INTRODUCTION

Misdiagnosis rates are high
- Depression historically identified in only 47.3% of patients.¹

Eye Movement analysis can already reliably detect:
- ADHD
- Alzheimer’s Disease
- Autism
- Concussions

Eye tracking can also identify Major Depressive Disorder (MDD) and General Anxiety Disorder (GAD).
- Depressed individuals orient/fixate gaze on negative images.²
- Anxious individuals orient gaze away from threatening or negative images in favor of positive or neutral images.³
- Healthy individuals do not show these biases.

Goals of the present study:
1. Distinguish gaze patterns present in healthy and unhealthy individuals.
2. Employ machine learning to create a predictive classification model capable of identifying those at risk for MDD and GAD.
3. Develop a cost-effective, easy to use, objective method of diagnosis.

METHOD

Depression and Anxiety ratings:
- Calculated via clinical self-report questionnaires (GAD-7: anxiety / PHQ9: depression)

Eye tracking measures:
- Fixation Duration: Total vs Visit
- Fixation Count: Total vs Visit

Two tasks:
- Emotional context (4 images)
- Implicit memory (2 images, novel vs repeated)

RESULTS

Depression

High Depression Rating:
- Looked more at negative images than neutrals
- Moved eyes between all images less
- Moved eyes within neutral images less

Low Depression Rating:
- Looked at negative and neutral images equally
- Moved eyes between all images more
- Moved eyes similarly within negative/neutral images

Predictive Analysis:
- Avg of 80% detection rate (p=.003)
- Used Logistic Regression (60/40 train/test split)
- Our results: comparable to state-of-the-art models

Anxiety

- Overall, threatening images most looked at
- Only small differences between High and Low ratings

Predictive Analysis:
- Avg of 65% accuracy (not significant)

CONCLUSION

Risk of depression may be able to be predicted using only eye movement behavior

Anxiety detection was inconclusive

Additional testing may increase detection rates, especially if clinical populations are utilized

REFERENCES