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Final Problem 4: CHD Study

Part (a) - General Study

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GOFTable[table]
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LR Statistic:	*Pearson's Statistic:*	*PValue based on Pearson's Statistic:*	*Sampling Distribution:*
19.565	21.2862	0.00163	ChiSquare(df=6)

Because we observe a p-value of 0.0016, the results suggest a significant association between anger levels, blood pressure levels, and whether somebody has experienced a coronary event.

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TableForm[residuals,
 TableHeadings → {varNames, labelList},
 TableAlignments → Right]
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	Low Anger	Moderate Anger	High Anger
Normotensive, CHD	-2.09	0.5	3.23
Normotensive, no CHD	-0.33	0.74	-1.26
Hypertensive, CHD	0.56	-0.78	0.86
Hypertensive, no CHD	0.77	-0.96	0.88

From the table above, there appears to be an interesting relationship between whether somebody with normotensive bloodpressure with a coronary event has high anger or low anger. In particular, the standardized residual for low anger, normotensive, and CHD has a residual of -2.08, which indicates a negative association between low anger levels and normotensive people who have had a coronary event. Furthermore, comparing the empirical versus expected results for the normotensive CHD observations with high anger yielded a standardized residual of 3.23. This indicates that there is likely a positive association between high anger levels and normotensive people with a CHD.

Part (b.1) - Blood Pressure Group vs. Anger Group

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GOFTable[table]
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LR Statistic:	*Pearson's Statistic:*	*PValue based on Pearson's Statistic:*	*Sampling Distribution:*
4.75105	4.76236	0.0924	ChiSquare(df=2)

Because we observe a p-value of 0.092, we can not reject the null hypothesis that there's no significant association between blood pressure level and anger levels (surprisingly enough).

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TableForm[residuals,
 TableHeadings → {varNames, labelList},
 TableAlignments → Right]
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	Low Anger	Moderate Anger	High Anger
Normotensive	-0.64	0.81	-0.77
Hypertensive	0.88	-1.11	1.05

As we would expect from failing to reject the null hypothesis, there does not appear to be any interesting behavior among the standardized residuals for this statistical test.

Part (b.2) - Gender versus Anger Group

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GOFTable[table]
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LR Statistic:	*Pearson's Statistic:*	*PValue based on Pearson's Statistic:*	*Sampling Distribution:*
7.0827	7.11115	0.0286	ChiSquare(df=2)

Because we observe a p-value of 0.0286, the results suggest a significant association between gender and anger level.

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TableForm[residuals,
 TableHeadings → {varNames, labelList},
 TableAlignments → Right]
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	Low Anger	Moderate Anger	High Anger
Male	-1.02	0.19	1.73
Female	0.88	-0.16	-1.5

From the standardized residuals, we can see that there are no unusually high residuals. However, we can notice that for low anger levels, men have a negative residual and women have a positive residual. Furthermore, for high anger levels, men have positive residuals and women have negative residuals. This suggests that men may have suffered from higher anger levels than women.

Part (b.3) - Race versus Anger Group

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GOFTable[table]
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LR Statistic:	*Pearson's Statistic:*	*PValue based on Pearson's Statistic:*	*Sampling Distribution:*
43.7077	43.8743	2.97×10^{-10}	ChiSquare(df=2)

Because we observe a p-value of approximately zero, the results suggest a significant association between ethnicity (black vs. white) and anger level.

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TableForm[residuals,
 TableHeadings → {varNames, labelList},
 TableAlignments → Right]
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	Low Anger	Moderate Anger	High Anger
White	-2.35	2.2	-0.74
Black	4.08	-3.83	1.29

From the standardized residuals, we see a few interesting results. The model had a standardized residual of -2.35 for white people with low anger, which suggests that there may be a negative association between being white and having low anger levels. Furthermore, we see a residual of 2.2 for white people with moderate anger, which suggests that there may be a positive association between being white and having moderate levels of anger.

For black people, we see a residual of 4.08 for lower anger, which indicates a positive correlation between being black and having low anger levels. Furthermore, we see a residual of -3.83 for black people with moderate anger, which suggests that there may be a negative correlation between being black and having moderate amounts of anger.

Part (c) - Discussion

From the results of this study, we can observe some interesting dynamics between blood pressure, CHD, gender, ethnicity, and anger levels. From the first study, we saw that when comparing people based on blood pressure and CHD, people's blood pressure level and CHD status had a significant association with anger levels. In particular, people with normotensive bloodpressure and CHD had a positive correlation with high anger and negative association with low anger, which suggests that having normotensive blood pressure and a history of CHD may make an individual angrier.

Interestingly enough, we could not find a statistically significant relationship between blood pressure level and anger level. This may have been because we only used two classifications for blood pressure level, but this result is still surprising given commonly accepted idea that blood pressure increases levels of anger.

Furthermore, we found a statistically significant association between gender and anger levels. There were no unusual standardized residuals, but the pattern of the residuals may have suggested the more men suffer from high anger and women are more prone to low levels of anger.

Finally, we found a statistically significant association between ethnicity and anger levels. From the pattern of the standardized residuals, white people appeared to be more prone to moderate levels of anger and less prone to low levels of anger. Black people appeared to be less prone to moderate levels of anger and more prone to low levels of anger.