



# Effects of Gender and Age on the Progress of Depression and Anxiety Measures Across Treatment Sessions

Emilie Cleveland, Jason Beaman, and Luke Lawson  
OSU Behavioral Medicine Clinic



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## Introduction

Depression and anxiety are among the most common mental disorders affecting the US today. When individuals seek treatment, they will often have to fill out standardized measurements to quantify the severity of their symptoms and eventually monitor their treatment.

The Generalized Anxiety Disorder-7 (GAD-7) and the Patient Health Questionnaire-9 (PHQ-9) are some of the most used tools in clinics and for research. The Patient Health Questionnaire-9 (PHQ-9) is a 9-item self-report on depression.<sup>1</sup> It is a 4-point Likert scale from 0 (not at all) to 3 (nearly every day).<sup>1</sup> The score for each item is summed, which can be used to determine the severity of depressive symptoms.<sup>1</sup> The Generalized Anxiety Disorder Scale-7 (GAD-7) questionnaire is a 7-item self-report survey on anxiety.<sup>2</sup> It has the same Likert scale as the PHQ-9, which can quantify anxiety symptoms' severity. Studies have shown that both questionnaires are valid measurements of their respective symptoms and have become highly utilized in clinical and research settings.<sup>1,2</sup>

The PHQ-9 and the GAD-7 have been used clinically as intake forms to track treatment progress. As intake forms, the sum scores provide information on the severity of symptoms and as a form of detection.<sup>3</sup> Sum scores have also been used to track treatment progress, with the scores being compared across sessions. However, recent studies have shown that using the raw scores from the PHQ-9 and the GAD-7 may not accurately measure symptom change. While the measures are invariant over time, the scale items themselves measure constructs differently due to changes in patient symptom perception, affecting their response to the surveys.<sup>4</sup>

The PHQ-9 and GAD-7 have been used to report the prevalence of anxiety and depression symptoms in populations. A recent study used the GAD-7 and PHQ-9 to determine how COVID has affected mental health.<sup>5</sup> These measures are then used to report the prevalence or severity of symptoms in different age groups, gender, and other demographics.

While the PHQ-9 and GAD-7 have been shown to be valid and reliable across most demographic groups, some studies have shown that demographics such as gender and sexual identity can affect the invariance of those measures.<sup>6</sup> Demographics inherently change the experience of mental illness, so it essential to determine how demographics impact these measurements. This study aims to determine the effects of demographic factors, gender, and age, on the PHQ-9 and GAD-7 measurements across treatment sessions.

## Methods

The data analyzed in this study was taken from two larger studies which fully describes the data collection methods.<sup>7</sup> Participants were newly admitted, in-person patients, above the age of 18. Patients would complete the PHQ-9 or GAD-7 at an initial appointment and then again at their 1-month follow-up.

**Participants:** For the PHQ-9 study, 41 participants completed both sessions, 25 females, 15 males, and 1 Transgender-Male. The mean age was 42. and the median was 41. For the GAD-7 study, 40 participants completed both sessions, 18 women, 20 men, 1 Transgender-Male, and 1 Transgender-Female. The mean and median age were both 40.

**Secondary Analysis:** Transgender participants for both data sets were excluded in the analysis due to small sample size. This resulted in 40 participants for the PHQ-9 analysis and 38 for the GAD-7 analysis. The age comparison for each dataset was set at 35 and below and 36 and above. This age split was determined based on the median ages and average age of onset for Major Depressive Disorder and Generalized Anxiety Disorder, which is 30 and 33 respectively.<sup>8</sup>

