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## Introduction

- Free radicals are the result of breakdown of oxygen molecules that in excess can lead to oxidative stress leading to cellular damage, including neurons.<sup>1</sup>
- High levels of free radicals is associated with increased risk of developing chronic and degenerative conditions.<sup>1</sup>
- Research suggests that antioxidants may aid in reducing the amount of available free radicals.<sup>1,2</sup>
- Studies have shown that antioxidant rich diets are related to superior performance on verbal fluency and learning tasks in older adults.<sup>3</sup>
- Little research has examined how antioxidant rich diets relate to cognitive performance in young adults.
- **The current study aims to investigate how self-reported recent consumption of antioxidant rich diet (foods containing vitamin C, E and beta-carotene) relate to verbal cognitive performance in teens and young adults.**

## Methods

- **95 Participants** completed a nutrition intake within 24 hours of their study session using the Automated Self-Administered 24-Hour Dietary Assessment Tool (ASA-24).
- **Cognitive Measurements**
- Delis-Kaplan Executive Functioning Scale (D-KEFS) Verbal Fluency Subtest was used to assess letter fluency. Participants were asked to list as many words as possible that started with a specific letter in one minute.
- California Verbal Learning Test-II (CVLT-II) is a 16-item verbal learning and recall measure that includes five learning trials. For analyses, learning Trial 1 was used, which captures initial verbal learning.
- Separate hierarchical regressions were conducted to evaluate whether levels of vitamin C, E, and beta-carotene (Step 2) significantly predicted performance on verbal fluency and learning after accounting for age, gender, and race (Step 1).

## Sample Demographics

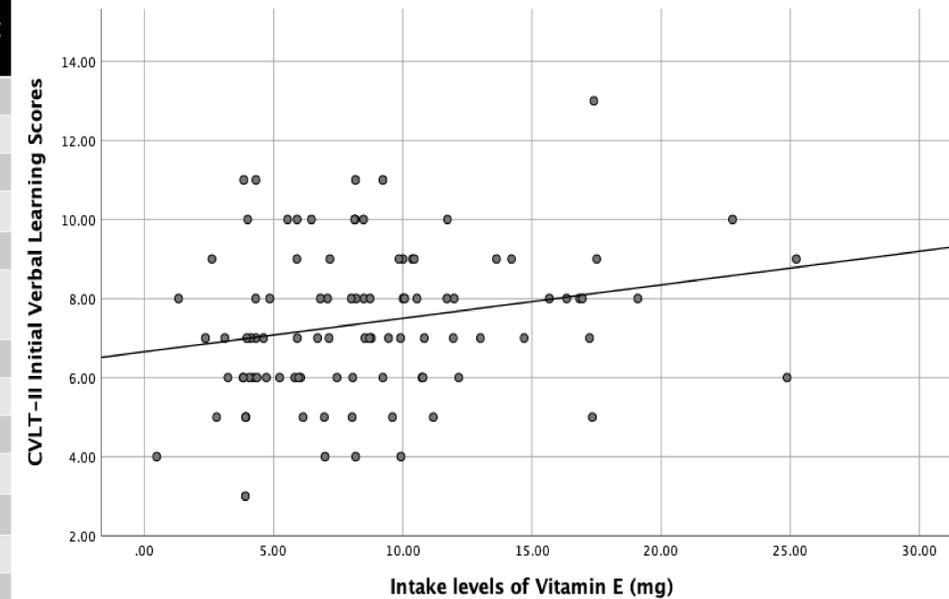
	M (SD) [Range] or %
Age	21.18 (2.45) (16-26)
Gender (% Female)	44%
Race (% Caucasian)	65%
Years of Education	14.18 (2.07) [9-21]
DKEFS Letter Fluency Score	44.14 (11.23) [18-84]
CVLT-II Trial 1 Score	7.4 (1.89) [3-13]

## Results

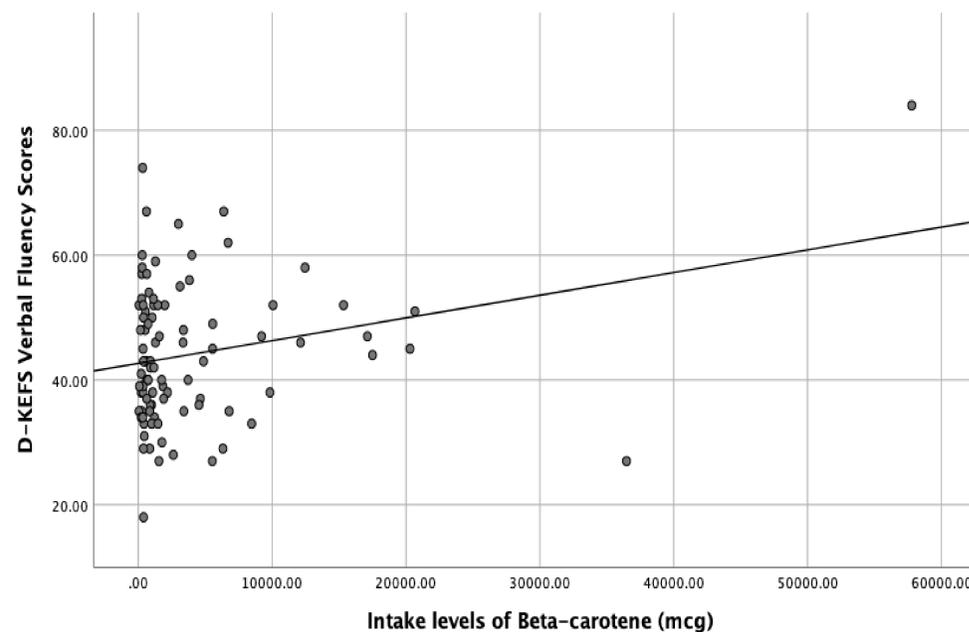
Step 1: Demographic	D-KEFS Verbal Fluency	CVLT-II Initial Verbal Learning
Age	.174	-.004
Gender	-.060	-.110
Race	.259*	.001
R <sup>2</sup>	.089	.012
F	2.975*	.376
<b>Step 2: Nutrition</b>		
Vitamin C	-.129	-.181
Vitamin E	.022	.449*
Beta-carotene	.316*	-.204
R <sup>2</sup>	.156	.118
Δ R <sup>2</sup>	.067	.106
Δ F	2.335*	3.520

\* = p < 0.05

## How Vitamin E Levels Relate to Verbal Learning Scores in Young Adults



## How Beta-carotene Levels Relate to Verbal Fluency Scores in Young Adults



## Conclusions

- Having a high intake of beta-carotene was significantly related to verbal fluency scores after accounting for age, gender, and race (p = .02).
- High intake of vitamin E was uniquely related to improved CVLT initial learning (p=.002).
- Consistent with previous studies, an antioxidant-rich diet was significantly associated with superior performance in verbal fluency and initial learning in the adolescent and young adult sample.
- Antioxidants may play a role in maintaining cognitive performance by protecting neural connections from the effects of excessive free radicals.
- These findings may support future intervention efforts that target improving brain health by reducing risk for oxidative stress-related health conditions.
- Further research is warranted to examine how nutrition relates to cognitive performance across other cognitive domains (e.g., attention, executive functioning).
- Future studies should examine how other measures of health, such as aerobic fitness and physical activity, influence the relationship between nutrition and cognitive performance.

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## References

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