THE POWER AND POTENTIAL OF LONGITUDINAL RESEARCH

BY

MICHAEL RUTTER

WHY UNDERTAKE LONGITUDINAL STUDIES? I

There are obvious disadvantages:

- By the time studies come to fruition, the original measures will have become outmoded, and the overall social context will have changed. Invariably, critics will query whether the findings are contemporaneously relevant
- Longitudinal researchers have to be prepared to accept a rather long period of postponed gratification
- Longitudinal studies are difficult to fund because funding bodies often press for measures relevant for cross-sectional questions, rather than longitudinal analysis
- Because of their expense, it will always be necessary to plan for multiple uses, and this carries the danger of not tackling any question thoroughly.
- Attrition over time is an ever-present hazard (but the best studies have maintained a high participant involvement)

WHY UNDERTAKE LONGITUDINAL STUDIES? II

Despite these disadvantages, well planned longitudinal studies are absolutely essential for answering developmental questions, because:

1. They allow an accurate time ordering of events (retrospective reporting is much better at recalling whether something happened than it is in recalling whether it was before or after some other event)
2. They allow the study of within-individual change (a much more powerful strategy for causal analyses than between-group comparison)
3. Because these are multiple data points, they provide a better leverage on the handling of missing data
4. For the same reason, they provide a much better estimate of lifetime prevalence than do cross-sectional studies
5. They allow an analysis of 'escape' from risk and not just risk effects
6. Similarly, they permit the study of heterotypic continuity and psychopathological progression

AL BALDWIN'S ADAGE (He is the father figure of developmental research)

- He argued 'longitudinal studies are absolutely essential for answering developmental questions but they should be avoided at all costs!'
- What he meant was that investigators should not leap prematurely into longitudinal research before they have thought out what it is they want to study, and how they plan to do it

ARE THERE WAYS OF OVERCOMING MANY OF THE DISADVANTAGES OF LONGITUDINAL STUDIES?

Certainly, there are many ways, e.g.:

- Comparing different general population cohorts in order to examine the possible effects of secular change (e.g. the UK 1946, 1958 & 1970 cohorts)
- Combining comparable cohorts (e.g. the Dunedin and Christchurch studies)
- Using both general population and high risk designs
- Capitalising on regional studies

IF THE MAIN INTEREST IS IN PSYCHOLOGICAL & SOCIAL DEVELOPMENT, WHY DIVERT ATTENTION ON TO BIOLOGICAL FEATURES?