## Results

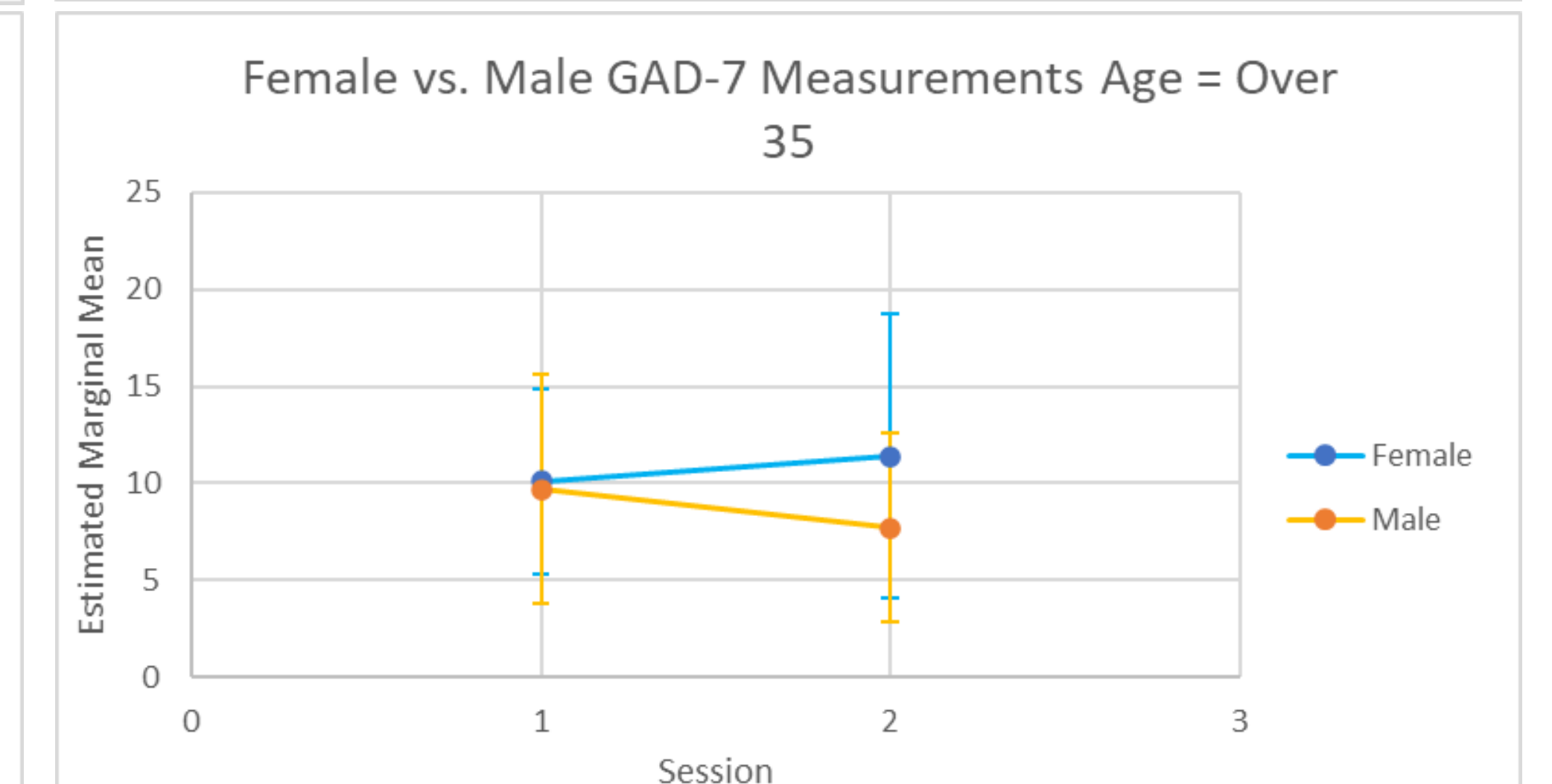
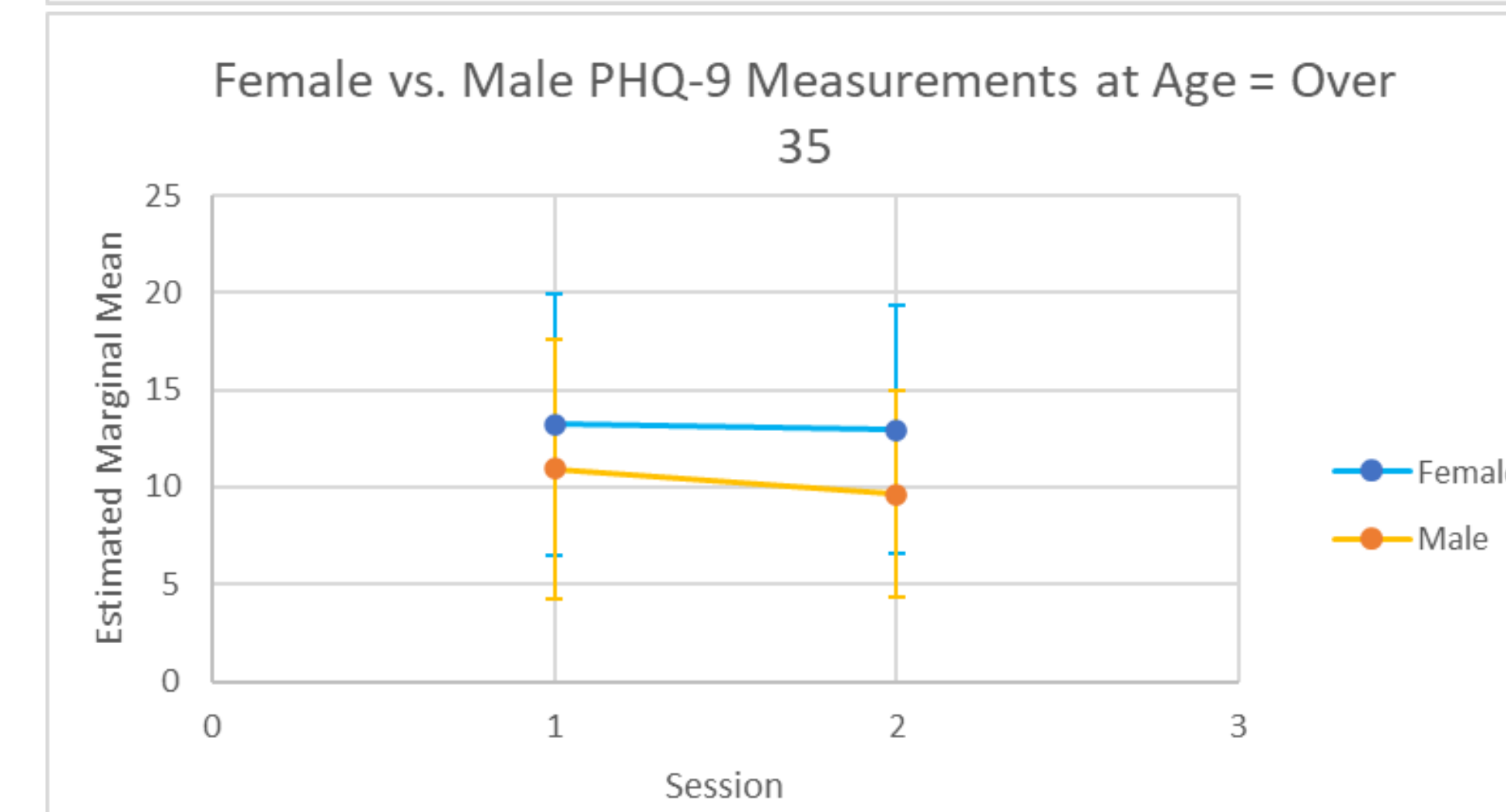
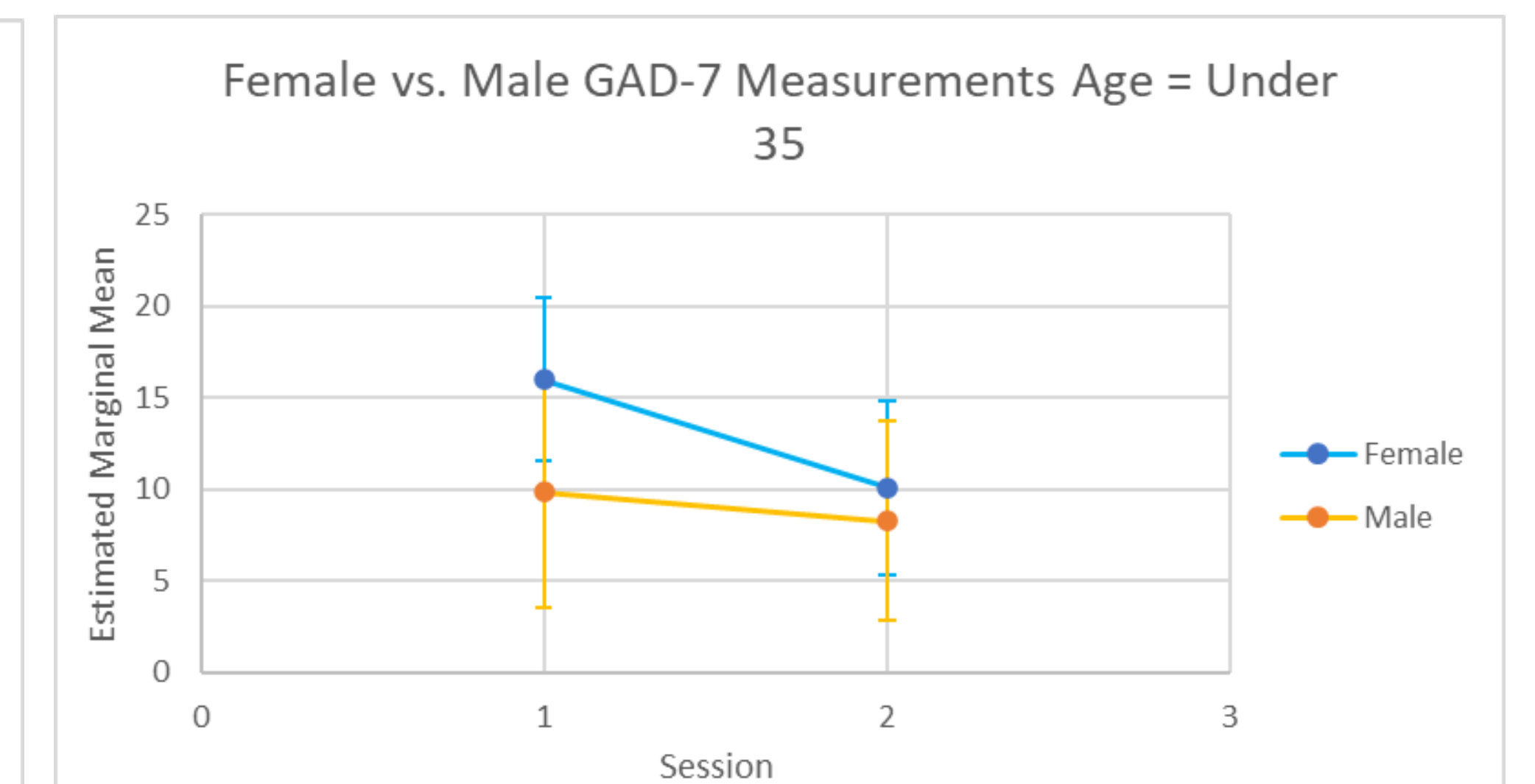
