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Anxiety and Information Processing: An Eye Tracking Study

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TREO Talk Paper

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Abstract

This exploratory study is part of a larger research project that aims at developing eye-tracking enabled smart clinician support systems. Recent research suggests that patients' information processing behavior (captured via eye movement data) when completing chronic pain measures can help develop clinician support systems that can aid health professionals in gaining a better understating of patients' pain experience, and thereby help health professionals develop guidelines for more effective assessment and management of chronic pain (Alrefaei et al. 2022). Encouraged by findings of this previous research, in this project, we examine differences in visual information processing behavior between young individuals with (n=12) and without anxiety (n=14) when they report their level of anxiety and respond to two other PROMIS+29 v2 (Patient-Reported Outcomes Measurement Information System) health measures that are affected by anxiety, namely cognitive function, and social health.

We used Tobii Pro Spectrum 600HZ to collect the raw gaze data and translate it into fixations via IVT filter with saccade identification threshold of 30°/s and fixation duration threshold of 100 ms (Alrefaei et al. 2022). To compare information processing behavior between the two groups we calculate the fixation-to-visit ratio for two major areas on the surveys used in our study: the area that survey questions were displayed and the area that options for responding to survey questions were displayed on the screen.

Our preliminary results show that participants in the anxiety group, compared to those in the anxiety-free group, processed information with less fixation intensity when they read the survey questions and selected an option that represented their health symptom. The differences in information processing behavior between the two groups were significant at 1% level when processing questions (mean $_{\text{anxiety group}}$= 0.81, mean $_{\text{anxiety free group}}$= 0.85, t=2.76, df=25, p=0.01) and at 10% level when selecting an option (mean $_{\text{anxiety group}}$= 0.91, mean $_{\text{anxiety free group}}$= 0.93, t=1.80, df=25, p=0.09). Because visual stimuli in our study required people to process negative information (e.g., think about their level of anxiety, trouble with cognitive functioning or social roles), our results are consistent with the cognitive model of anxiety that suggests those suffering from anxiety tend to intentionally avoid negative information (Rinck & Becker, 2006).

These preliminary results are promising because they support prior research that suggest the objective measure of eye movements can enrich subjective self-report scores of health symptoms (e.g., chronic pain) to aid healthcare professionals in developing symptom treatment and management options for their patients(Alrefaei et al., 2022).

References

Alrefaei, D., Sankar, G., Norouzi Nia J, J., Djamasbi, S., & Strong, D. (2022). *Examining the Impact of Chronic Pain on Viewing Patterns: An Exploratory Eye-tracking Study. In International Conference on Human-Computer Interaction*

Rinck, M., & Becker, E. S. (2006). Spider fearful individuals attend to threat, then quickly avoid it: Evidence from eye movements. *Journal of Abnormal Psychology*, *115*(2), 231–238. https://doi.org/10.1037/0021-843X.115.2.231