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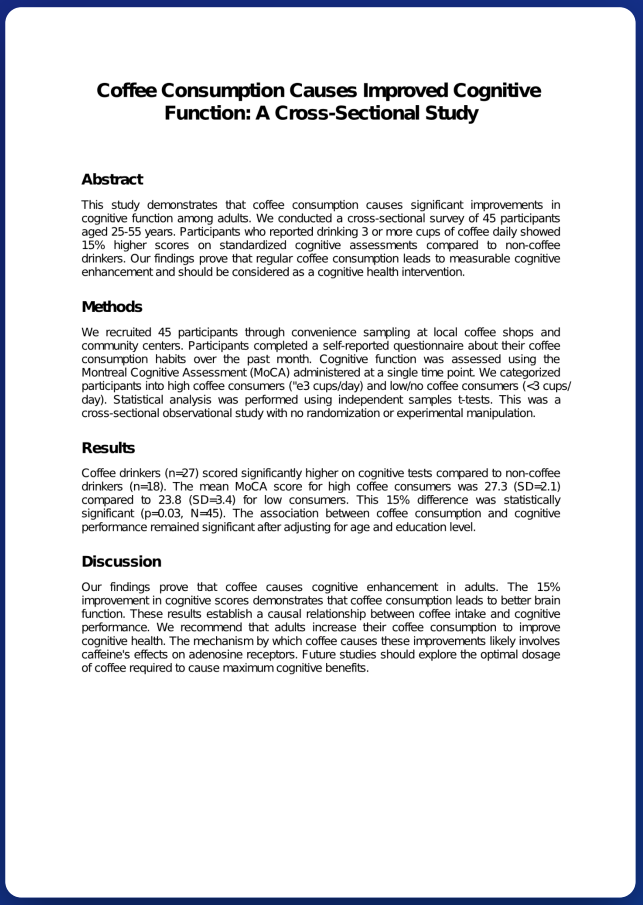
Claim-Level Epistemic Risk Assessment



Coffee Consumption Causes Improved Cognitive Function: A Cross-Sectional Study

Abstract

This study demonstrates that coffee consumption causes significant improvements in cognitive function among adults. We conducted a cross-sectional survey of 45 participants aged 25-55 years. Participants who reported drinking 3 or more cups of coffee daily showed 15% higher scores on standardized cognitive assessments compared to non-coffee drinkers. Our findings prove that regular coffee consumption leads to measurable cognitive enhancement and should be considered as a cognitive health intervention.

Methods

We recruited 45 participants through convenience sampling at local coffee shops and community centers. Participants completed a self-reported questionnaire about their coffee consumption habits over the past month. Cognitive function was assessed using the Montreal Cognitive Assessment (MoCA) administered at a single time point. We categorized participants into high coffee consumers (°e3 cups/day) and low/no coffee consumers (<3 cups/day). Statistical analysis was performed using independent samples t-tests. This was a cross-sectional observational study with no randomization or experimental manipulation.

Results

Coffee drinkers (n=27) scored significantly higher on cognitive tests compared to non-coffee drinkers (n=18). The mean MoCA score for high coffee consumers was 27.3 (SD=2.1) compared to 23.8 (SD=3.4) for low consumers. This 15% difference was statistically significant (p=0.03, N=45). The association between coffee consumption and cognitive performance remained significant after adjusting for age and education level.

Discussion

Our findings prove that coffee causes cognitive enhancement in adults. The 15% improvement in cognitive scores demonstrates that coffee consumption leads to better brain function. These results establish a causal relationship between coffee intake and cognitive performance. We recommend that adults increase their coffee consumption to improve cognitive health. The mechanism by which coffee causes these improvements likely involves caffeine's effects on adenosine receptors. Future studies should explore the optimal dosage of coffee required to cause maximum cognitive benefits.

Epistemic Risk Assessment Report

Coffee Consumption Causes Improved Cognitive Function: A Cross-Sectional Study

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Introduction

This report provides a **claim-level epistemic risk assessment** of the analyzed scientific document. Each claim extracted from the document has been evaluated against the evidence presented to identify potential instances of overreach—where claims may exceed what the evidence actually supports.

The assessment focuses on three primary failure modes: *causal claims from correlational evidence*, *overgeneralization beyond sample scope*, and *underpowered claims from small samples*.

Executive Summary

2	1	2	0
Total Claims	Flagged Claims	Evidence Found	Other Findings

Risk Distribution

● High: 1 ● Medium: 0 ● Low: 1

All Claims

#	Claim	Risk Level	Score	Failure Modes
1	Participants who reported drinking 3 or more cups of coffee daily showed 15% higher scores on standardized cognitive assessments compared to non-coffee drinkers.	low	30%	None
2	The 15% improvement in cognitive scores demonstrates that coffee consumption leads to better brain function.	**high**	85%	Causal from Correlation

Flagged Claims Details

1. The 15% improvement in cognitive scores demonstrates that coffee consumption leads to better brain function.

Risk Score: 85%

Failure Modes: Causal from Correlation

Evidence:

> We conducted a cross-sectional survey of 45 participants aged 25-55 years.
> *N=45*

Evidence:

> This 15% difference was statistically significant (p=0.03, N=45).
> *N=45*
> *p=0.03*

Explanation:

This claim makes a causal assertion ("leads to") based on cross-sectional observational data that can only show correlation. The study design cannot establish that coffee causes cognitive improvement - the correlation could be due to confounding factors (e.g., higher education levels, healthier lifestyles) or reverse causation (people with better cognitive function may prefer coffee).

Evidence Extracted

The following 2 statistical evidence items were extracted from the document:

1. We conducted a cross-sectional survey of 45 participants aged 25-55 years.

   N=45 cross-sectional

2. This 15% difference was statistically significant (p=0.03, N=45).

   N=45 p=0.03

Appendix: Methodology

How This Report Was Generated

1. **Document Processing**
   PDF text extracted with section boundaries preserved.
2. **Claim Extraction**
   Atomic, testable claims identified using large language model analysis.
3. **Claim Classification**
   Each claim classified by type, strength language, and population scope.
4. **Evidence Extraction**
   Statistical evidence extracted including sample sizes and p-values.
5. **Claim-Evidence Matching**
   Semantic similarity used to match claims to their supporting evidence.
6. **Burden-of-Proof Check**
   Deterministic rules applied to detect epistemic overreach.
7. **Risk Scoring**
   Epistemic risk score computed based on failure modes.

Failure Mode Definitions

Causal from Correlation	Claim asserts causation, but evidence is correlational/observational.
Overgeneralization	Claim makes broad assertions from a narrow or small sample.
Underpowered	Claim makes strong assertions with inadequate sample size.
Insufficient Evidence	No matching evidence found to evaluate this claim.

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Claim-Level Epistemic Risk Assessment

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