

## Introduction

Headache is the fifth leading cause of all emergency department visits and a common complaint in neurology clinics. Migraine is defined as a recurrent, unilateral headache attack that lasts 4-72 hours and has a pulsating quality. There is a debate in the extant literature as to whether migraine is associated with neuropsychological deficits. The objective of this study was to conduct a meta-analysis comparing cognition on clinical measures between individuals with migraine and healthy controls.

## Data Selection

Article selection:

- University of South Alabama Libraries' OneSearch
- PubMed
- Uniform search-strategy
- Original research comparing cognition between migraine and control samples

Analyses:

- Modeled under random effects
- Hedge's  $g$  was used as a bias-corrected estimate of effect size

We assessed between-study heterogeneity using:

- Cochran's  $Q$
- $I^2$

## Data Synthesis

Search interval:

- Inception–May 2021
- 6692 results

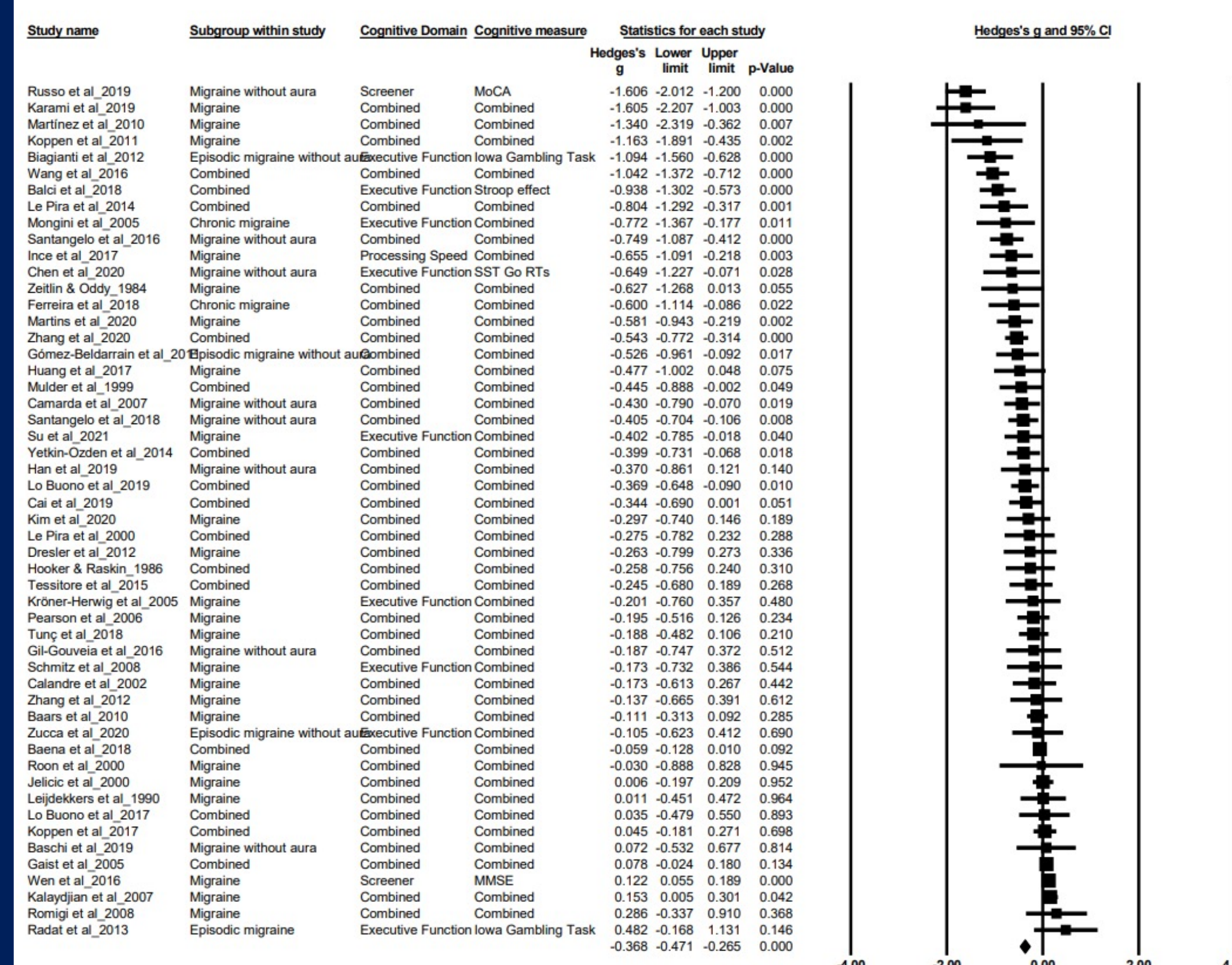
**52 studies** were analyzed

- Migraine  $n = 5324$
- Control  $n = 16540$

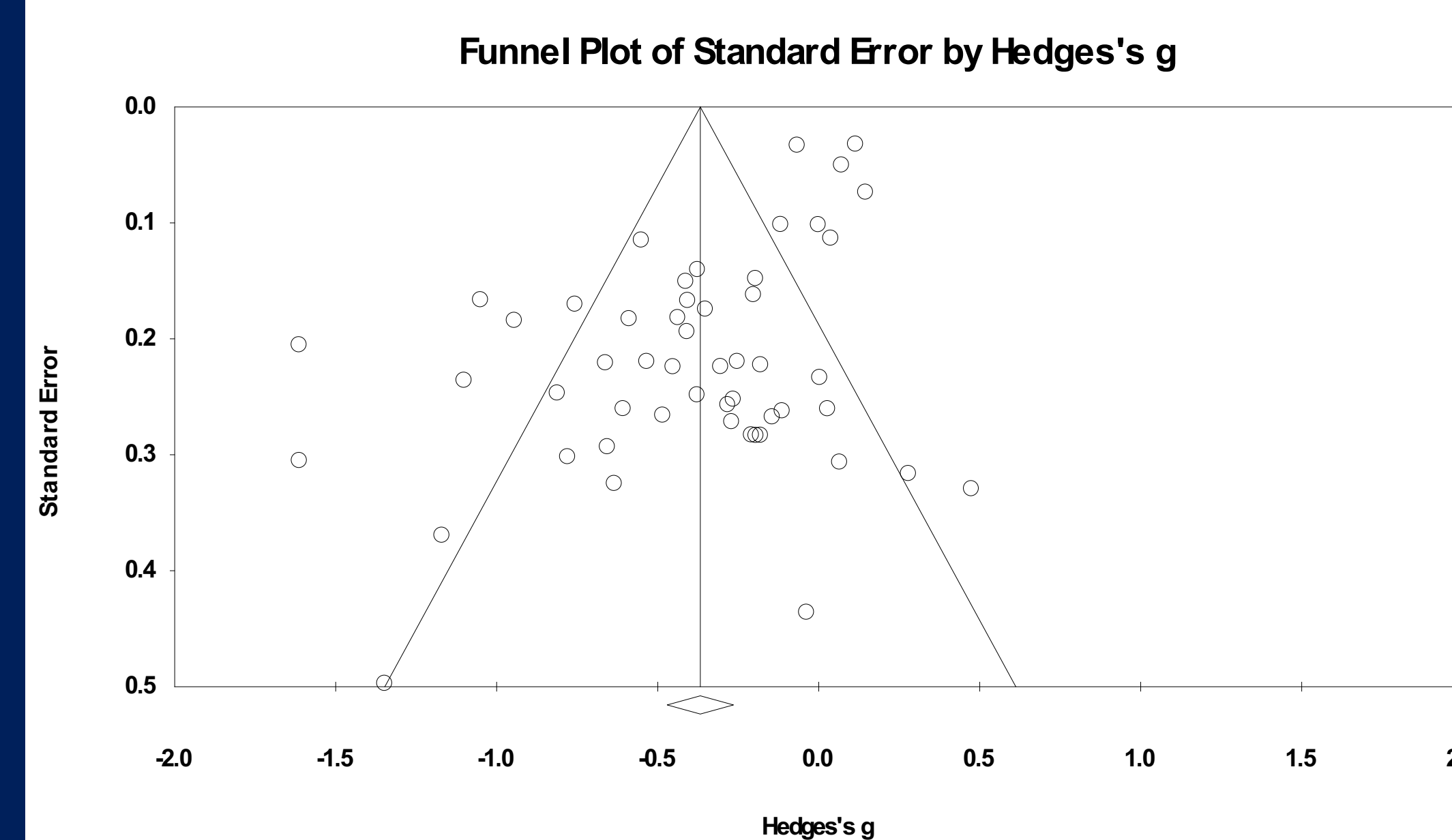
**Meta-analysis showed a significant combined effect size of migraine across all studies**

- $g = -0.37$ ,  $p < .001$
- High heterogeneity
- $Q = 329.84$ ,  $p < .001$ ,  $I^2 = 84.54$
- Trim-and-fill procedure estimated 0 studies to be missing due to publication bias

## Forest Plot of Summary Combined Effect Sizes



## Data Synthesis



Domain	k	g	p	Q	I <sup>2</sup>
<b> Screener </b>	16	-0.50	< 0.001	252.13	94.05
