

# Patients' Mental Well-being by PHA Questionnaires and Their Relation to Cancer Progression

Hetian Bai, Zachary Abrams, PhD; Tasneem Motiwala, PhD, Kevin R. Coombes, PhD

Department of Biomedical Informatics, The Ohio State University

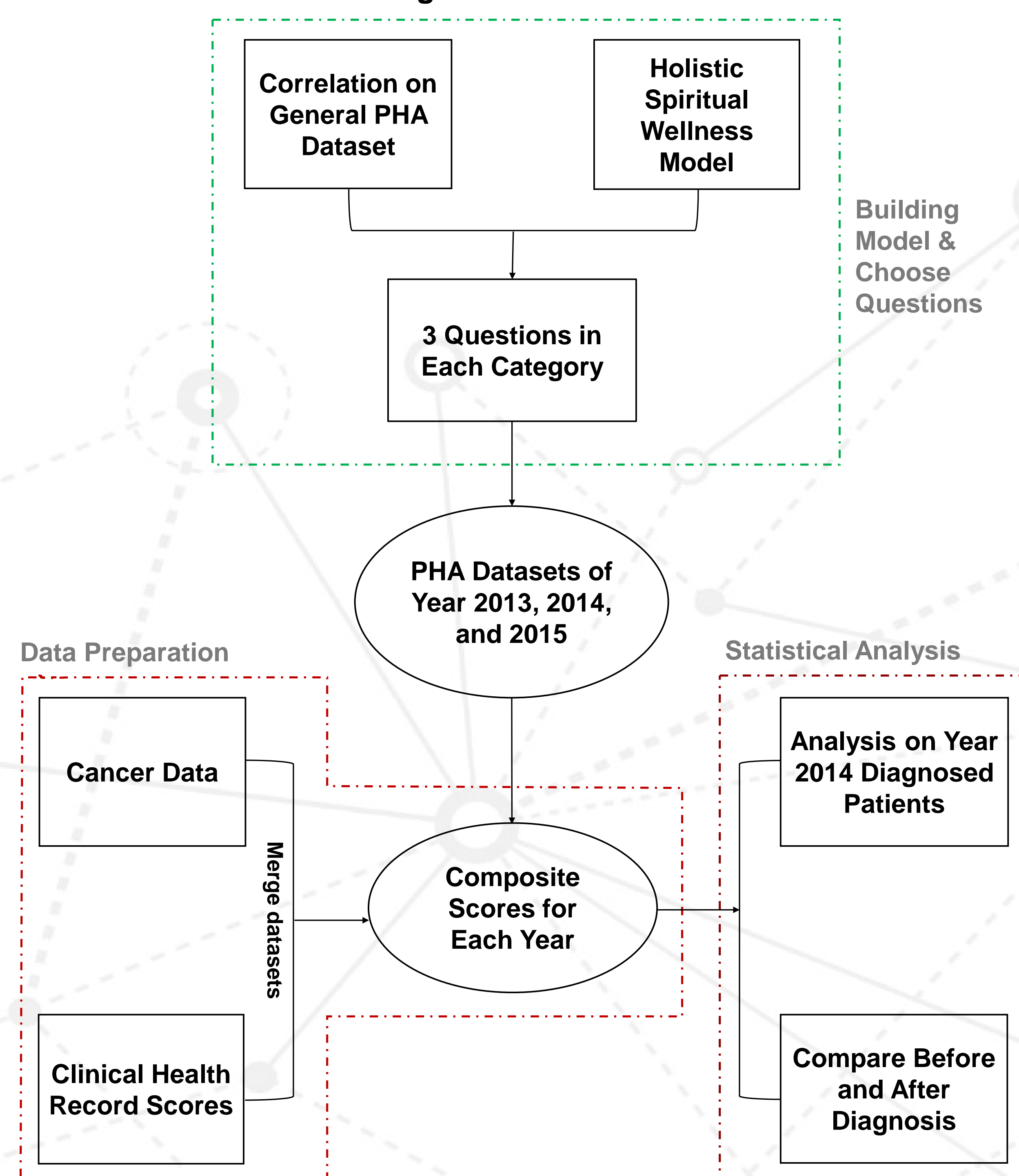
## Introduction & Aim

- A research<sup>[1]</sup> experiment on mice found that an enriched environment has significant therapeutic effects on cancer tumors. Enlightened by the research, this study investigates the influence of social environment on cancer patients' health status. We used statistical and data mining approaches to find out the relationship between quantified mental well-being with corresponding clinical health records on a group of 544 cancer patients who were diagnosed with cancer during the year of 2014.
- Mental well-being is measured in order to quantify the impacts from living environment on patients' health. According to the Holistic Flow Model of Spiritual Wellness<sup>[2]</sup>, mental well-being is measured by four categories: mental status, physical health status, work-life, and stress & anxiety.