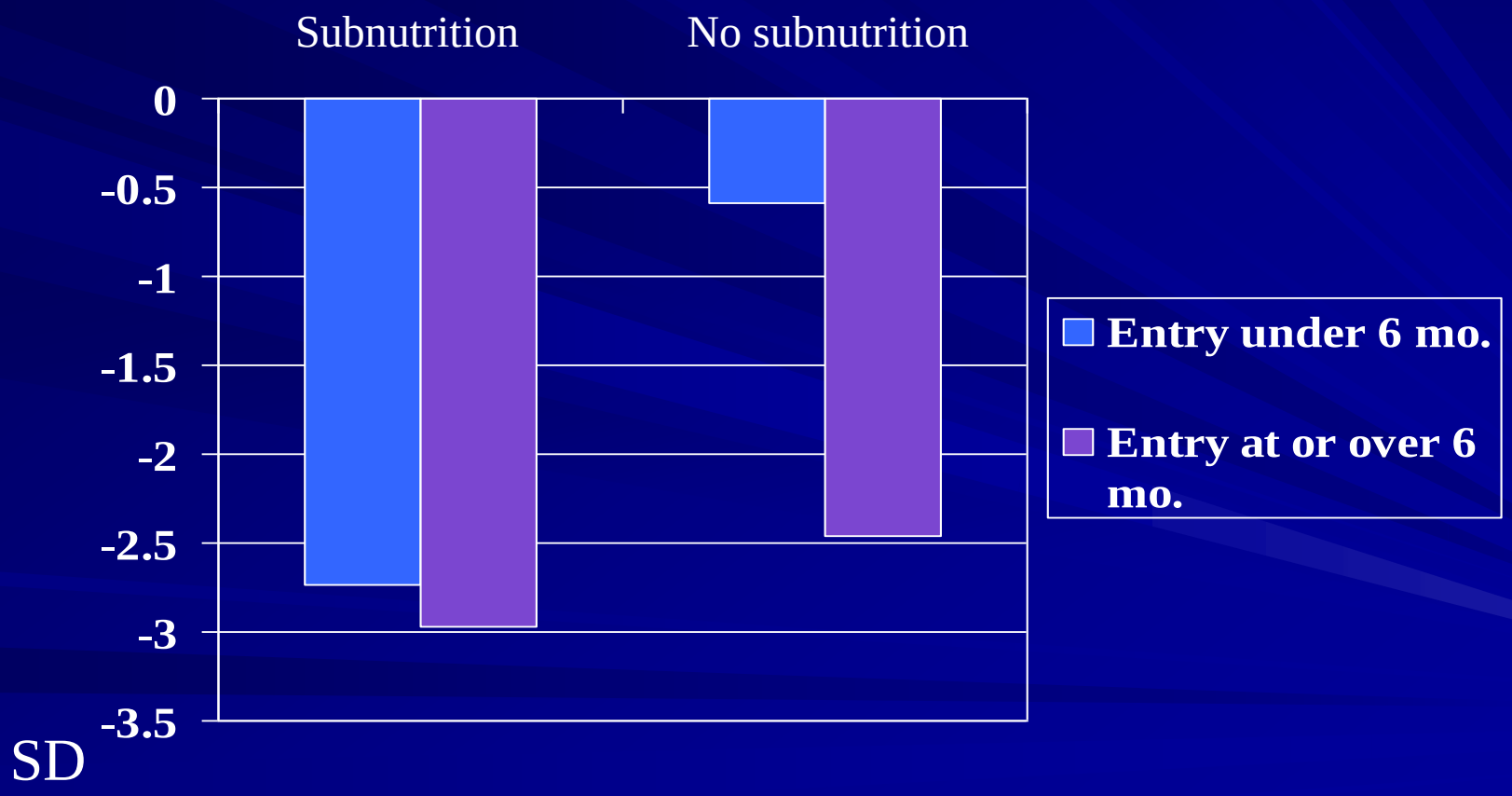
There are 3 main reasons why biology has to be introduced into studies of psychosocial development.

1. When dealing with multifactorial features, the subdivision into those that are due to nature and those due to nurture is meaningless. Biology has to include the psychological and the social
2. If early environments have enduring effects (and we know that some do), it is essential to ask what the environment does to the organism in order for the effects to persist beyond the stress or adversity. That is, how do environments get 'under the skin'?
3. There is overwhelming evidence that there are huge individual differences in how people respond to environmental hazards; the evidence indicates that this is due in considerable part to genetic effects on both environmental risk exposure and on environmental susceptibility. That is, how do genes 'get outside the skin'?

EFFECTS OF PROFOUND INSTITUTIONAL DEPRIVATION ON THE ORGANISM

1. Effects on head circumference (and therefore brain size)
2. Persistence of institutional deprivation effects to age 15 years
3. Persistence of deprivation-specific effects to age 15 years

HEAD CIRCUMFERENCE ON UK ENTRY



OPERATIONAL CRITERIA FOR DEPRIVATION-SPECIFICITY

1. Present before age 6 years
2. Distinctive features that differ from other patterns
3. DSP much more common in children experiencing institutional deprivation at age 6 mo, or later
4. DSP rare in groups not experiencing institutional deprivation
5. Persistence to age 11 years
6. DSP accompanied by substantial functional impairment
7. DSP evident following deprivation not accompanied by subnutrition

CRITERIA FOR SPECIFICITY FOR EACH DSP

- Q-A — The pattern that is most obviously DSP. No additional criteria needed
- D-A — The next most clear-cut DSP but less obviously requiring deprivation in addition to institutional care. Also measures less satisfactory. Essential to require persistence
- CI, I/O } Included as a DSP only if co-occurrence with either Q-A or DA.

