Included Analyses

- Binary Logistic Regression with Complication predicted by Surgeon

Results

Binary Logistic Regression

Introduction A binary logistic regression was conducted to examine whether Surgeon had a significant effect on the odds of observing the Yes category of Complication. The reference category for Complication was No.

Results

The model was evaluated based on an alpha of .05. The overall model was significant, $\chi^2(3) = 9.82$, $p = .020$, suggesting that Surgeon had a significant effect on the odds of observing the Yes category of Complication. McFadden's R-squared was calculated to examine the model fit, where values greater than .2 are indicative of models with excellent fit (Louviere et al., 2000). The McFadden R-squared value calculated for this model was 0.06. The effect of the Jackson category of Surgeon was significant, $B = 1.34$, OR = 3.80, $p = .020$, indicating that observing the Jackson category of Surgeon increases the odds of observing the Yes category of Complication by approximately 280.36% relative to the Kingstrom category of Surgeon. The effect of the Bright category of Surgeon was not significant, $B = 0.95$, OR = 2.58, $p = .074$, indicating that observing the Bright category of Surgeon did not have a significant effect on the odds of observing the Yes category of Complication. The effect of the Hetterberg category of Surgeon was not significant, $B = -0.82$, OR = 0.44, $p = .455$, indicating that observing the Hetterberg category of Surgeon did not have a significant effect on the odds of observing the Yes category of Complication. Table 1 summarizes the results of the regression model.

Table 1

Logistic Regression Results with Surgeon Predicting Complication

Variable	*B*	*SE*	χ^2	*p*	*OR*	95.00% CI
(Intercept)	-2.47	0.43	33.78	< .001	-	-

SurgeonJackson	1.34	0.57	5.45	.020	3.80	[1.24, 11.68]
SurgeonBright	0.95	0.53	3.19	.074	2.58	[0.91, 7.31]
SurgeonHetterberg	-0.82	1.10	0.56	.455	0.44	[0.05, 3.81]

Note. $\chi^2(3) = 9.82$, $p = .020$, McFadden $R^2 = 0.06$.

References

Intellectus Statistics [Online computer software]. (2023). Intellectus Statistics. https://statistics.intellectus360.com

Louviere, J. J., Hensher, D. A., & Swait, J. D. (2000). *Stated choice methods: Analysis and Applications.* Cambridge University Press. https://doi.org/10.1017/CBO9780511753831

Glossaries

Binary Logistic Regression

Binary logistic regression is used to examine the relationship between one or more independent (predictor) variables and a single dichotomous dependent (outcome) variable. The purpose of this analysis is to use the independent variables to estimate the probability that a case is a member of one group versus the other (e.g., whether a patient has cancer or not). The binary logistic regression creates a linear combination of all the independent variables to predict the log-odds of the dependent variable. In this analysis, the overall significance of the regression model is tested by computing the χ^2 statistic, which is used with the *df* to compute the *p*-value (i.e., significance level). A significant overall model means that the set of independent variables significantly predict the dependent variable. If the overall model is significant, the significance of each independent variable is assessed. An odds ratio (*OR*) is computed for each independent variable and shows the extent that each independent variable affects the probability that a case is a member of one outcome group versus the other. In order to conduct a binary logistic regression, the dependent variable must be dichotomous (i.e., there are only two possible outcomes), the observations must be independent of each other, and the relationship between the independent variables and the logit-transformed dependent variable must be linear.

Fun Fact! *In economics, the binary logistic regression model may be referred to as a discrete choice model, meaning it is used to predict the choice between two alternatives.*

Chi-Square Test Statistic (χ^2): Used with the *df* to compute the *p*-value of the overall model and each predictor in the model.

Degrees of Freedom (*df*): Refers to the number of values used to compute a statistic; used with χ^2 to compute the *p*-value.

Dummy-Code: Performed in order to add a nominal or ordinal independent variable into the regression model; turns the one variable into a series of dichotomous "yes/no" variables, one for each category; one of the categories are left out of the regression as the reference group that all other categories are compared to.

McFadden R^2: Measures the goodness-of-fit of the model. It tends to be more conservative than R^2 values utilized in linear regression models. McFadden R^2 values of .2 or greater indicate an

excellent model fit.

Multicollinearity: A state of very high intercorrelations or inter-associations among a set of variables.

Odds Ratio (*OR*): Gives the factor increase in likelihood of the dependent variable occurring for every one unit increase in the predictor; sometimes labeled in statistical output as Exp(B).

***p*-value:** The probability of obtaining the observed results if the null hypothesis (no relationship between the independent variable(s) and dependent variable) is true.

Reference Category: Category of the dependent variable that the likelihood the other category is compared to.

Standard Error (*SE*): How much the *B* is expected to vary.

Unstandardized Beta (*B*): The slope of the predictor with the log-odds of the dependent variable.

Variance Inflation Factors: A measurement to assess the amount of multicollinearity present in regression analysis.

Raw Output

Binary Logistic Regression with Complication predicted by Surgeon

Included Variables:
Complication and Surgeon

Sample Size (Complete Cases):
N = 209

Coefficients:

Variable	B	SE	χ^2	p	OR	95.000% CI
(Intercept)	-2.471	0.425	33.778	6.177×10^{-09}		
SurgeonJackson	1.336	0.572	5.448	0.0196	3.804	[1.239, 11.678]
SurgeonBright	0.948	0.531	3.187	0.0742	2.582	[0.911, 7.314]
SurgeonHetterberg	-0.825	1.103	0.559	0.455	0.438	[0.0504, 3.808]

Model Fit Statistics:
χ^2 = 9.825 on 3 df, p = 0.0201, McFadden R^2 = 0.0597, Residual Deviance = 154.811, Residual df = 205