Individual differences in neural sensitivity to health messages associated with behavior change

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Duke
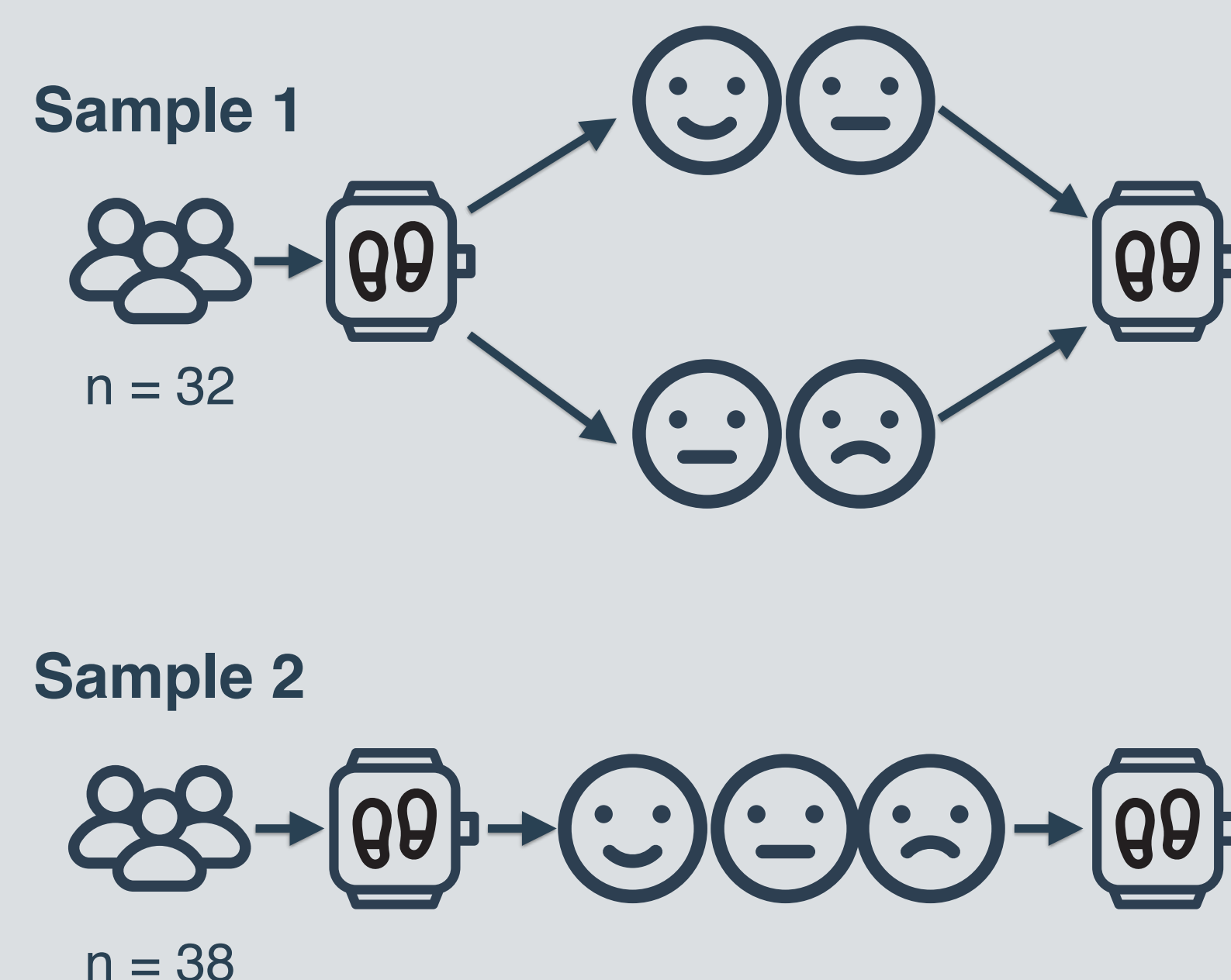MOTIVATED COGNITION
& AGING BRAIN LAB

Introduction

Sedentary lifestyles are detrimental to physical and mental health as people age. As life expectancy of the population increases, promoting regular physical activity in older adults is an important target for interventions to promote public health. Simple health messaging-based interventions have proven effective for increasing physical activity in adults of all ages. However, the neural mechanisms underlying motivating behavior change are unknown.

