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Review

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Metadata

Title

Effects of Social Exclusion on Working Memory: An ERP Study

Description

Previous research has demonstrated that social exclusion can impair working memory, but the exact mechanisms of this impact remain ambiguous. We aim to explore how social exclusion affects working memory and identify the neural mechanisms involved. We used the n-back task to measure spatial and verbal working memory and recorded event-related potentials (ERPs) to observe any changes under social exclusion compared to neutral conditions.

Contributors

Remove me

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Category

Project

Affiliated institutions

No affiliated institutions

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Subjects

Psychology Social and Behavioral Sciences Cognitive Psychology Biological Psychology Experimental Analysis of Behavior Social Psychology

Tags

No tags

Study Information

Hypotheses

Social exclusion is associated with impaired working memory, we expect to observe lower accuracy and slower response times in both spatial and verbal n-back task, and anticipate a larger reduction in LPC and P300 in spatial tasks than in verbal tasks.

Design Plan

Study type

Experiment - A researcher randomly assigns treatments to study subjects, this includes field or lab experiments. This is also known as an intervention experiment and includes randomized controlled trials.

Blinding

For studies that involve human subjects, they will not know the treatment group to which they have been assigned.

Is there any additional blinding in this study?

No response

Study design

We have a within-subjects (repeated measures) design with 3 factors (2×2×2), 8 level. The study's three factors include:
Emotional State: Social exclusion vs. Neutral condition
Task Type: verbal vs. spatial working memory.
Working Memory Load: 2-back vs. 3-back.
The experiment was divided into two sessions. In one session, only the social exclusion pictures will be presented, while the other session are neutral pictures presented as control condition. Each session contained 4 blocks and each block had 48 trails. There will be a 5-minite interval to avoid emotional interference between sessions. Participants will perform both spatial and verbal tasks during 2-back and also 3-back tasks in each session. All those tasks order will be counterbalanced between participants.

No files selected

Randomization

No response

Sampling Plan

Existing Data

Registration prior to creation of data

Explanation of existing data

No response

Data collection procedures

Participants will be recruited through online advertisements and posters for ¥ 60 in remuneration. All participants should be right-handed, have normal or corrected vision, and intact scalps without injuries. Additionally, they should not have any history of physical or mental health disorders. Before starting the experiment, they will be provided with written informed consent.

No files selected

Sample size

Our target sample size is 24 participants. We will attempt to recruit up to 28, assuming that not all will complete the total task.

Sample size rationale

We used the software program G*Power to conduct a power analysis indicating at least 16 participants we should recruit. Our goal is to obtain .80 power to detect a medium effect size of .25 at the standard .05 alpha error probability.

Stopping rule

No response

Variables

Manipulated variables

Emotional State: Social exclusion vs. Neutral condition
We will use images as emotional stimuli from the Social Inclusion/Exclusion in young Asian adults image database (Zheng et al., 2022). The images are divided into two groups: social exclusion and neutral control. We chose 48 images from each group with significantly higher arousal and lower valence social exclusion images in contrast to neutral control ones according to evaluations conducted by 20 students(10 male, 10 female) from Zhejiang Sci-Tech University.
Task Type: spatial vs. verbal working memory.
We will use identical target stimuli in both spatial and verbal tasks to achieve physical attributes consistency, with different guiding language only. The target stimulus are 16 English letters selected randomly, excepting F&J as response key to avoid conflicts. Spatial tasks require participants to ignore the letters themselves, to remember the spatial position of letters, while verbal tasks are to ignore the spatial position, to remember the letters themselves.
Working Memory Load:
We will manipulate memory load using 2-back and 3-back tasks. In 2-back tasks, participants should compare the current stimulus with that two steps before, while in 3-back, they compare it with that three steps before.

No files selected

Measured variables

Working Memory Performance: We will access accuracy and response times in the n-back tasks.
Event-Related Potentials (ERP): We will measure P300 and LPC amplitude during the tasks.

No files selected

Indices

No response

No files selected

Analysis Plan

Statistical models

We will use a repeated measures ANOVA to test our hypothesis, as our study involves a 2×2×2 within-subjects design. The factors we will examine include emotional state (social exclusion vs. neutral control), task type (verbal vs. spatial tasks), and memory load (2-back and 3-back tasks). The dependent variables include accuracy and response times in the n-back tasks, as well as Event-Related Potentials such as P300 and LPC amplitude.

Interactions between the three factors (emotional state, task type, and memory load) will be analyzed to determine their combined effect on the dependent variables. If necessary, we will also perform follow-up tests and contrasts to further explore significant interactions. The alpha level will be set at 0.05 for all analyses.

No files selected

Transformations

No response

Inference criteria

We will use a significance level of $p < 0.05$ for all analyses to determine if the results are significantly different from what would be expected if the null hypothesis were correct. For analyses comparing multiple conditions or testing multiple hypotheses, we will use appropriate adjustments for multiple comparisons, such as the Bonferroni correction or Tukey's HSD post-hoc test, to control for type I error.

Data exclusion

Behavior：For Response Time analyses, trials with wrong response and exceedingly short or long RTs (±3 SD from the mean RT calculated separately for each participant and each experimental condition) will be removed.
The EEG and EOG will be digitally filtered off-line with a 16 Hz lowpass filter. Trials with artifacts will be rejected with a criterion of ± 100 μV.Eye blinks, eye movements, muscle artifacts, or other types of noise will be also removed from the EEG data.

Missing data

No response

Exploratory analysis

No response

Other

Other