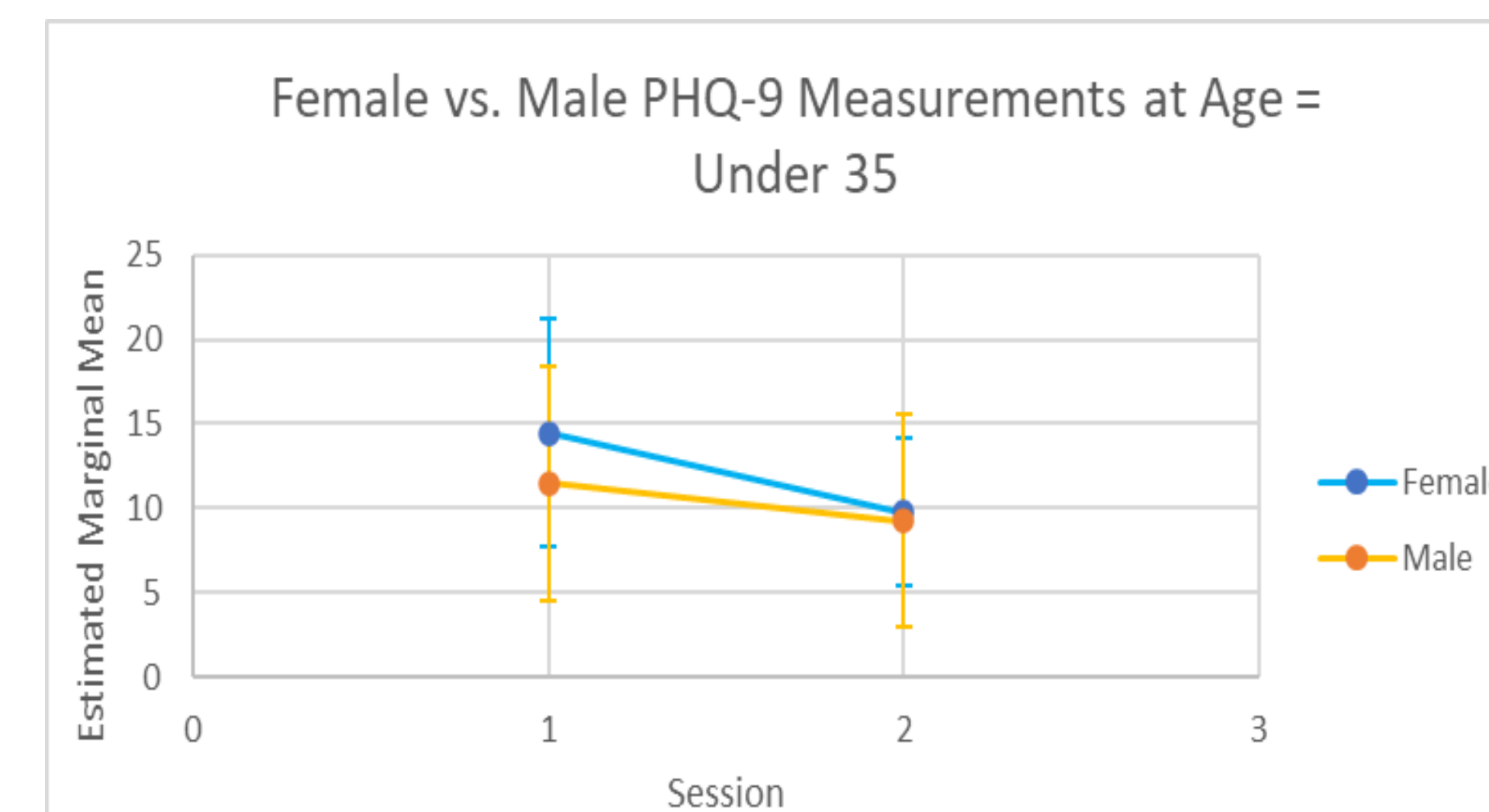
A Repeated Measures (2x2) Split Plot Factorial Design with age (35 and below, 36 and above) and gender (Male, Female) as the between-subject effects and PHQ9/GAD-7 within-subjects effects (Session 1, Session 2) was completed for each data set.