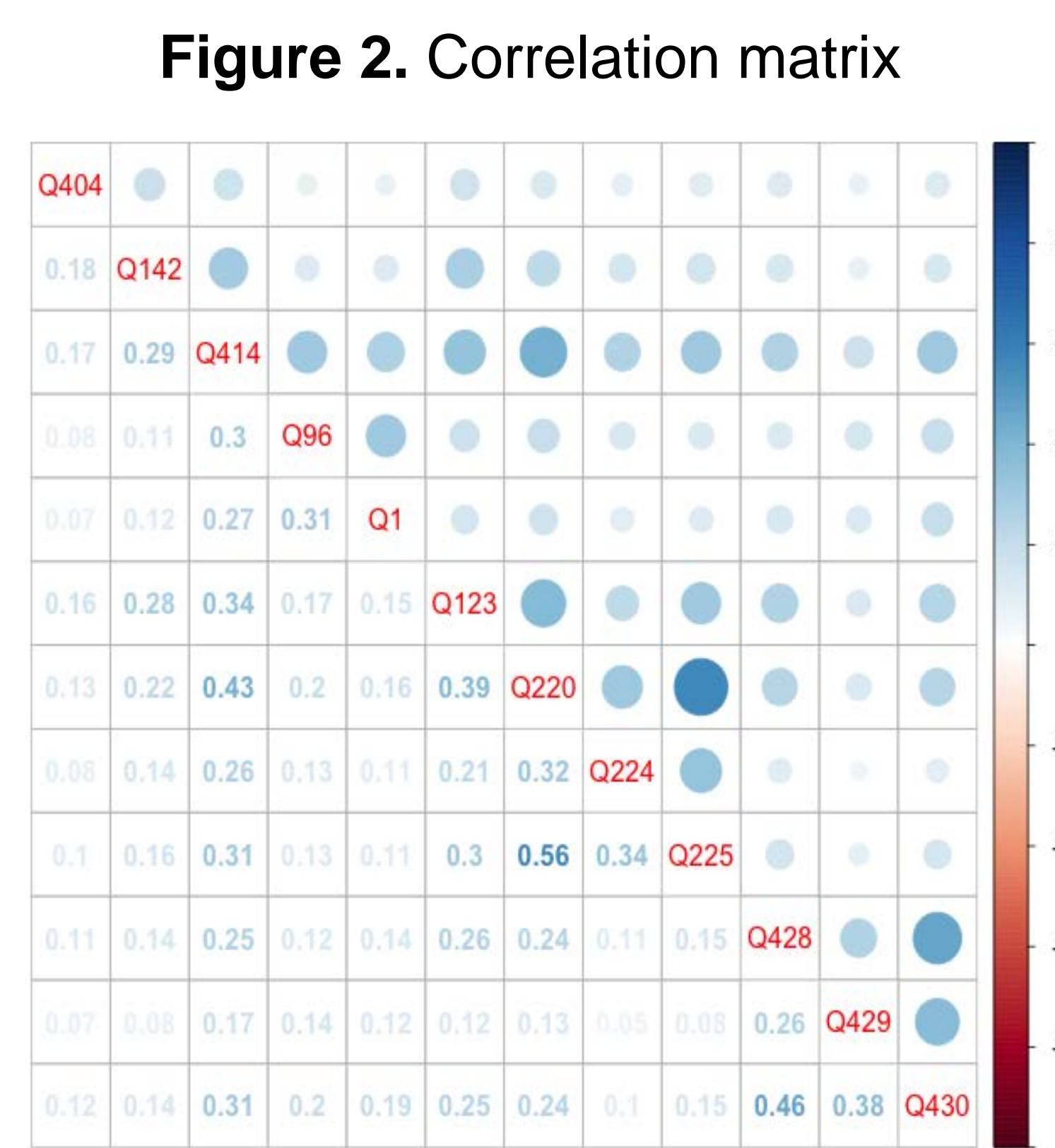
## Method

- The years of 2013, 2014, and 2015 PHA (Personal Health Assessment survey) were used in this research.
- Figure 1 displays the work flow on data in this study.

Figure 1. Workflow