We used fMRI to examine neural responses to health messages and how they relate to behavior change.

Methods

Healthy adults heard and read emotional and neutral statements about walking while in the scanner.

Daily step count was measured by a pedometer worn for one week before and after the scanner session.

Sample 1

n = 32

Sample 2

n = 38

☺ "Walking can have important cardiovascular health benefits"
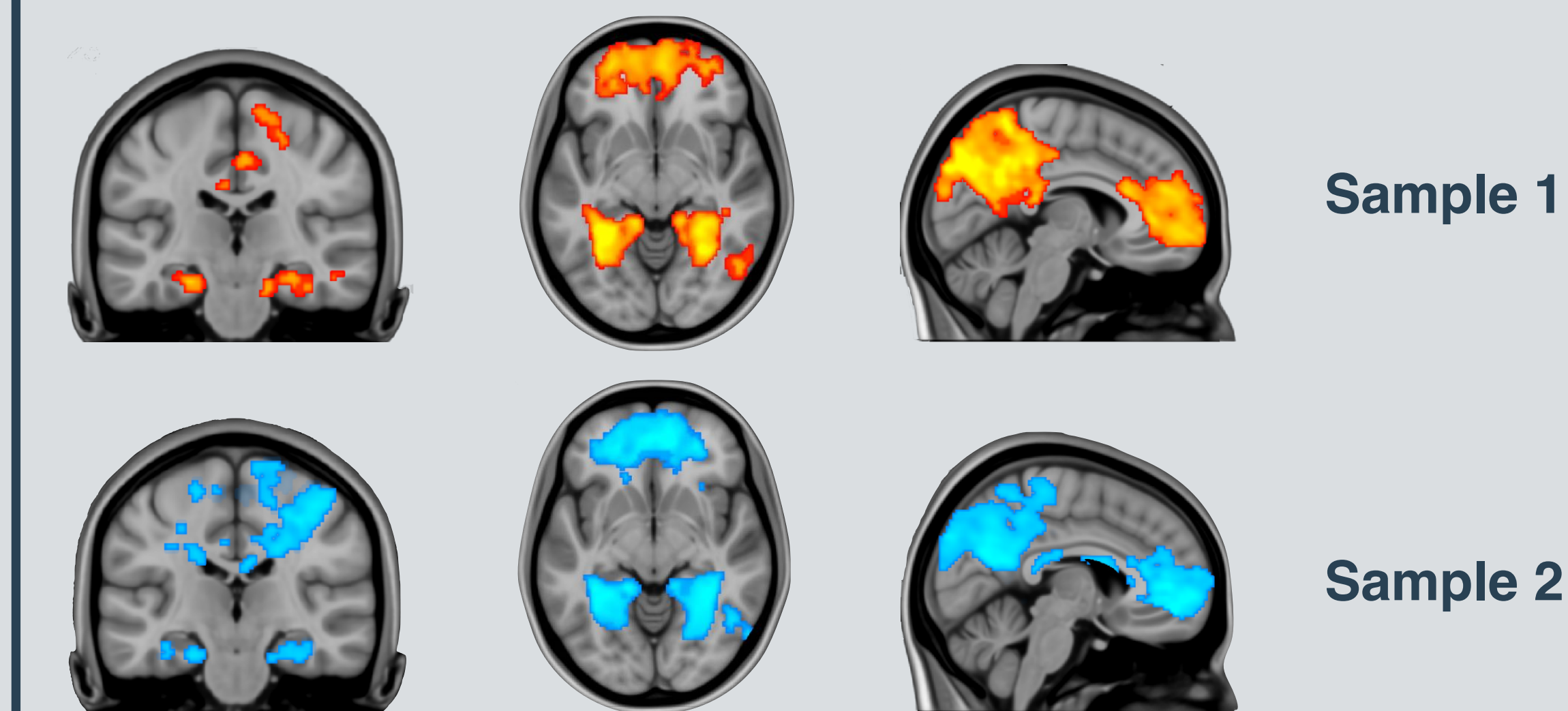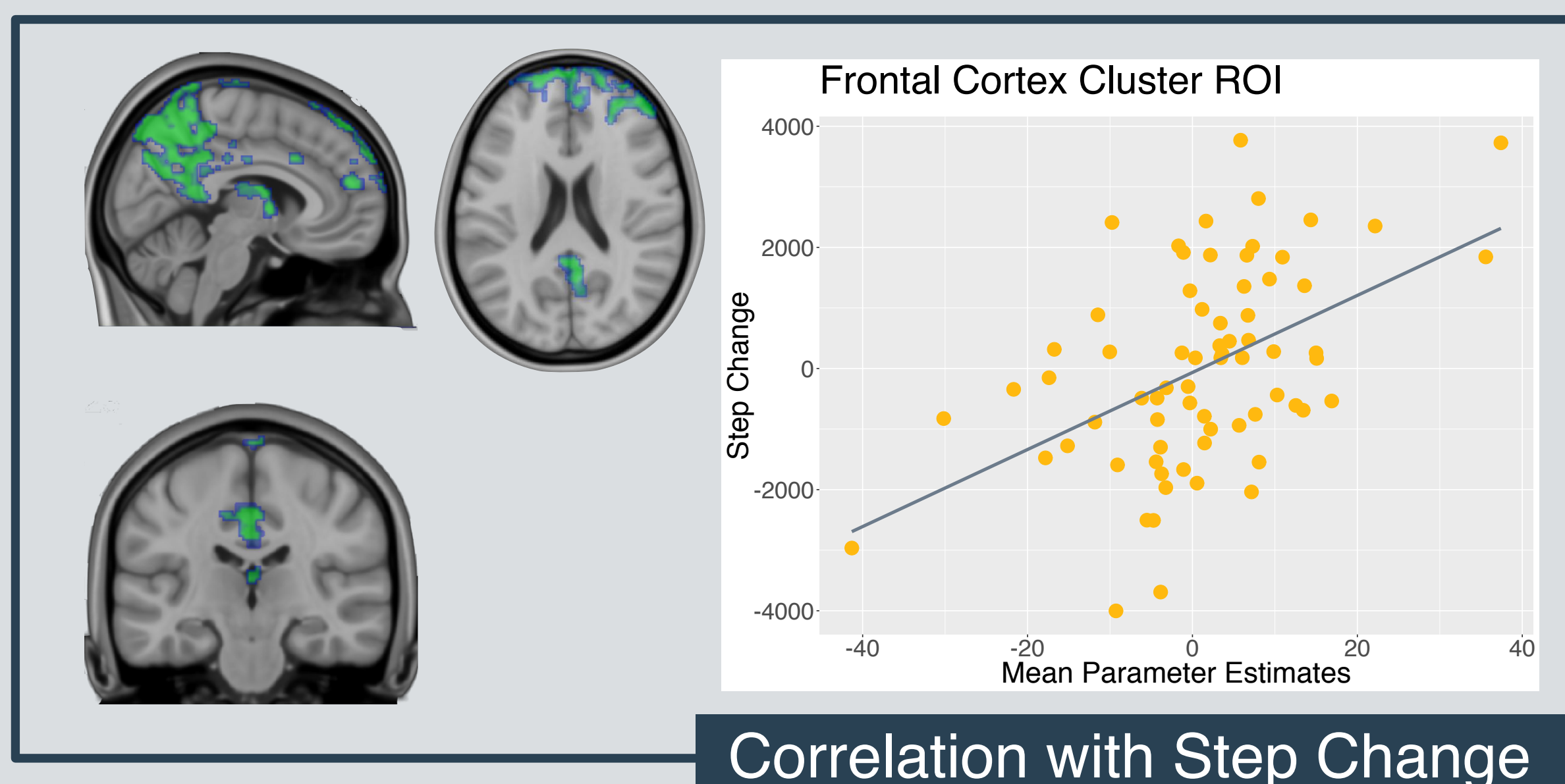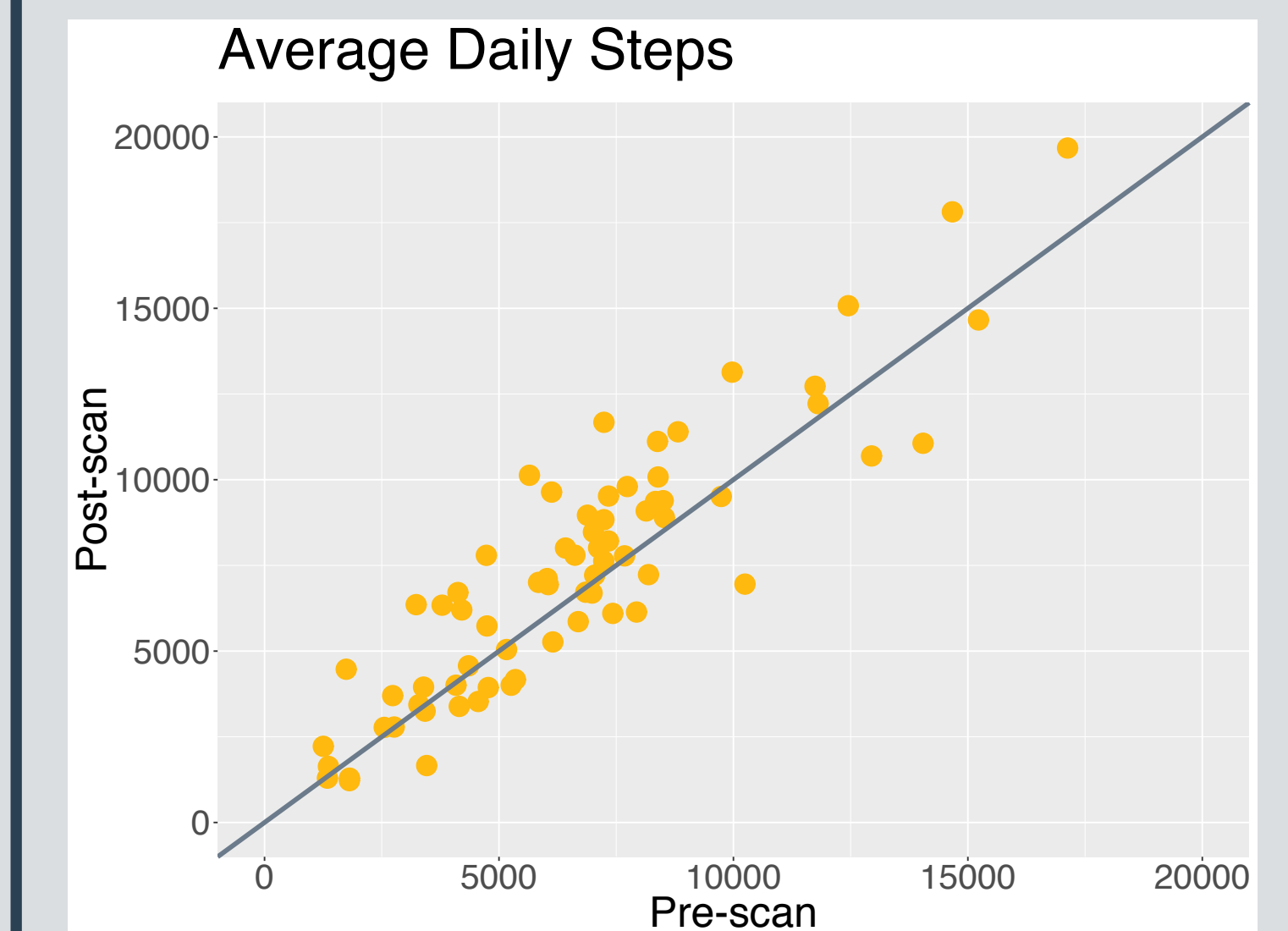
😐 "Walking is an aerobic activity"

☹ "Not walking enough can lead to an increased risk of cardiovascular disease"

Results

Mean Task-Related Activation

Sample 1

Sample 2

Correlation with Step Change

Frontal Cortex Cluster ROI

Average Daily Steps

Average Daily Steps

Individual differences in behavior change were positively correlated with brain activity
- cingulate gyrus
- superior frontal gyrus
- precuneus

Conclusion

Across two samples, we saw similar brain activation while people were viewing and listening to messages about walking. Overall, most people walked more after processing the statements in the scanner compared to how much they walked before the scan. Individual differences in behavior change were positively correlated with brain activity. Individuals with more activation in precuneus and cingulate showed more behavior change. These regions have been associated with self-referential processing suggesting that these individuals processed the statements more personally. In future research, we are using this approach to optimize health messaging for physical activity in general - not just specific to walking.