The results for the PHQ-9 analysis showed that assumptions were met for sphericity and insignificant Box's M test (Box M = 6.18, F(9, 1036) = 0.43, p = .92) and significant Bartlett's. Tests of within-subject effects revealed no significant effect of age and gender on PHQ-9 scores between sessions.

The results for the GAD-7 analysis showed that assumptions were met for sphericity and insignificant Box's M test (Box M = 6.18, F(9, 6283) = 0.61, p = .79) and significant Bartlett's. Tests of within-subject effects revealed an effect of age and gender on GAD-7 scores between sessions (F(1,34) = 6.18, p = 0.02).

Distribution of participants after separating by age for each study is shown in table below.

Age	Gender	PHQ-9	GAD-7
Under 35	Female	11	8
	Male	4	7
Over 35	Female	14	10
	Male	11	13



## Conclusions

There was an interaction observed of age and gender for the GAD-7 anxiety measures within the sample. While there was not an interaction with the PHQ-9 the small sample size limits the strength of the results. This study could open the doors for further studies with larger sample sizes and more sessions. Future research may test between session measurement variance of the GAD-7 based on age and gender.

## References

1. Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*.
2. Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine*.
3. Kroenke, K. (2021). PHQ-9: Global uptake of a depression scale. *World Psychiatry*,
4. Ong, C. W., Pierce, B. G., Klein, K. P., Hudson, C. C., Beard, C., & Björgvinsson, T. (2022). Longitudinal measurement invariance of the PHQ-9 and GAD-7. *Assessment*, 29(8),
5. Kar, N., Kar, B., & Kar, S. (2021). Stress and coping during COVID-19 pandemic: Result of an online survey. *Psychiatry Research*,
6. Borgogna, N. C., Brenner, R. E., & McDermott, R. C. (2021). Sexuality and gender invariance of the PHQ-9 and GAD-7: Implications for 16 identity groups.
7. Beaman, J., Lawson, L., Keener, A., & Mathews, M. L. (2022). Within clinic reliability and usability of a voice-based Amazon Alexa administration of the Patient Health Questionnaire 9 (PHQ-9). *Journal of Medical Systems*,
8. Solmi, M., Radua, J., Olivola, M., Croce, et. al (2022). Age at onset of mental disorders worldwide: Large-scale meta-analysis of 192 epidemiological studies. *Molecular Psychiatry*