



# IMPLICATIONS OF ADVERSITY ON VISUAL WORKING MEMORY

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# INTRODUCTION



Background

Problem

Purpose

# BACKGROUND

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## What we know about **Visual Working Memory**

- Temporary storage of visual information: allows us to *hold & manipulate visual information* for short periods.
- Capacity is limited: research shows we can only hold about 3-4 items at a time.
- Interactive with other cognitive processes: memory interacts with other cognitive systems, such as *attention & long-term memory*.

## What we know about **Adversity**

- Stressful life changing events that can lead to unwanted consequences (Ex. trauma, etc.).
- Emotional and psychological impact: stress, anxiety, or depression can result from/ exacerbate adverse effects, affecting mental well-being.
- Physical health consequences: long-term effects may lead to issues like sleep disturbances, chronic pain, etc.

## What we know about **both**

- Cognitive impairments: *reduced memory, attention, & decision-making abilities*.
- Stress or fatigue can impair visual working memory.
- Slower processing: mental strain can slow the ability to comprehend visual information.
- Increased errors: can lead to more mistakes in visual tasks.

# OBJECTIVE

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- Research Question
  - Is there a significant difference in visual working memory between individuals with low and high adversity when recalling words with different emotional tones (positive, negative, neutral).
- Importance of study
  - Insight into memory processes
  - Mental health approach
  - More research

# Hypotheses

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**Main hypothesis:** Individuals with high adversity scores will recall more negative words than positive or neutral ones.

**Null hypothesis:** There is no correlation between levels of adversity and visual working memory emotional stimuli.

**Alternative hypothesis:** Visual working memory performance differs across emotional stimuli (word valences of positive, negative, and neutral).

Hope to answer:

- The impact of adversity: whether lifetime adversity levels influence recall performance.
- The role of emotional tone: How emotional tone (positive, negative, and neutral) impact an individual's recall ability.
- Adversity and negative recall: whether individuals with high adversity scores exhibit enhanced recall of negative words.

# METHODOLOGY



Participants &  
Materials

Procedure and  
Data Collection

Data Analysis

# PARTICIPANTS & MATERIALS

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## Participants

- Undergraduate students at the University of California, Riverside
  - Taking an upper division psychology course (PSYC182J)
- Age range: 20-31
- Number of participants: 18

## Materials

- Projector and screen
- Personal device (laptop, phone, etc.)
- Google Forms for participants
  - STRAIN
- Powerpoint for task slideshow
  - ANEW

# PROCEDURE

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- Anonymous Google Form containing all components of experiment.
  - Demographics/ Recall report/ STRAIN
- 3 Trials
  - 12 words total in each list- randomized (4 positive, 4 negative, and 4 neutral words).
  - Each word was shown for 1 second.
- After each group of words, participants were given 2 minutes to type words they remembered.
- Following the visual task, we administered the STRAIN survey.
  - Given post-trial to make sure it did not influence memory in natural state.



# DATA COLLECTION

- Data was collected through the Google Forms administered to the participants.
  - Tallied total words recalled and total CORRECT (included total positive, total negative, and total neutral words).
  - The STRAIN survey scored on a dichotomous scale (1-"YES"; 0-"NO").
    - Had a "Decline to State" option.
      - Significant amount would exclude individual from data set.
    - Median Split to separate into a HIGH or LOW Adversity group.
- Used JASP to analyze data.

# DATA ANALYSIS

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- Found descriptive statistics to identify any possible trends.
- Correlation analysis- Adversity Score vs Recall (Overall & Specific).
  - Pearson R → strength and direction with  $\alpha = 0.05$
- Repeated Measures ANOVA-
  - Main Effects of Emotional Tones on Recall.
  - Ran again, but with Adversity Level as between subjects factor.
- Exploratory Analysis: Repeated Measures ANOVA with Sex as a between subjects factor.

# RESULTS, DISCUSSION, AND FUTURE RESEARCH

Result

Discussion &  
Future Research

# RESULTS

<i>Descriptive Statistics</i>													
		Valid		Mean		Std. Deviation		Range		Minimum		Maximum	
Negative recall		18		5.056		1.798		6.000		2.000		8.000	
Positive recall		18		6.556		1.653		6.000		4.000		10.000	
Neutral recall		18		7.056		2.313		8.000		3.000		11.000	
Total Correct Recall		18		18.61		3.806		13.000		13.000		26.000	
Adversity Score		18		6.444		4.342		13.000		2.000		15.000	

Spotted a trend of higher mean for neutral recall...