<b> Processing Speed </b>	26	-0.42	< 0.001	125.69	80.12
<b> Executive Function </b>	41	-0.40	< 0.001	151.83	73.66
<b> Simple/Complex Attention </b>	21	-0.35	< 0.001	94.87	78.92
<b> Visuospatial/Construction </b>	16	-0.36	0.049	200.00	92.50
<b> Language </b>	10	-0.26	0.002	17.18	47.60
<b> Global Cognition/Orientation </b>	7	-0.20	0.201	23.01	73.93
<b> Learning/Memory </b>	29	-0.24	< 0.001	156.04	82.06
<b> Motor </b>	5	-0.09	0.238	3.77	0.00
<b> Migraine Overall </b>	52	-0.37	< 0.001	329.84	84.54

**Meta-regressions:**

- Studies with control groups that were younger and had a higher percentage of female control participants yielded greater (negative) differences.
- Migraine groups with a high frequency of headache attacks yielded greater (negative) differences.**

## Conclusions

**Individuals with migraine consistently demonstrated lower performances on neuropsychological tests compared to controls.**

Effect sizes were generally small in strength, with largest effects in Executive Functioning, Processing Speed, and Screeners consistent with a subcortical etiology. This quantitative summary indicates that, through use of neuropsychological tests, individuals with migraine experience difficulties in multiple aspects of cognition.

We also found that studies which included a clinical group with a high frequency of headache attacks yielded greater (negative) effect sizes. Frequency of headache attacks matter in determining severity, especially regarding cognitive functioning. Future studies should explore this further and pay special attention to indicating frequency of headache attacks.