RATES OF DSP PERSISTENCE TO AGE 15 AND SERVICE USAGE

Pattern	% Persistence to 15	% Service Usage
Quasi-autism	100%	100%
Disinhibited attachment	76%	79%
Cognitive impairment	95%	84%
Inattention/overactivity	100%	91%
Pattern spanning all four	83%	83%

ASSOCIATION BETWEEN INSTITUTIONAL DEPRIVATION AND DEPRIVATION-SPECIFIC PATTERNS AT 15 YEARS

Pattern	Pooled Comparison Group %	Institutional Deprivation Group
Quasi-autism	7%	93%
Disinhibited attachment	7%	93%
Cognitive impairment	0%	100%
Inattention/overactivity	0%	100%
Pattern spanning all four	8%	92%

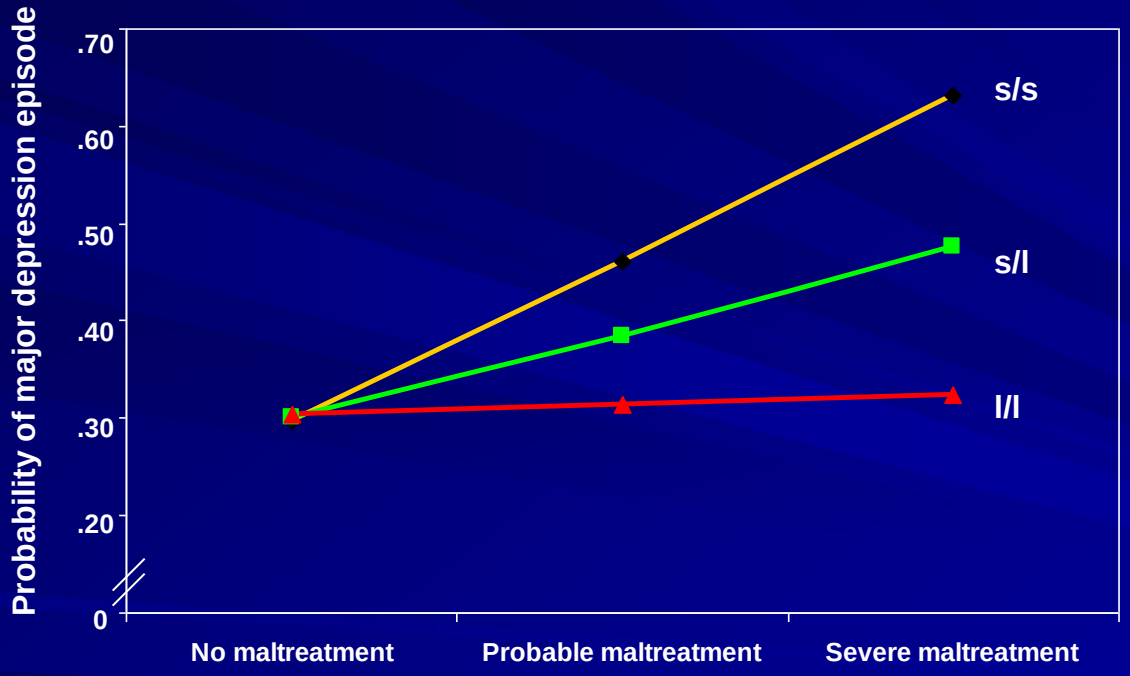
All differences statistically significant at .001 level

GENE-ENVIRONMENT INTERDEPENDENCE

1. Epigenetic effects on gene expression (i.e. how the environment influences gene effects)
2. Gene-environment correlations, (rGE), which reflect genetic influences on individual behaviours involved in the shaping and selecting of environments
3. Gene-environment interactions (GxE) by which genes influence environmental susceptibility

