

# Does personality/cognitive profile predict perceived listening effort in older adults?

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## Introduction

Factors such as age, performance on cognitive tasks, and measures of personality have been linked to differences in ratings of physical and psychological health, subjective listening outcomes, and success with amplification. Cox, et al. (1999) found that hearing aid users with higher neuroticism and users with lower openness had more everyday listening problems and a greater negative reaction to environmental sounds. Ghazanfari, et al. (2019) reported that those with higher neuroticism and those with lower openness tend to report more physical complaints. Traits are typically examined independently against the outcome of interest. Fewer studies have examined how the relationships among these factors might combine to influence how subjective outcomes are reported.

## Research Question

How are hearing aid users' subjective ratings of listening effort (LE) impacted by combinations of personality traits and cognitive abilities?

## Hypothesis

Hearing aid users with higher neuroticism, lower openness, and lower performance on working memory tasks will report more LE with and without hearing aids, and less aided benefit in this domain.

## Methods

### Participants:

Forty-five older adults age 61-81 years old (M=70.3 years old) with bilateral mild-to-moderate sensorineural hearing loss.

Participants wore four pairs of bilaterally fitted hearing aids for one month each. Outcomes were assessed at the end of each month.

### Subjective listening outcome:

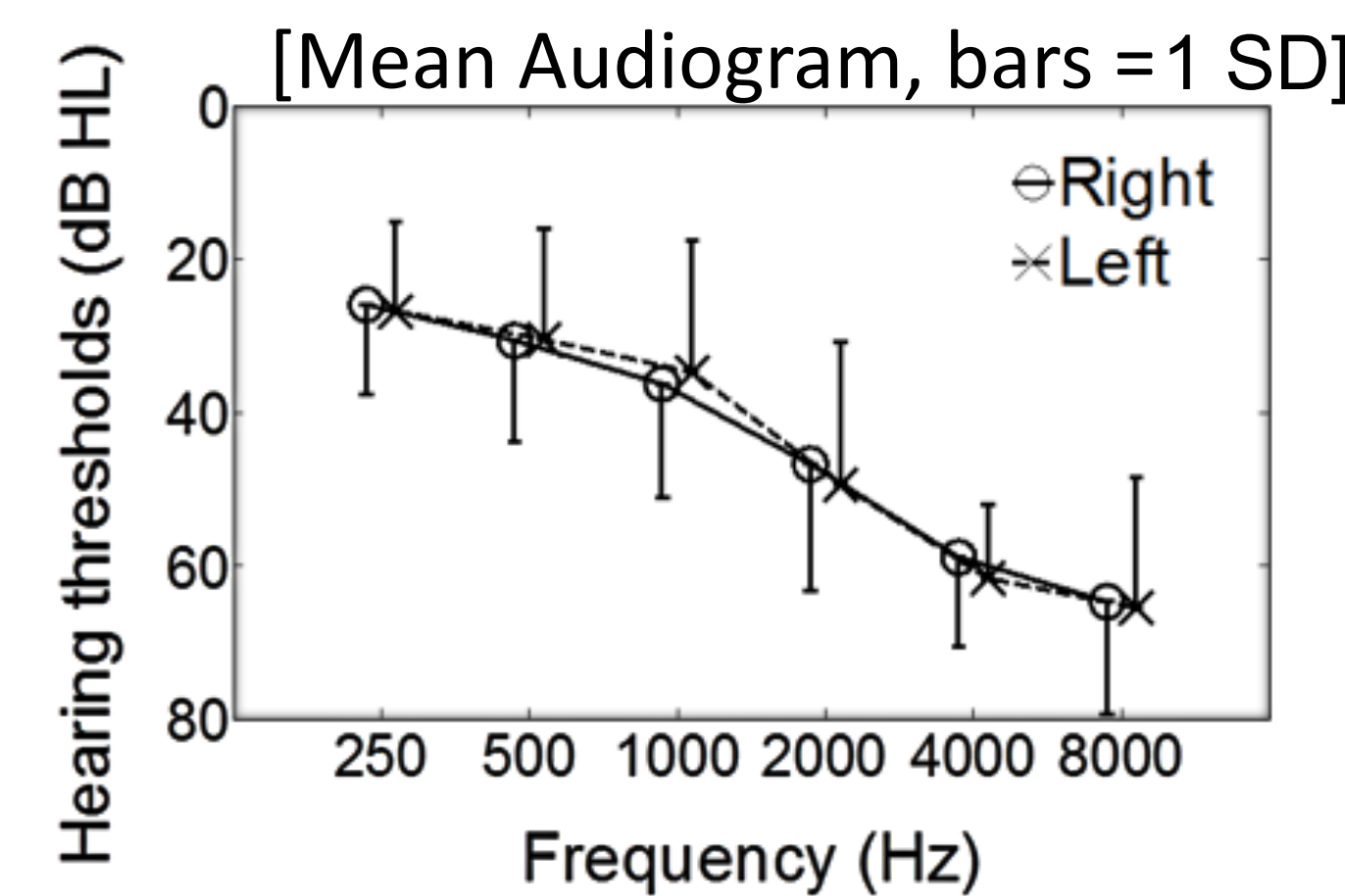
Items 3.14, 3.15, and 3.18 of the Speech, Spatial, and Qualities of Hearing Scale (SSQ). Assessed for unaided listening and with each pair of hearing aids. Scores on these questions were combined to create "Unaided LE" and "Aided LE" scores

