING PREGNANCY

If causal, the correlation with E should be present whatever the genetic relationship between child and mother.
Smoking and ADHD was only correlated where the M & Ch were genetically related.
Smoking and ADHD was only correlated where the M & Ch were genetically related.
DO THESE CORRELATIONS EXTEND TO PARENTING?

Correlation between Ch-ADHD & parenting largely due to G

Lifford, Harold & Thapar, 2009
WHAT MIGHT MEDIATE THESE PASSIVE G EFFECTS?

Parent ADHD adds to the special family environment

Moroney et al, 2017

Parenting mediates pathway from P- to Ch-ADHD
EXPLAINING ADHD – REARING E CORRELATIONS (AGAIN)
G create E via the impact of the child’s ADHD behaviour
Familial early child hyperactivity evokes adoptive parent hostility that increases ADHD.
Familial early child hyperactivity evokes adoptive parent hostility that increases ADHD.

……but most especially childhood conduct problems
If we can train parents to be less reactive to ADHD we can improve outcome for children.
GxE INTERACTIONS

G may activate Family E?

GxE INTERACTIONS

G may activate Family E?
HOW ELSE MIGHT REARING E BE IMPORTANT?

GxE INTERACTIONS

Does 5HTTLPR Genotype Moderate the Association of Family Environment With Child Attention-Deficit Hyperactivity Disorder Symptomatology?

Alexis L. Elmore, Joel T. Nigg, Karen H. Friderici, Katherine Jernigan & Molly A. Nikolas

CAUTION

Results for GxE and ADHD very inconsistent and replication rare.

Serotonin transporter interacts with conflict and cohesion.
Could they induce extreme brain plasticity that overrides G?
TWO EDGES OF THE NEUROPLASTICITY SWORD

BRAIN STUNTING AND RECOVERY

ARRIVE IN THE ADOPTIVE HOME

DEPRIVATION FOLLOWED BY ADOPTION - BRAIN GROWTH

INITIAL DEVASTATING EFFECTS OF DEPRIVATION FOLLOWED BY REMARKABLE CATCH UP
REMISSION OF COGNITIVE IMPAIRMENT BUT PERSISTENCE OF NEURO-DEVELOPMENTAL PROBLEMS

Child-to-adult neurodevelopmental and mental health trajectories after early life deprivation: the young adult follow-up of the longitudinal English and Romanian Adoptees study

THE LANCET
Early severe institutional deprivation is associated with a persistent variant of adult attention-deficit/hyperactivity disorder: clinical presentation, developmental continuities and life circumstances in the English and Romanian Adoptees study

Mark Kennedy,¹ Jana Kreppner,¹ Nicky Knights,² Robert Kumsta,³ Barbara Maughan,⁴ Dennis Golm,¹ Michael Rutter,⁴ Wolff Schlotz,⁵ and Edmund J.S. Sonuga-Barke¹
YOUNG ADULT PRESENTATION

- HYPER/IMPULSIVE
- INATTENTIVE
- COMBINED
- ANY PRESENTATION

% CASES

- UK
- <6
- >6
ADOLESCENT AND ADULT RATES OF ADHD

Age 15:
- Low risk (n=85): 1:3.9
- High risk (n=60): χ²=8.48

Young Adult:
- Low risk (n=85): 1:7.7
- High risk (n=60): χ²=17.46
Within normative E, shared G rather shared rearing E largely determines ADHD.

Links between ADHD and rearing E likely due to passive or evocative GE correlations.

GxE interactions may also play a role.

Reducing parents reactivity should improve outcomes (special provision for parents with ADHD).

Extraordinary E such as extreme ID can override G to create severe ADHD risks?

Paradoxically this highlights the potential of therapeutic extraordinary environments to shape underlying brain development.
• Principle – Sophisticated reflection-based eye-tracking technology allows the direct training of attention through gaze contingent interaction even at this age.
TASK – SUSTAINED ATTENTION

NO SIGNAL

NO SIGNAL
TASK – INTERFERENCE CONTROL

Trial 1
‘No conflict’

Trial 2
‘Conflict’
INTERSTAAARS – CAN ATTENTION TRAINING IN INFANCY REDUCE ADHD RISK LONG TERM

INTERSTAAARS IS STILL RECRUITING

IF YOU HAVE A FAMILY MEMBER WITH ADHD AND AN INFANT WHO WILL BE OVER 6 MONTHS OF AGE THIS YEAR PLEASE DROP ME A LINE

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