# RESULTS

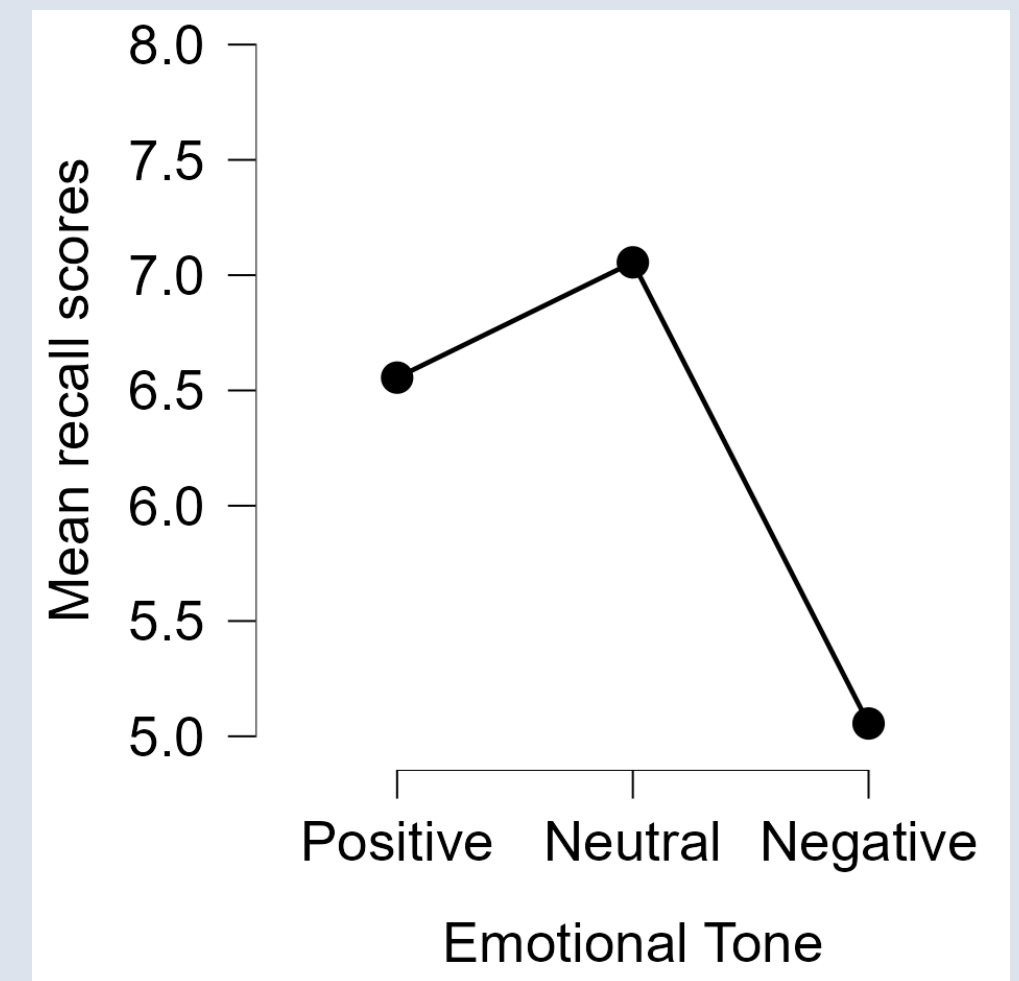
Is there a difference between recall of stimuli within subjects?

- ★ Data suggested that there is a statistically significant difference in scores for emotional tones  $F(2,34) = 6.314$ ,  $p < 0.05$ . ( $p = 0.005$ ).

