

What About The Children?



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RESEARCH SUMMARY

Altered development of hippocampus-dependent associated learning following early-life adversity.

Lambert H. K., Peverill M., Sambrook K. A., Rosen M. L., Sheridan M. A., & McLaughlin K. A.
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This paper seeks to determine whether early childhood adversity affects the development of memory and learning during the later mid-teen years. It focuses into parts of the brain that play a key role in normal memory and learning mechanisms. In this study the regions of the brain are all connected to memory and learning centres around the hippocampus.

In the research method used here, memory is encoded in the brain by the subject observing a picture of an object, for example a pile of books, and being able to remember it. The object is then deemed to have been remembered if the subject can identify the object when shown a set of pictures of different objects which also contain the chosen picture (a pile of books). This part of the experimental strategy was called the encoding step.

Tests for associative memory make the memory coding and recall one step more difficult. The subjects are shown two pictures as a pair: a picture of an object as before, together with a picture of a human adult face side-by-side. The subjects have to try to remember both the face and the object. As before, the pair of face and object pictures have to be identified from a larger set of different pairs (face and object). This part of the experimental strategy was called the associative memory test.

It is well known that children can identify facial expressions showing an emotion. Three expressions were used in this work. Each face had either an angry, neutral or happy expression. The task now was to identify the correct pair from a set of pictures of objects paired with a face and with the correct facial expression. This strategy was called the violence-related associative learning.

Two groups of children (31 F, 29 M) aged 8-19, (mean 14 years), from a low socioeconomic status area in Seattle (WA), were selected for study. (i) The control group from the same neighbourhood had no record of childhood adversity. (ii) The other group had been exposed to violence and were known to Child Protective Services; they were described as the violence-exposed group.

Each child's brain was examined by functional Magnetic Resonance Imaging (fMRI) whilst the task of associative learning was being tested. This enables the researchers to identify regions of the brain that are activated during the experiment; activated regions 'light up' on the instrument's visual display unit.

The results showed that encoded learning (paired face and object pictures) was observed in 35 brain regions; these regions fall into 7 statistically significant clusters. With the associative memory experiment, all subjects who experienced violence showed a lower measurement of associated memory, compared with controls with no experience of violence. However, in the group who had experienced violence, only the angry face pictures evoked a statistically significant difference compared with controls. The two main brain regions involved in emotion and violence are the intraparietal sulcus (IPS) and the middle frontal gyrus (MFG).

In conclusion, children exposed to violence showed learning difficulties compared with the control group not exposed to violence. The IPS and MFG are brain regions that store visual representations within memory before long-term storage. If this is not well developed in an early life experience of violence, memory development would be impaired.

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