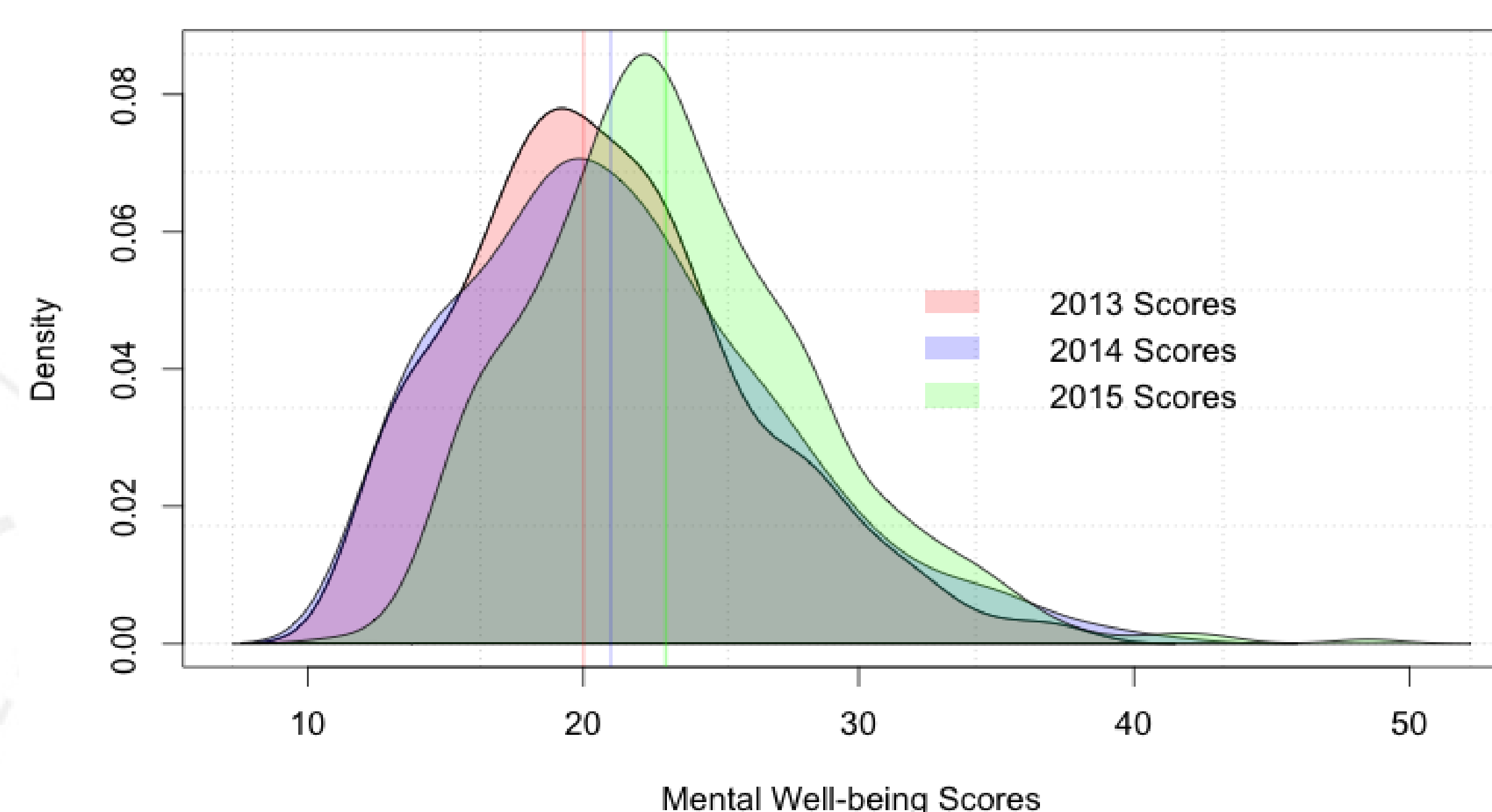
- Figure 2 shows the correlations between questions which are included in the total Mental Well-being score.
- All 12 questions in this research were selected from the PHA survey question pool.