<i>Post Hoc Comparisons - Emotional Tone</i>						
		Mean Difference	SE	t	Cohen's d	$P_{holm}$
Positive	Neutral	-0.500	0.715	-0.699	-0.257	0.494
	Negative	1.500	0.430	3.491	0.772	0.008
Neutral	Negative	2.000	0.577	3.464	1.030	0.008

*Note.* P-value adjusted for comparing a family of 3

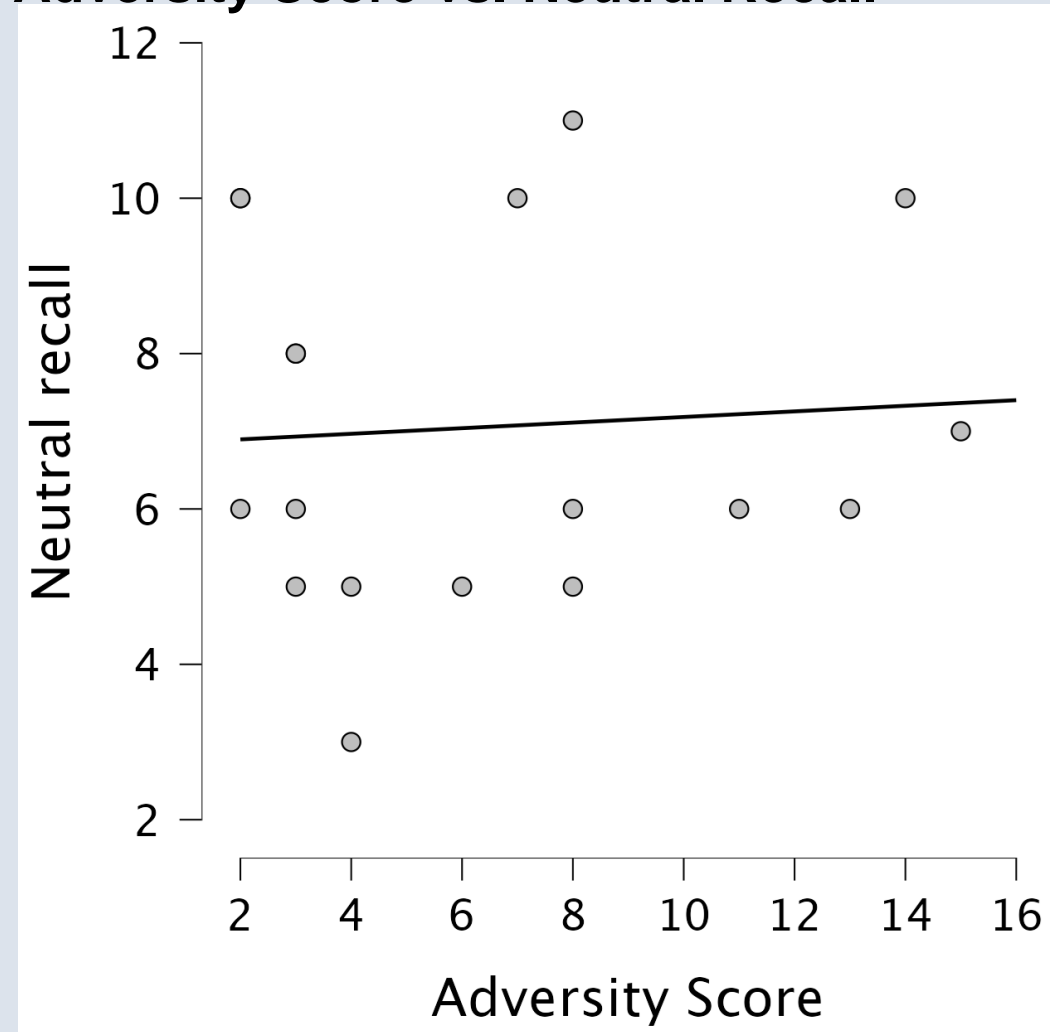
- ★ Post Hoc comparisons revealed that negative stimuli were recalled significantly less than positive ( $M=6.556$ ,  $p=0.008$ ) and neutral ( $M=7.056$ ,  $p=0.008$ ).