### Personality traits:

International Mini-Markers (IMM, Saucier, 1994) personality test, based on the "Big Five" personality traits: Extraversion, Openness, Neuroticism, Conscientiousness, and Agreeableness.

### Cognition:

Reading Span Test (RST; Daneman & Carpenter, 1980) to evaluate working memory.



## Results

### Personality/Cognitive Profile

A K-means cluster analysis was used to identify groups according to personality traits and reading span scores. The scores were converted to z-scores for the analysis, and a total of 3 groups were determined based on final cluster centers.

The groups are classified here as

#### Hi-Cog, Hi-Trait

Higher Cognition with Higher Scores on Personality Traits

#### Lo-Cog, Mod-Trait

Lower Cognition with Moderate Scores on Personality Traits

#### Hi-Cog, Lo-Trait

Higher Cognition with Lower Scores on Personality Traits

### Listening Effort

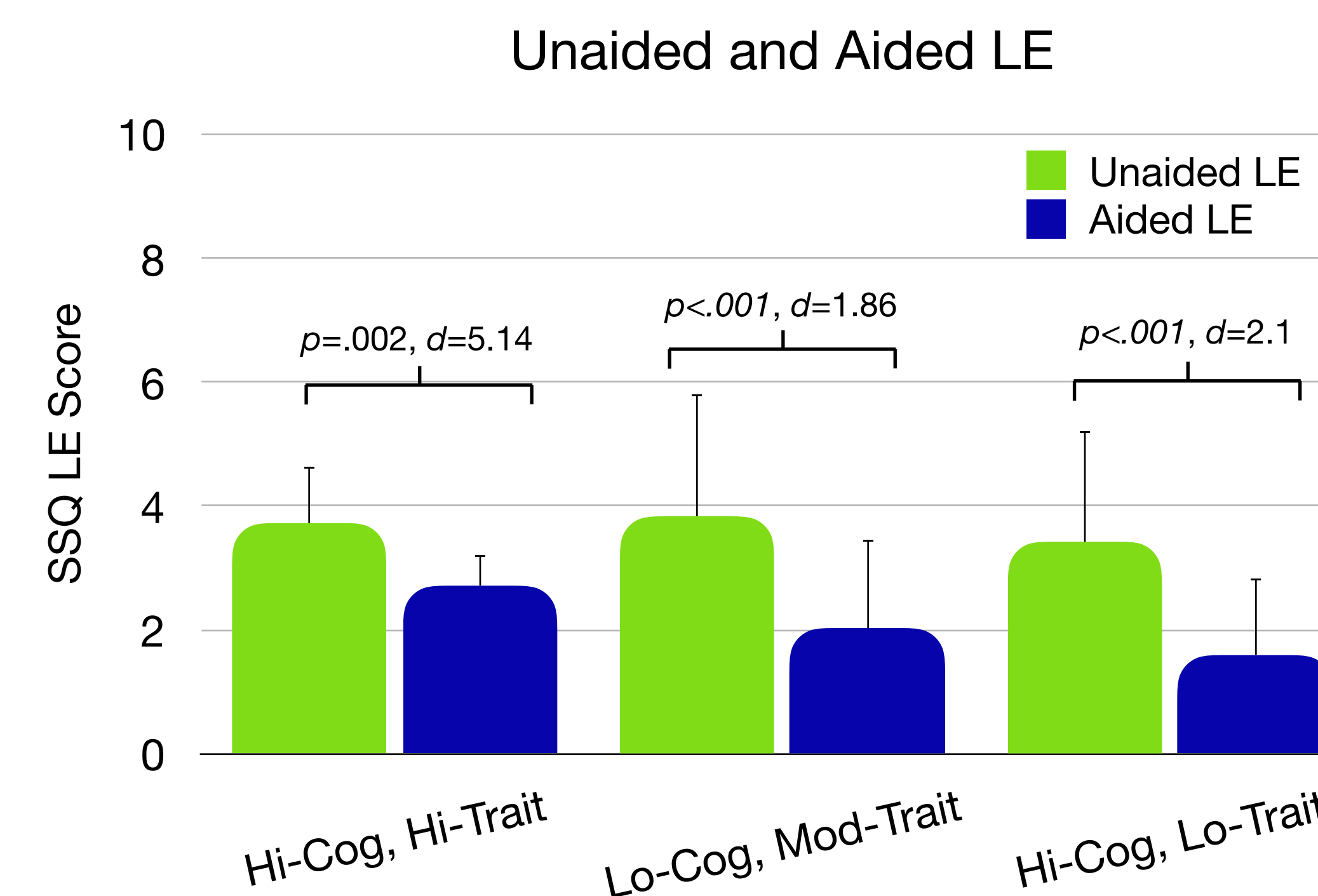
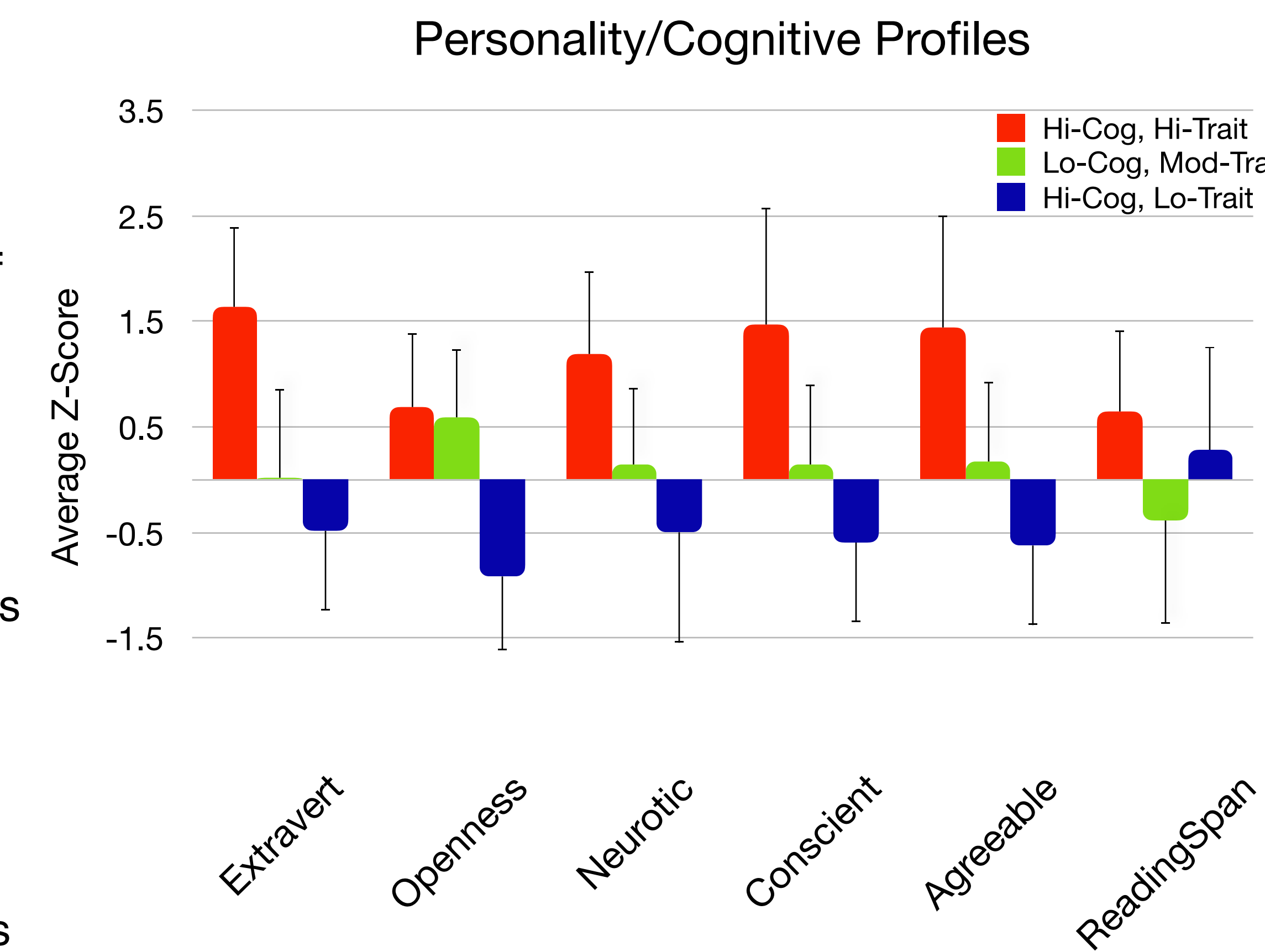
Participants' reported listening effort with and without hearing aids was analyzed within and between the three groups, shown at right.

