Sex differences in the effect of acute tryptophan depletion on declarative episodic memory: a pooled analysis of nine studies


CRD summary
This review assessed the effects of acute tryptophan depletion (ATD) on declarative episodic memory. Secondary objectives included investigating the effects of gender, age and serotonergic vulnerability. The authors concluded that delayed recall and immediate recall is affected by ATD, and that ATD affects females more than males. An unclear analysis, lack of reported methodology, and uncertain quality of the primary studies limit interpretation of the results.

Authors' objectives
To determine the effects of acute tryptophan depletion (ATD) on declarative episodic memory. Secondary objectives included investigating the effects of gender, age and serotonergic vulnerability.

Searching
MEDLINE and PsycLIT were searched; the search dates and terms were not reported. Research groups worldwide were contacted for additional studies.

Study selection
Study designs of evaluations included in the review
Within-subject, placebo-controlled studies were eligible for inclusion. All of the included studies were of a placebo-controlled, double-blind crossover design and treatment order was balanced over test days.

Specific interventions included in the review
Studies that assessed the effects of ATD using an amino acid mixture as treatment were eligible for inclusion. All of the included studies compared a mixture of 15 amino acids (range: 52 to 100 g; the ATD-inducing treatment) with the same 15 amino acids plus between 1.15 and 4.6 g L-tryptophan (TRP; used as placebo treatment). All of the studies appeared to use one dose of treatment.

Participants included in the review
The authors did not report any criteria for inclusion. Where reported, the studies included healthy controls and participants with a family history of depression, or who had recovered from depression, or had irritable bowel syndrome. The mean age ranged from 21.8 to 77.0 years.

Outcomes assessed in the review
Studies using a word-list learning test as a measure of declarative memory were eligible for inclusion. All studies reported on the visual verbal learning test (with 15 or 30 words in the list); immediate recall, delayed recall and delayed recognition were reported. Depression and blood or plasma levels of tryptophan and TRP were also assessed.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The authors do not appear to have systematically assessed study quality.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

Recall scores on 15- and 30-item word lists were converted into percentages.
Methods of synthesis
How were the studies combined?
The data was based on an analysis of variance (ANOVA) model.

How were differences between studies investigated?
The effect of gender, serotonergic vulnerability and age on the results were assessed. Differences in testing procedures or assessment for confounding factors that might affect cognitive performance were reported for included studies in the body of the text.

Results of the review
Nine studies (n=214) were included.

ATD impaired delayed (F1,210 = 32.71, p<0.01) and immediate recall (F1,179 = 11.40, p=0.001). ATD-induced impairments for delayed and immediate recall were greater in females than in males (F1,209 = 6.62, p=0.011 and F2,177 = 10.54, p=0.001, respectively). No statistically significant effects of serotonergic vulnerability or age were found.

Authors' conclusions
Delayed recall, and to a lesser extent immediate recall, is affected by ATD; ATD affects females more than males. Thus, the only factor that has the properties of a serotonergic vulnerability factor in memory performance is gender.

CRD commentary
The review question was clearly supported in terms of the treatment, outcome and study design. Two electronic databases were searched, but the search terms were not reported and it was not clear whether the search was restricted by language. The authors did not describe the procedures undertaken to select papers and extract the data, therefore it is not possible to assess the likelihood of reviewer error or bias being introduced at these stages. Only double-blind studies were included but no other aspect of validity was assessed, which limits interpretation of the results. The results were based on an ANOVA model but the data were not pooled on a within-study basis. Since the results were based on a single treatment dose in a small number of diverse participants, the authors' main conclusions should be interpreted with caution.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors suggested that future research should be aimed at unravelling the processes behind the effect of ATD on declarative memory.

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Record Status
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