# RESULTS

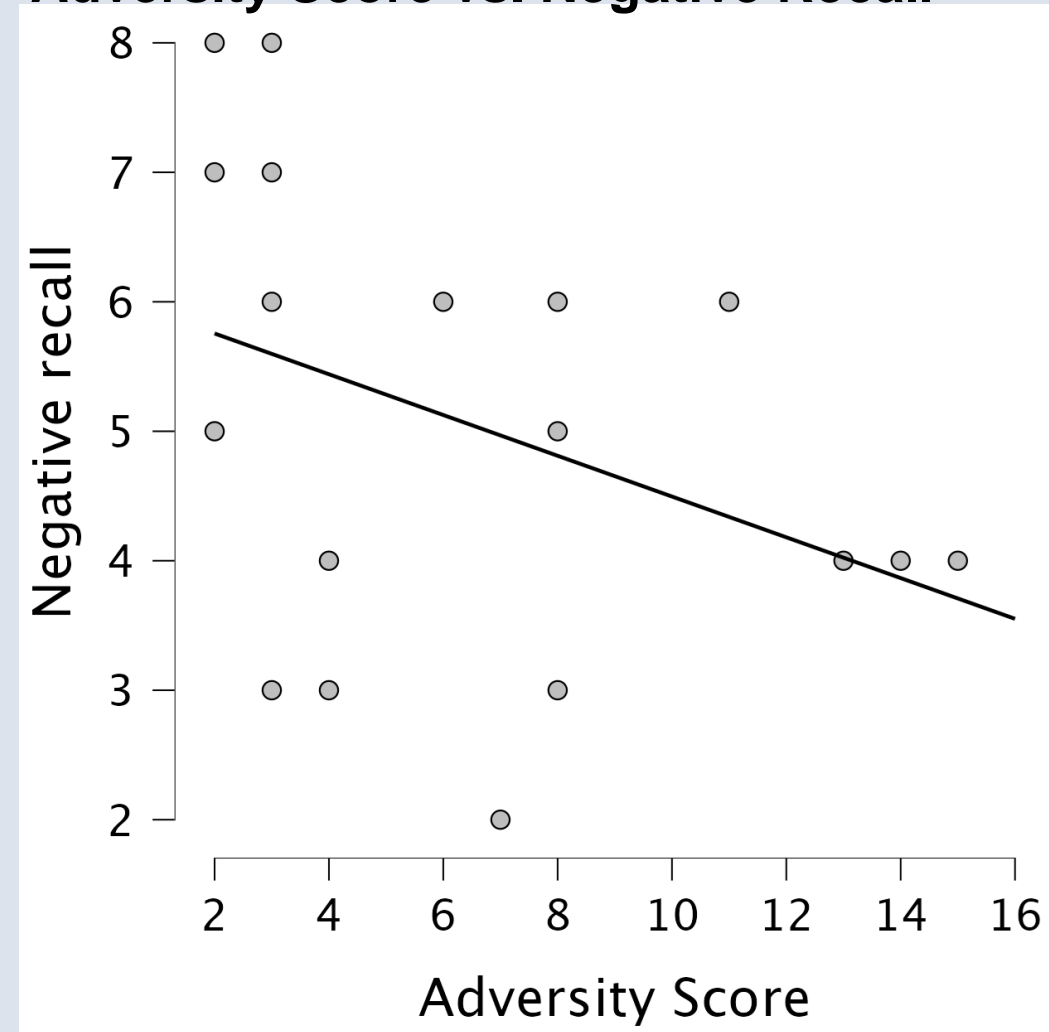
Is there a relationship between adversity and recall of the emotional stimuli?

