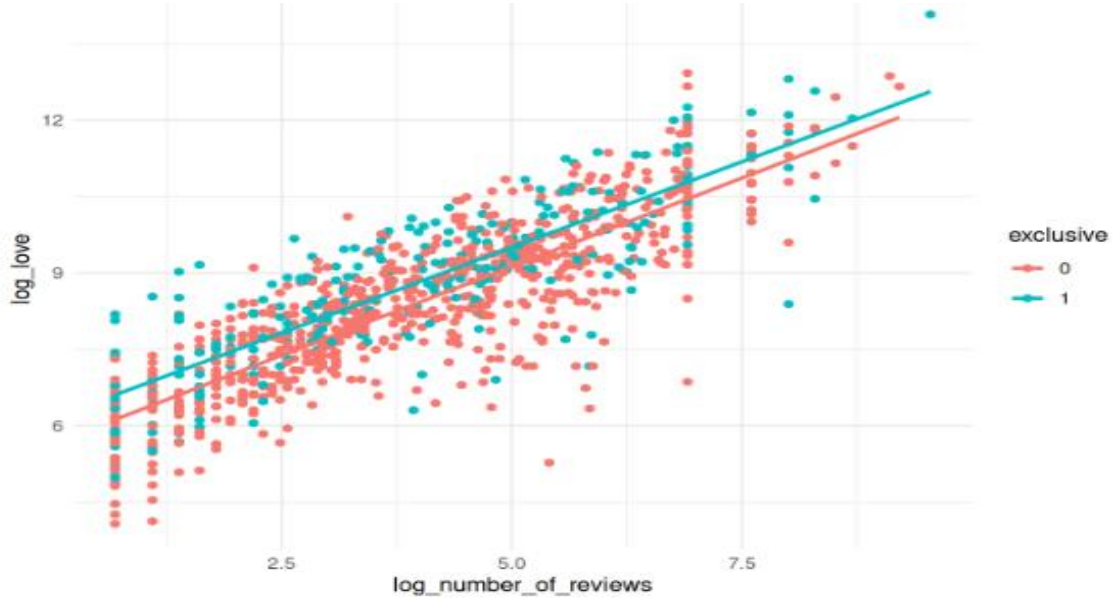
Appendix S

Interaction analysis for exclusive vs log number of reviews

The interaction test between exclusive vs log number of reviews predictors suggests no statistically significant interaction effect. The F-test yielded an F-value of 0.638, with a corresponding p-value of 0.425. We fail to reject the null hypothesis at a significance level of $\alpha = 0.01$, indicating no significant interaction effect between these two predictors on log love. Therefore, the regression lines for exclusive vs log number of reviews are parallel across different levels of these predictors.

Interaction plot for exclusive vs log number of reviews

```{r}
ggplot(data = sephoraData, aes(y = log_love, x = log_number_of_reviews, color = exclusive)) +
      geom_point() +
      geom_smooth(se = FALSE, method = "lm") +
      theme_minimal()
```



Analysis of variance

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
log_number_of_reviews	1	1768.37	1768.37	2516.89	0.00
exclusive	1	32.88	32.88	46.79	0.00
Log number of reviews * exclusive	1	0.45	0.45	0.64	0.42
Residuals	996	699.79	0.70	NA	

F-test Analysis

```{r}
F_start <- round(qf(.99,anova_model1$Df[3],anova_model1$Df[4]),3)
```

$$H_0 : \beta_1 = 0$$
$$H_A : \beta_1 \neq 0$$
$$\alpha = 0.05$$
$$\text{Reject if } F^* > F(0.99, 1, 996) = 6.66$$
$$F^* = 0.638$$
$$P_{value} = 0.425$$

From the ANOVA output, we have F∗ = 0.638, we fail to reject H0 and conclude that the interaction terms should be dropped from the model. The p-value associated with this test is 0.425