

Children's temperament and parenting practices in the first five years of life and cognitive, academic and adiposity outcomes in later childhood and adolescence

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Abstract

The aims of this thesis are to examine the associations between children's temperament, parenting practices and three important public health outcomes: cognitive ability, academic achievement and adiposity. While there have been decades of psychological research in this area, this thesis takes a contemporary epidemiological approach to the topic and addresses some of the methodological limitations of past studies by using more advanced methods and longitudinal data from both Australia and the UK.

There are four papers in this thesis. The first study examined whether norms in the Revised Infant Temperament Questionnaire (RITQ) were suitable for use in a population sample of UK infants. The RITQ was normed on a small group of US infants in 1978 and has never been updated. Findings showed that 15% of children would be classified as temperamentally difficult using norms empirically derived from the UK infant data, compared to 24% using RITQ's norms, suggesting that potential misclassification of infant temperament occurred from using different norms. This study highlighted the need for more recent and culturally-specific temperament norms to categorise infant temperament. Temperament categories defined using the norms in this study were used in subsequent analyses in study 3 and 4.

Children's temperament may influence parenting, which is known to affect cognitive and academic outcomes. Most studies of temperament have not adequately accounted for parenting practices when examining the effect of temperament on cognitive and academic outcomes. To properly handle parenting practices at age 4 to 5 years as an intermediate variable, the second study used a marginal structural model to examine the

controlled direct effects of temperament at 2 to 3 years on cognitive and academic outcomes at 6 to 7 years in a nationally representative sample of Australian children. Temperament dimensions measured in this study were reactivity, approach, and persistence. This study found that the controlled direct effects of temperament on cognitive and academic outcomes was small. The largest effect (0.11 SD) was for persistence on verbal ability.

Since temperament had such a small influence on children's cognitive and academic outcomes, this thesis then examined parenting as the exposure, as parenting may have a greater influence on cognitive ability than temperament. The associations between parenting practices (warmth and control) and children's IQ in the UK cohort were explored in study 3. Temperament was contextualised as an effect-measure modifier, a variable that may modify the associations between warmth, control and IQ. Low parental warmth and high parental control at 24 to 47 months were associated with lower IQ at age 8 years. Effect sizes for warmth and control were 0.03 SD and 0.15 SD, respectively. Counter to the study's hypothesis, temperamentally easier children were more susceptible to the negative effects of low warmth and high control parenting than temperamentally difficult children.

Besides cognitive and academic outcomes, there is some evidence that parenting and temperament may influence children's adiposity. The fourth study focused on two more specific dimensions of parenting, namely parental feeding control and using food to soothe a child. The associations between feeding control, using food to soothe, and body mass index (BMI) and fat mass were explored in the UK cohort. Whether these

associations differed for children with different temperaments were examined using an analysis of effect-measure modification. Contrary to some studies, higher parental feeding control at age 42 to 65 months was associated with lower BMI at ages 7 and 15 years and fat mass at age 15 years. No association between using food to soothe (42 months) and BMI (7 and 15 years) or fat mass (15 years) were found.

Using two large, longitudinal observational studies from different countries, different temperament tools, and measures of temperament at different ages, the research in this thesis indicated that the effect sizes for temperament on cognitive, academic and adiposity outcomes are at best, very small. The differential susceptibility theory suggested by previous psychological studies, that temperamentally difficult children were more vulnerable to the detrimental effects of negative parenting, was not supported in the UK cohort and using contemporary epidemiological methods. It is recommended that future studies adjust rigorously for important confounders and use large, representative samples when examining the effect-measure modification by temperament of the associations between parenting and cognitive, academic and adiposity outcomes.

Declaration

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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- Chong SY, Chittleborough CR, Gregory T, Mittinty MN, Lynch JW, Smithers LG. Parenting practices at 24 to 47 months and IQ at age 8: Effect-measure modification by infant temperament. *PLoS One.* 2016; 11(3): e0152452.
- Chong SY, Chittleborough CR, Gregory T, Lynch JW, Mittinty MN, Smithers LG. Does temperament at ages 2-3 directly affect cognitive and academic outcomes at ages 6-7? Under review.
- Chong SY, Chittleborough CR, Gregory T, Lynch JW, Mittinty MN, Smithers LG. Associations of parental feeding control and use of food to soothe with adiposity in childhood and adolescence. Under review.

Presentations arising from this thesis

- Chong SY, Chittleborough CR, Gregory T, Mittinty MN, Lynch JW, Smithers LG.
Parenting influence on the association between temperament and IQ. Infant and Early Childhood Social and Emotional Wellbeing Conference. Canberra, Australia, October 2013.
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Influence of parenting and child temperament on Intelligence Quotient (IQ) at 8 years. The 20th Occasional Temperament Conference. Lincoln, Nebraska, USA, November 2014.
- Chong SY, Chittleborough CR, Gregory T, Mittinty MN, Lynch JW, Smithers LG. Using marginal structural models to estimate the direct effect of temperament at 2-3 years on receptive vocabulary and academic achievement at 6-7 years. 2015 Robinson Research Institute Symposium. Adelaide, November 2015.
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Abbreviations

ALSPAC	Avon Longitudinal Study of Parents and Children
ARS	Academic Rating Scale
ATP	Australian Temperament Project
BMI	Body Mass Index
CDE	Controlled direct effect
CDC	Centers for Disease Control and Prevention
CFQ	Child Feeding Questionnaire
CSE	Certificate of Secondary Education
DAG	Directed acyclic graph
DXA	Dual energy X-ray absorptiometry
EAS	Emotional, Activity, and Sociability
EMM	Effect-measure modification
FFQ	Food Frequency Questionnaire
IOTF	International Obesity Task Force
ITQ	Infant Temperament Questionnaire
IQ	Intelligence Quotient
IRSD	Index of Relative Socio-economic Disadvantage
K6	Kessler 6 Scale
LAB-TAB	Laboratory Temperament Assessment Battery
LCA	latent class analysis
MAR	Missing at random
MCAR	Missing completely at random
MNAR	Missing not at random
MICE	Multiple imputation by chained equation
LSAC	Longitudinal Study of Australian Children

MSM	Marginal structural model
NYLS	New York Longitudinal Study
PPVT	Peabody Picture Vocabulary Test
RERI	Relative excess risk due to interaction
RITQ	Revised Infant Temperament Questionnaire
RR	Risk ratio
SEM	Structural equation model
STSC	Short Temperament Scale for Children
STSI	Short Temperament Scale for Infants
STST	Short Temperament Scale for Toddlers
TBAQ	Toddler Behavior Assessment Questionnaire
TTS	Toddler Temperament Scale

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