**Adversity Score vs. Neutral Recall**



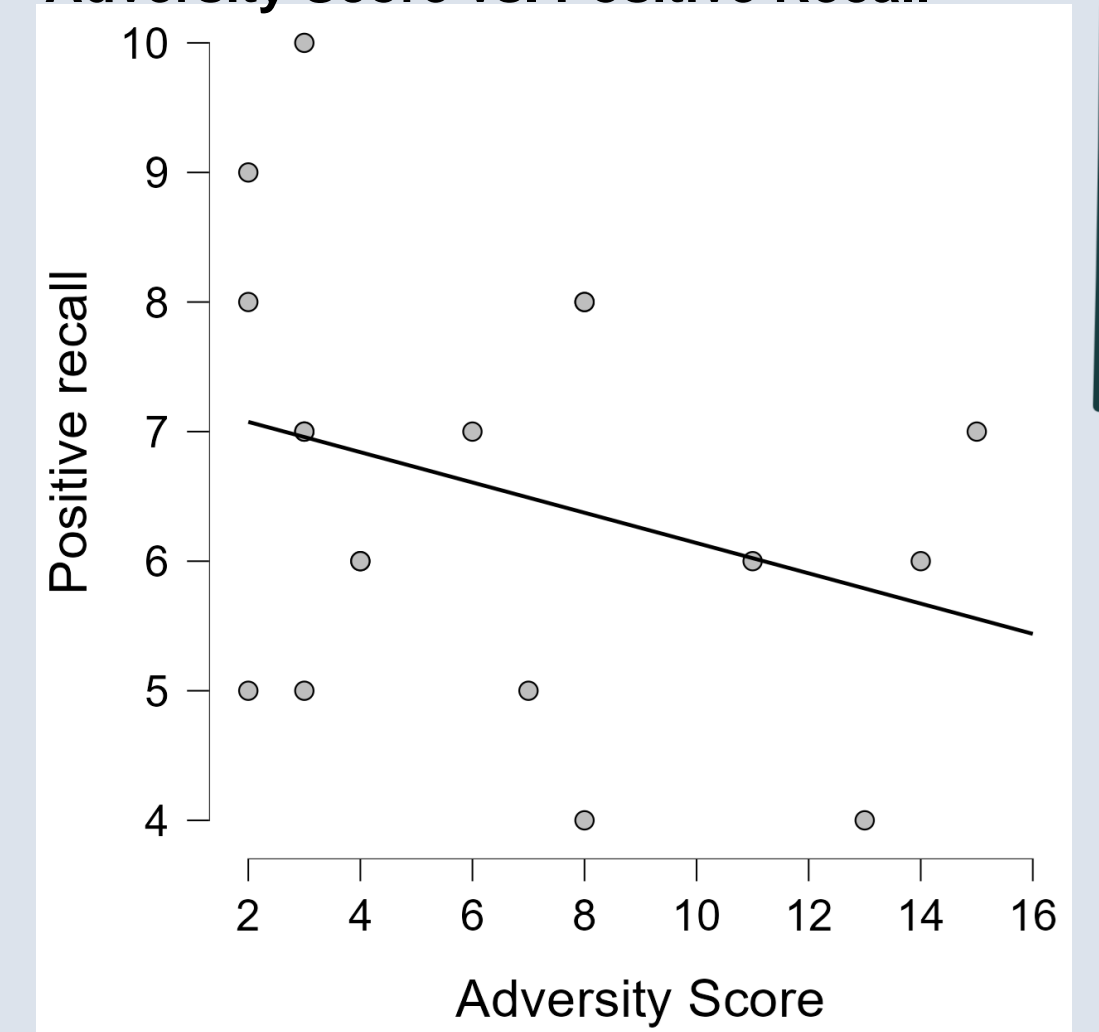
Relationship between the scores on the STRAIN and recall of the **Neutral** valenced words. Pearson's  $r$  indicates a weak non-significant positive trend,  $r = 0.068$ ,  $p = 0.790$ .

**Adversity Score vs. Negative Recall**



Relationship between the scores on the STRAIN and recall of the **Negative** valenced words. Pearson's  $r$  indicates a weak non-significant negative trend,  $r = -0.380$ ,  $p = 0.120$ .