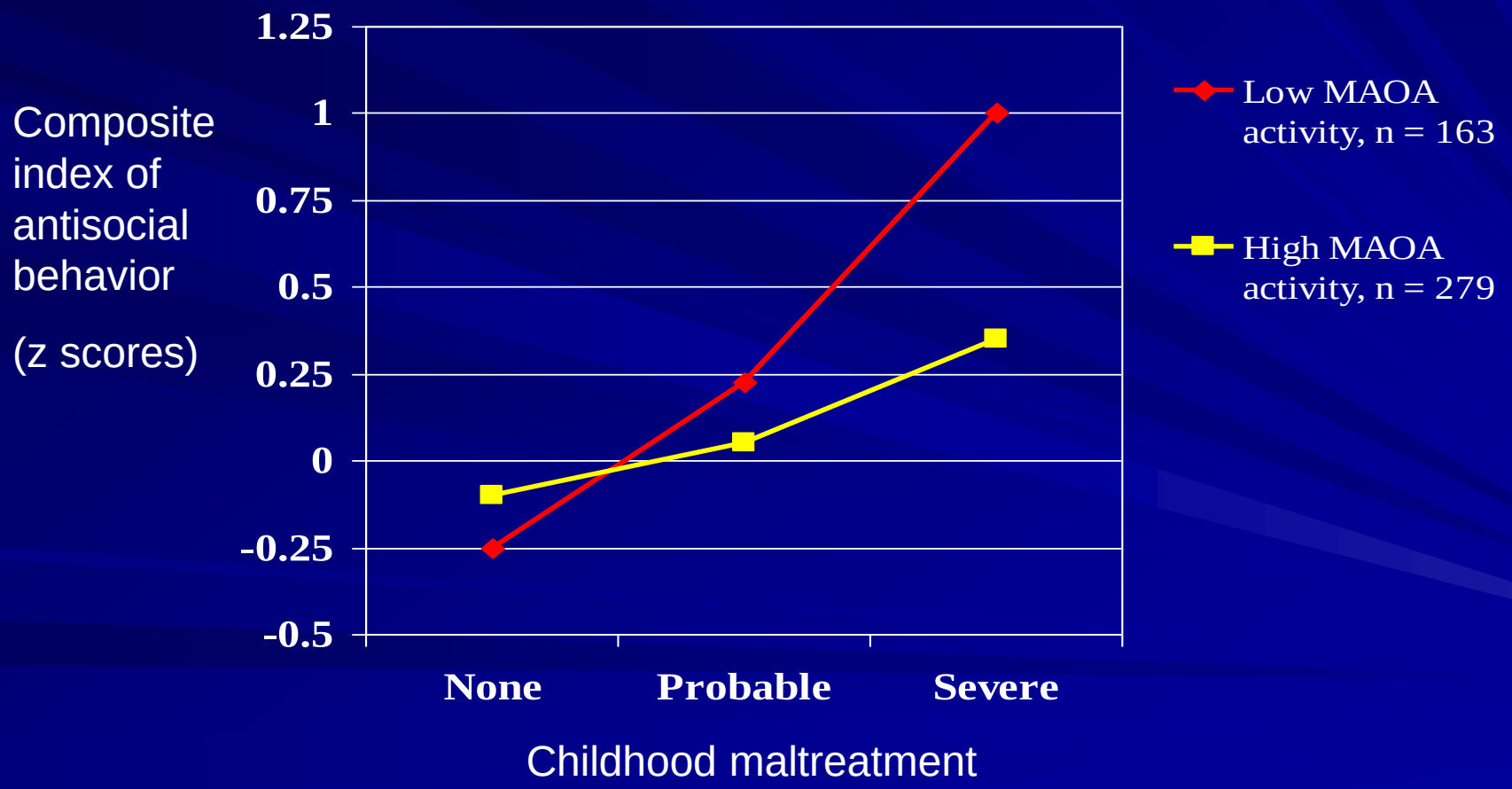
EFFECT OF MALTREATMENT IN CHILDHOOD ON LIABILITY TO DEPRESSION MODERATED BY 5-HTT GENE

(from Caspi et al., 2003)