## Results

- Smaller mental well-being score indicates better mental health condition.
- Figure 3 shows the distributions of 2013, 2014, and 2015 overall Mental Well-being scores of cancer patients who were diagnosed with cancer in 2014.

Figure 3. Distributions of 2013, 2014, and 2015 Mental Well-being Score



- Table 1 presents the statistics of Mental Well-being scores in each category and in total on three years.
- Looking into the score changes in each category, from year 2013 to 2014, the time period prior to cancer diagnosis, there is no significant change in scores of patients' mental status, work-life balance, and stress & anxiety.
- After the diagnosis, however, it shows significant score changes in the categories of health status and work-life balance from 2014 to 2015, as well as total mental well-being score.

Table 1. Statistics of 2013, 2014, and 2015 Mental Well-being Score

Mental Well-being Scores of cancer patients (2014 diagnosed)	Before Diagnosis (2013 vs. 2014)				After Diagnosis (2014 vs. 2015)			
	Mean of 2013	Mean of 2014	Mean Diff.	p-value	Mean of 2014	Mean of 2015	Mean Diff.	p-value
Mental Status	4.8797	4.8796	=	1	4.8797	4.8064	-	0.475
Health Status	6.1090	6.4924	+	0.0023	6.4925	8.1222	+	2.2e <sup>-16</sup>
Work-Life Balance	5.7782	5.7707	-	0.9538	5.7707	6.3177	+	0.0001
Stress and Anxiety	4.1015	4.1664	+	0.5711	4.1664	4.1147	-	0.6634
Mental Well-being Total Score	20.868	21.310	+	0.191	21.310	23.361	+	1.68e <sup>-09</sup>

## Conclusion

- Before clinical cancer diagnosis, patients' mental status, work-life balance, and stress & anxiety are constant with no statistically significant differences in means. However, Health Status is significant prior to diagnosis. This could indicate that people are physically feeling worse in or where this prior to being diagnosed with cancer.
- After cancer diagnosis, work-life balance becomes a significant factor that influences patients' mental well-being. Cancer patients are have trouble to balance work and life well.
- Changes in stress & anxiety and mental status stay insignificant. The results show that anxiety & stress and patients' self-report psychological mental health are not main factors that negatively impact on patients' mental wellness.
- Future study should include: Testing the accuracy of self-reported results in the PHA survey by comparing to corresponding clinical records on each individual.

## Bibliography

[1]: Cao, L., Liu, X., Lin, E. D., Wang, C., Choi, E. Y., Riban, V., . . . During, M. J. (2010). Environmental and Genetic Activation of a Brain-Adipocyte BDNF/Leptin Axis Causes Cancer Remission and Inhibition. *Cell*, 142(1), 52-64. doi:10.1016/j.cell.2010.05.029

[2]: Purdy, M., & Dupey, P. (2005). Holistic Flow Model of Spiritual Wellness. *Counseling and Values*, 49(2), 95-106. doi:10.1002/j.2161-007x.2005.tb00256.x

## Acknowledgement

2016 Summer Biomedical Informatics Internship Program  
Department of Biomedical Informatics, the Ohio State University