**Adversity Score vs. Positive Recall**



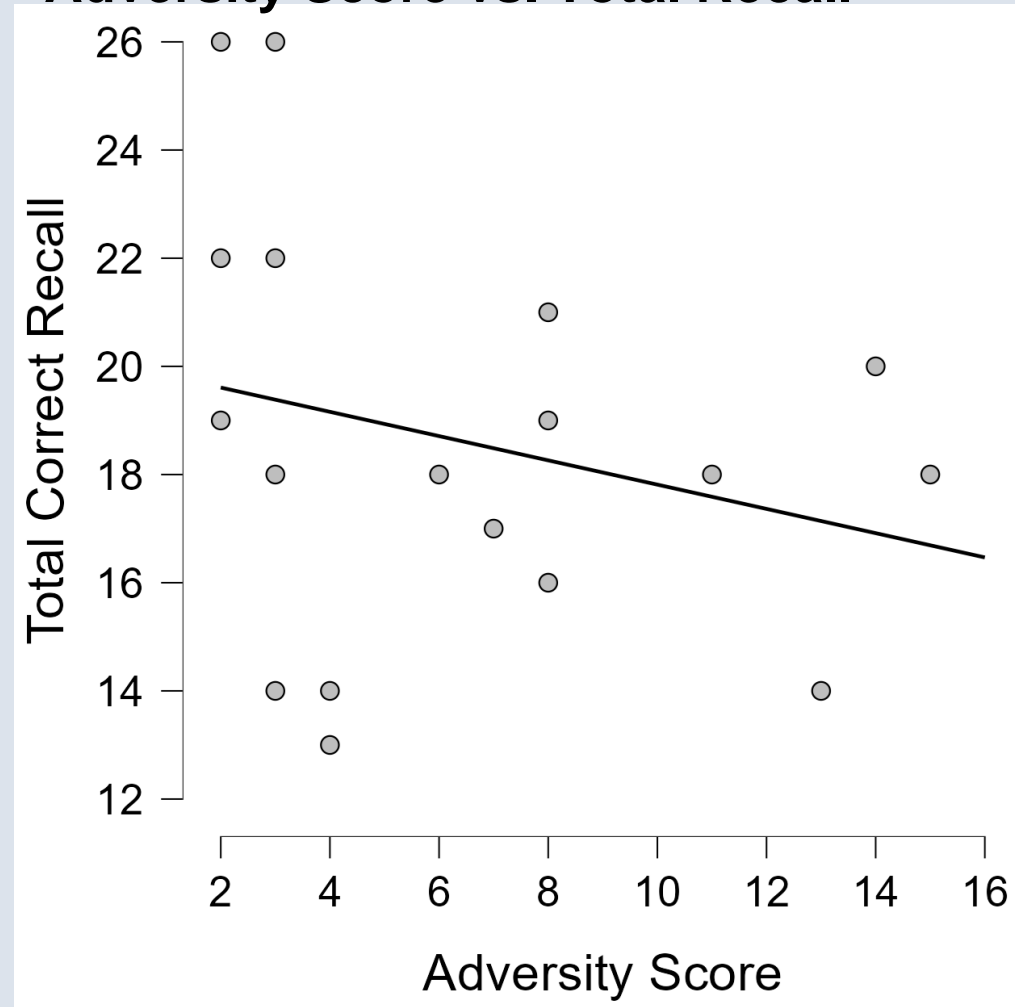
Relationship between the scores on the STRAIN and recall of the **Positive** valenced words. Pearson's  $r$  indicates a weak non-significant negative trend,  $r = -0.307$ ,  $p = 0.215$ .

★ No significant correlations → Retain  $H_0$

# RESULTS

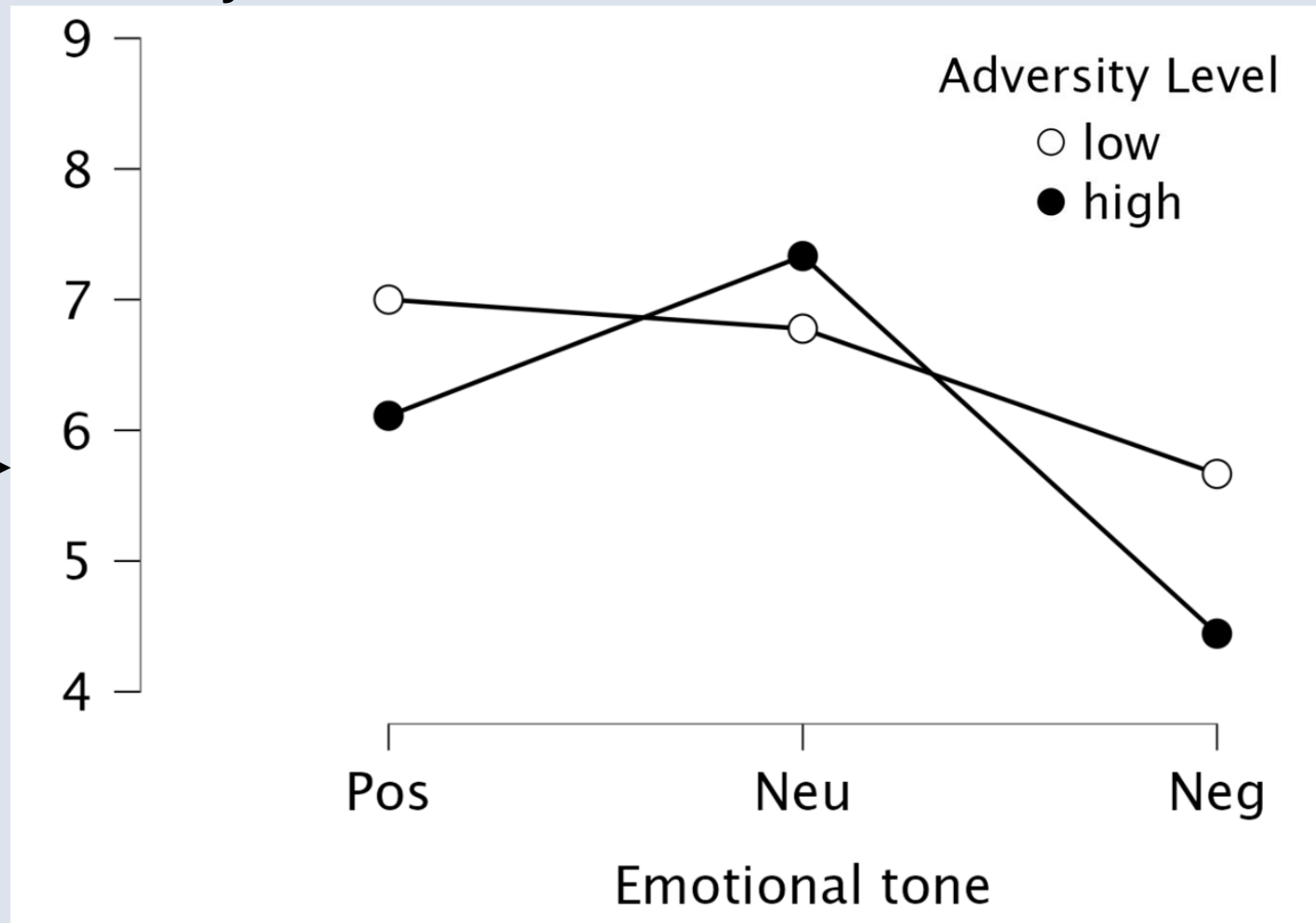
What can we say about total recall and adversity?