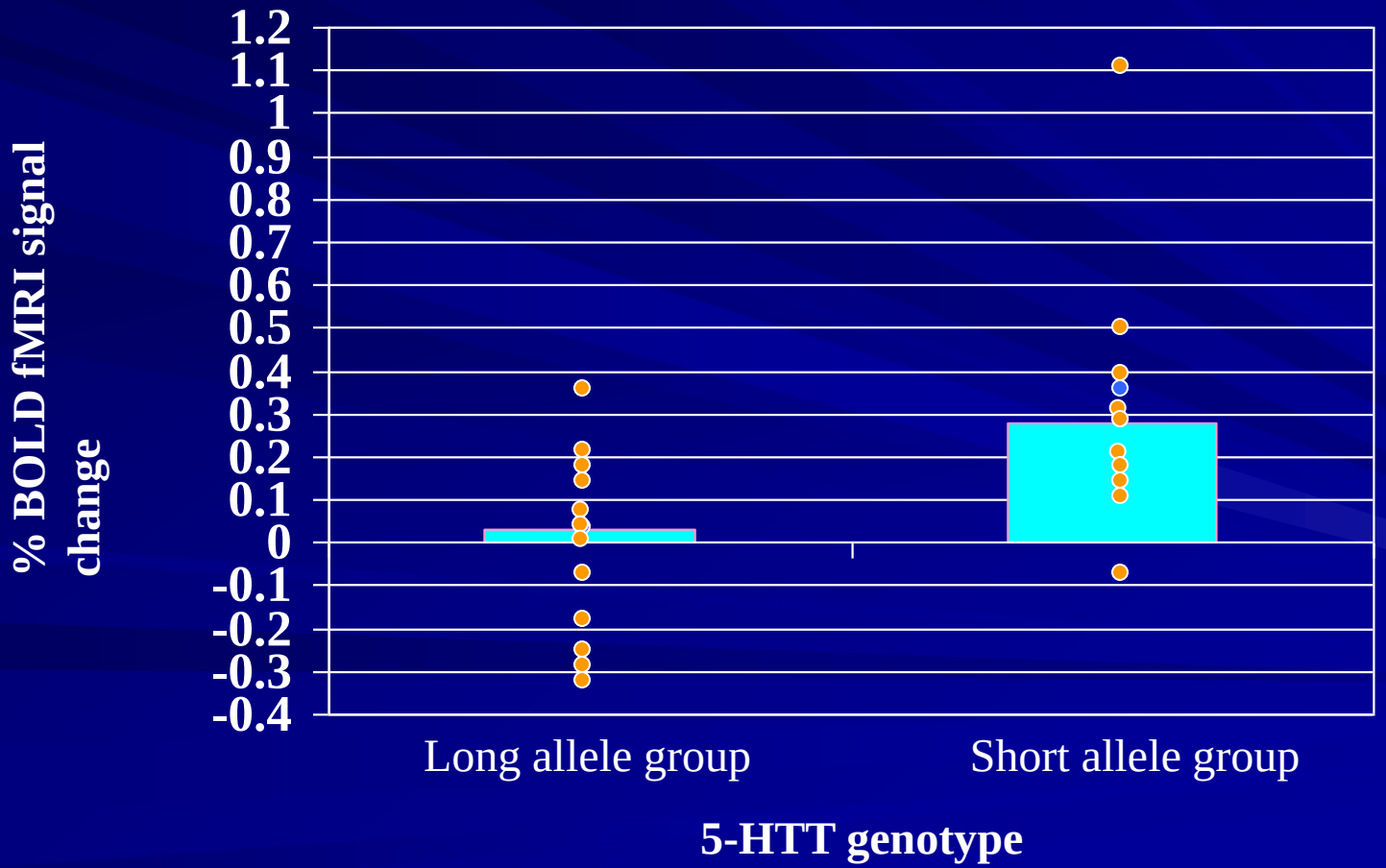


s/s = short allele homozygous
l/l = long allele homozygous
s/l = heterozygous

ANTISOCIAL BEHAVIOR AS A FUNCTION OF MAOA ACTIVITY AND A CHILDHOOD HISTORY OF MALTREATMENT (from Caspi et al., 2002)



EFFECTS OF 5-HTT GENOTYPE ON RIGHT AMYGDALA ACTIVATION IN RESPONSE TO FEARFUL STIMULI (from Hariri et al., 2002)



OVERALL CONCLUSIONS

1. Longitudinal research is essential for answering developmental questions
2. Both general population and high risk strategies are required
3. There are many ways that may be used to capitalise on the strengths of longitudinal studies and to avoid some of the disadvantages
4. Modern psychosocial studies have got to incorporate biology into the design

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