

What About The Children?

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RESEARCH SUMMARY

Timing of Early-Life Stress and Development of Brain-Related Capacities

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We know that Early Life Stress (ELS), in the first few months and years of life, increases the risk of developmental and mental health problems in children and throughout their later life. This paper looks at the effect of ELS in its different forms on the neurodevelopment of young children, when stress has occurred early in life including in the first two months of life.

The 2155 children studied were between 8 to 10 years old, had histories of developmental adversity and had sought help or were being treated at a clinic for behavioural health.

This age group were selected because the changes of behaviour due to ELS are often displayed at this age and there were sufficient numbers in this group to be used for statistical analysis. All races were represented, and females made up 33%, males 67% (see reviewer's notes¹). The children were being supported by clinicians in US, Canada, Europe and Australia.

Any stressful experiences in the children's lives were documented (by carer's/child's conversation) into four time periods:

- (i) 0-2 months (perinatal period)
- (ii) 2-12 months (infancy)
- (iii) 13 months to 4 years (early childhood)
- (iv) 4-11 years (childhood)

The data was collected from clinicians using a method called a Neurosequential Model of Therapeutics (NMT). This gives output in several forms from the effect on the lowest (first) part of the brain to be organised (metabolic and sensory processes), to the top of the brain and latest to fully organise (cognitive processes), and indicates to the clinicians a route of treatment and intervention. They determined a score for:

Part A: For each child in the study, the severity of their stress from severe adversity was scored in any of the four time periods (i, ii, iii or iv). The greater the stress the higher the score. This score of stress was derived from something going on around the child, such as domestic violence or drug use by parents or caregivers, which could be described as an *indirect* lack of love.

(This Summary may be photocopied)

Part B: For each child in the study, the stress caused by a poverty of early relational experiences was scored in any of the four time periods (i, ii, iii or iv). The lower the quality of attachment relations with their parent, the lower the score. Poverty of early relational experiences causes suffering from a lack of the amount of time and quality of relations that a child had with a parent or caregiver, such as neglect or lack of “attunement” by the caregiver. This could be described as a *direct* lack of love.

Part C: For each child in the study, the clinicians answered 32 questions which together covered brain related functions such as sleep, arousal/alertness, impulsivity, empathy and concrete cognition (understanding that something stays the same in quantity even though its appearance changes). Normal range was scored with the highest score, and the greater the dysfunction, the lower the score, for each question.

Statistical analysis correlating the scores of the 32 questions led to significant relationships when the scores were grouped into four factors (related to subdomains of brain-related function):

(factor 1), questions about Self-regulation – attention tracking, sleep, arousal.

(factor 2), questions about Sensory integration – autonomic regulation, temperature regulation/metabolism, eye movements, suck/swallow/gag, cardiovascular health.

(factor 3) questions about Cognitive functioning – short-term memory/learning, speech/articulation, concrete cognition, recognition of symbols.

(factor 4) questions about early Relational experiences/attachment.

Part D: For each child in the study, the clinicians rated the child’s relationships within nine areas of their life, from primary caregiver, siblings, extended family, school, peers and community and these were added together. The higher the score, the better the relational health across all interactions. A lower score meant low attachment.

Results: Through computational analysis, the authors determined the strongest correlations between the factors identified in Part C and the scores for the individual 8-10-year-olds in Parts A, B and D.

A lower score in Self-regulation and Sensory integration of the children (factors 1 and 2) was correlated with a low score in emotional neglect, and specifically a severe lack of positive relational experiences (Part B and D), in the earliest period of ELS at (i) 0-2 months.

A lower score in Cognitive functioning (factor 3) was correlated with both types of stress in periods (ii) 2-12 months and (iii) 13 months to 4 years.

A lower score in Relational experiences/attachment (factor 4) was correlated with both types of stress at (iii) early childhood 13 months to 4 years.

Conclusions: The study of ELS on neurodevelopmental effects has traditionally been done by basic research scientists. This piece of research has shown that it can be applied to clinical settings. The authors hope that it will lead to improvements in practical help to children requiring help from behaviour health services.

This study has identified some types of effect which are particular to specific timings of early life stress. Not all stressors affect development in the same way. Clinicians may be able to target specific interventions more successfully when they know the age at which the child experienced their early life stress.

During early brain development, the lower parts of the brain are organised first, (affecting sleep, arousal/alertness, metabolic and sensory processes) and the results showed that these factors (1 and 2) were affected by stress in the earliest period tested (0-2 months). Later, the higher parts of the brain develop which control cognitive functioning, factor 3, and these were affected negatively by stress in the later periods (ii) 2-12 months and (iii) 13 months to 4 years. It seems that the brain function controlling factor 4, relational experiences, develops in the later period (period 13 months to 4 years).

The more rapidly moving a dynamic system is, the more influence a perturbation will have (dynamic systems theory). Thus, the effect of stress on the brain will depend on the rate at which that part of the brain is developing. The influence of an adverse experience on the child may not appear as a change in behaviour until much later. The effect on behaviour may be different depending on the timing of that adverse experience during their very early months and years.

This research team's future work will look at this group of children later in their life. The interventions received will be related to the effects on their brain-related outcomes. They will begin collecting information on whether child welfare/social services become involved and whether the child is removed from the family, or whether the child or family received supportive services.

Other future work will involve finding more samples of children, whose early life stresses were even earlier, in the womb, and have been reported with enough certainty to be used in the analysis.

Notes by reviewer:

¹Twice as many boys than girls were in the data set. This suggests that more boys than girls were referred to therapy because of their behaviour. See the Research Summary on this website by Schore (2017) for a possible explanation.

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