Adversity Score vs. Total Recall

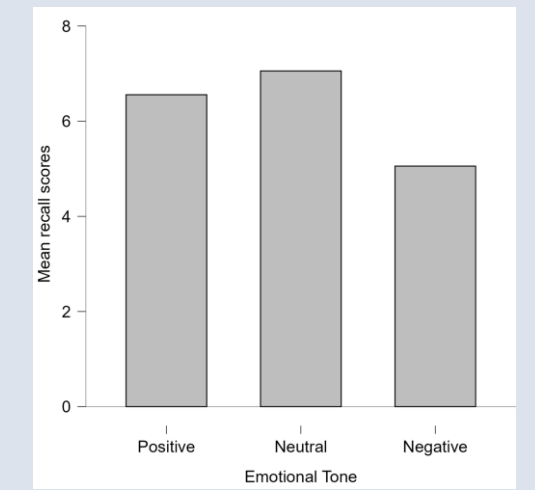


Relationship between the scores on the STRAIN and **Total** words correctly recalled. Pearson's  $r$  indicates a weak non-significant negative trend,  $r = -0.380$ ,  $p = 0.120$ .

Adversity Level & Stimuli Recall



Repeated Measures ANOVA observing effect of Adversity Level between subjects when recalling each valence. No significant difference was found making it inconclusive,  $F(1,16) = 0.694$ ,  $p > 0.05$ .



★ No correlation → Retain  $H_0$

★ No statistical significance → Does not support main hypothesis

# RESULTS

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**Main hypothesis:** Data did not provide sufficient evidence to support

**Null hypothesis:** Retained

**Alternative hypothesis:** Accepted

We found:

- No correlation between adversity and overall recall performance.
- Emotional tone significantly affected recall performance.
- Negative word recall was the lowest overall while neutral was highest.



# DISCUSSION

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## Implications

- Lack of correlation implies adversity, in this study, does not have a substantial effect on memory performance.
  - These findings suggest that the overall effect of adversity on recall ability is not statistically significant in this study.
  - Contradicts what we previously known as negativity bias.

## Limitations

- Small participant pool
- Convenience sample
- Correlational design → inability to establish causality
  - Potential for confounding/ extraneous variables
  - Low internal validity

# FUTURE RESEARCH

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- Increase participant pool and use random sampling.
- Examine whether recent or distant adverse events impact visual working memory.
  - More granular adversity metrics
  - Emotional resilience? Regulation? Coping?
- See how this may affect other types of working memory (auditory).
- Look at longer term memory (does it affect consolidation rather than immediate recall).

# CONCLUSION

Conclusion

# CONCLUSION

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## Importance of adversity research

- Adversity comes in many forms and can affect a person's functioning.
- As many individuals experience varying levels of adversity, understanding its effects on memory is critical for advancing trauma and mental health research.

## Key Findings

- Results highlight that emotional tone significantly affects recall performance with neutral words being remembered the most and negative words the least.



**THANK YOU**

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