All groups showed a significant decrease in listening effort when aided; however, LE scores were not significantly different between the groups.

## Discussion

Personality traits and cognitive ability might influence respondents' decisions about how to answer questions at several different levels, including how they interpret the questionnaires, recall information about their experiences, form judgments, and edit their answers.

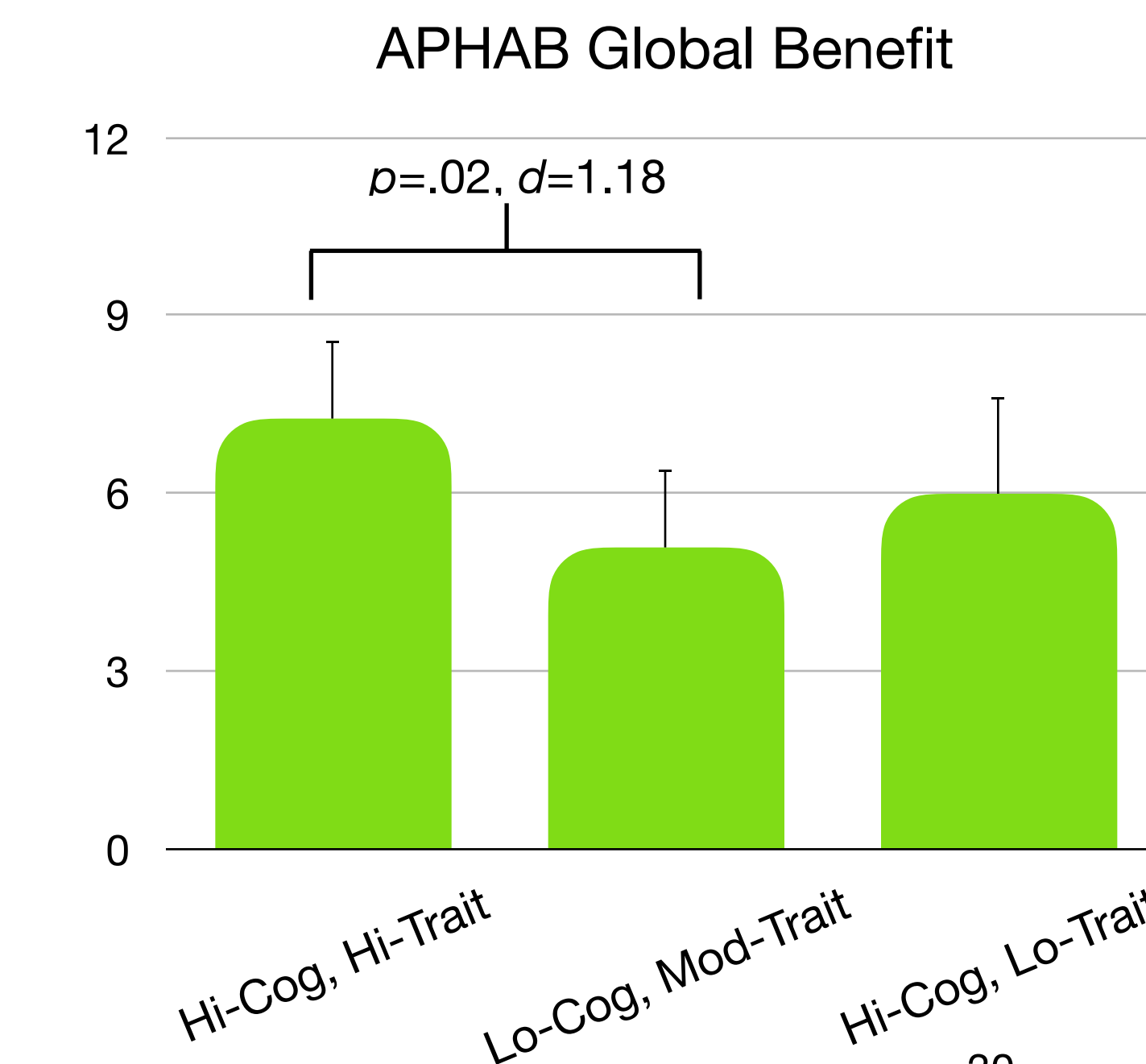
This study aimed to look at how combinations of these traits might impact LE. We hypothesized that participants having a profile with higher neuroticism, lower openness, and lower cognition would report more effort with and without hearing aids. Such a profile was not derived from the characteristics of the 45 older volunteers evaluated for this project. In fact, the cluster analysis was not able to detect any profiles with a great deal of variability among their different personality traits. Rather, participants tended to rate themselves as high on all traits, moderate on all traits, or low on all traits. It seems likely that personality and cognitive characteristics that are common among those older adults who choose to volunteer for field research might have limited the variability of profiles seen for this group.



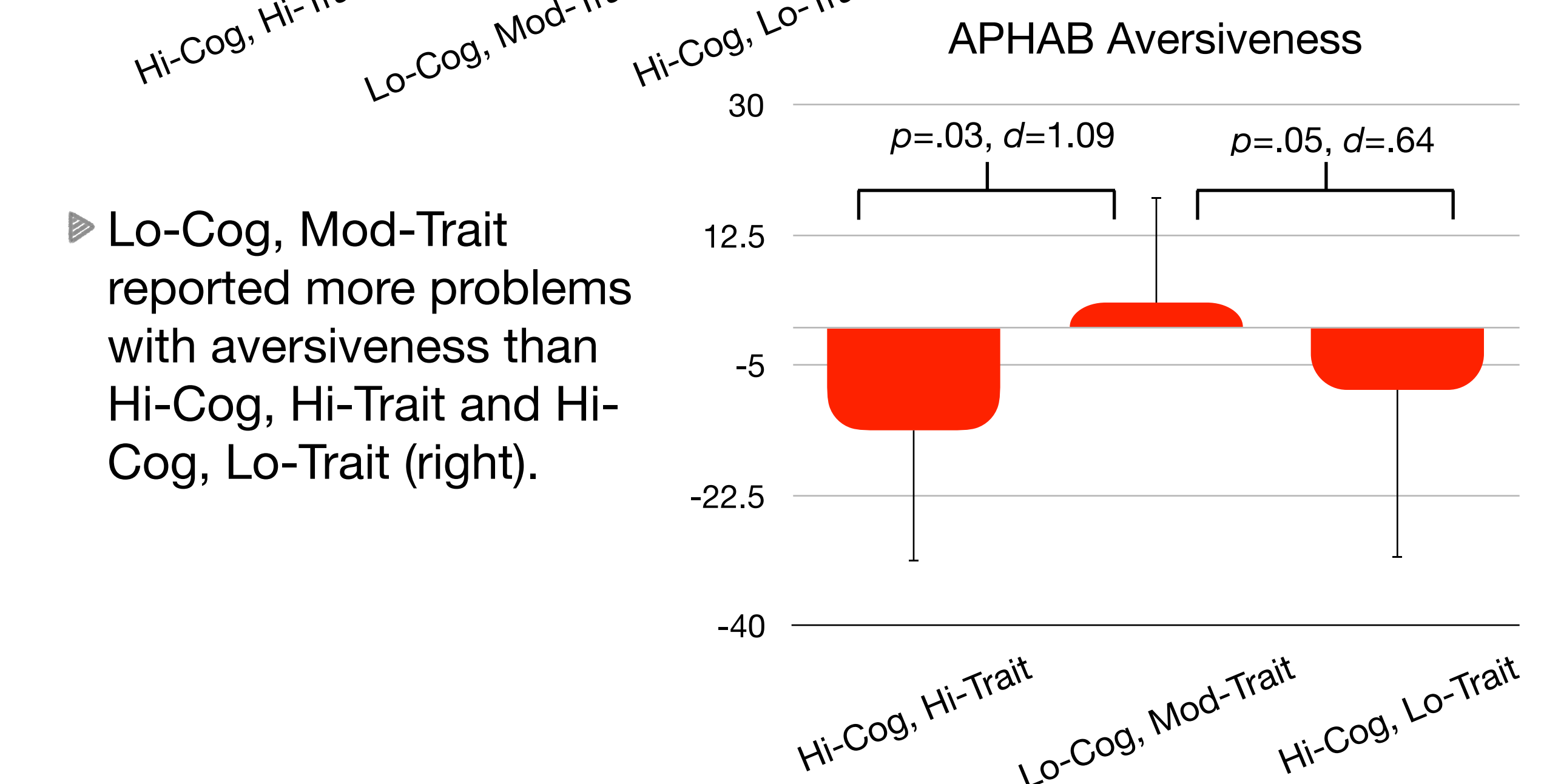
## Discussion

### Post-hoc

For these participants, derived personality/cognitive profiles did not impact perceived listening effort. To further explore participants' experiences, we decided to look at their perceived aided benefit in domains of speech understanding and aversiveness.



Lo-Cog, Mod-Trait reported less speech understanding benefit than Hi-Cog, Hi-Trait and Hi-Cog, Lo-Trait (left).



Lo-Cog, Mod-Trait reported more problems with aversiveness than Hi-Cog, Hi-Trait and Hi-Cog, Lo-Trait (right).

Comparisons of results between these personality/cognitive profiles did not result in differences in LE. However, individuals in these groups did report differences with their hearing aids in other domains, with those with lower cognition and more moderate scores on measures of personality traits reporting less benefit and greater aversiveness. It is worth noting that no comparisons of results based only on cognition or on any individual personality trait demonstrated any differences in aided experiences across domains. This supports the notion that these traits might combine to impact self-reported listening experiences in systematic and predictable ways.

## Future Research

The results of this study provide evidence that combinations of personality and cognition might impact responses to subjective measures of listening outcomes in different domains. Some questionnaires and/or outcome domains might be more sensitive to these influences than others. It is possible that alternative methods of data collection (e.g., ecological momentary assessment and wearable sensor data) might be less impacted by cognitive and personality characteristics and/or might provide additional insights to help interpret responses to retrospective questionnaires. These possibilities should be explored.

### References

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