Title: Assignment 2 - The General Linear Model

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# Background

The study had two hypotheses where the research questions were framed and then converted to linear models.

Hypothesis 1: Sex, conscientiousness, and socially prescribed perfectionism (SPP) will all significantly predict negative affect, in the manner described above (women will have more negative affect than men, conscientiousness will be negatively related to negative affect).

**Research Question:** Does sex, conscientiousness, and SPP significantly predict negative affect?

Full linear model: negative affect = b₀ + **b₁(sex) + b₂(conscientiousness) + b₃(SPP)** + e

Reduced linear model: negative affect = b₀

**Hypothesis 2:** SPP will predict unique variance in negative affect over and above sex and conscientiousness in a meaningful way.

**Research Question:** Does SPP significantly predict negative affect, after controlling for sex and conscientiousness?

Full linear model: negative affect = b₀ + b₁(sex) + b₂(conscientiousness) + **b₃(SPP)** + e

Reduced linear model: negative affect = b₀ + b₁(sex) + b₂(conscientiousness) + e

# Results

Descriptive Statistics

The sample consisted of 131 participants (undergraduate students) after excluding 6 participants with missing variables. Females (n = 112, 85.50%) and of males (n = 19, 14.50%).

Means (M), standard deviations (SD), and ranges for the main study variables (Socially Prescribed Perfectionism, Conscientiousness, and Negative Affect) were calculated for the sample by gender (see Table 1).

**Table 1**

Descriptive Statistics of Study Variables

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **Gender** | **n** | **Mean** | **SD** | **Min** | **Max** |
| Socially Prescribed Perfectionism (SPP) | Female | 112 | 4.38 | 1.46 | 1.00 | 7.00 |
| Male | 19 | 4.42 | 1.26 | 2.00 | 6.40 |
| Conscientiousness | Female | 112 | 4.11 | 1.31 | 0.00 | 6.00 |
| Male | 19 | 3.61 | 1.07 | 2.00 | 6.00 |
| Negative Affect | Female | 112 | 2.50 | 0.99 | 1.00 | 4.83 |
| Male | 19 | 2.07 | 0.84 | 1.00 | 3.83 |

Both female and male participants had nearly identical means of Socially Prescribed Perfectionism (SPP), (females: M = 4.38, SD = 1.46; males: M = 4.42, SD = 1.26). Female participants showed slightly higher scores on Conscientiousness (M = 4.11, SD = 1.31) compared to male participants (M = 3.61, SD = 1.07). Similarly, female participants reported somewhat higher levels of Negative Affect (M = 2.50, SD = 0.99) than male participants (M = 2.07, SD = 0.84). The range of scores for all three variables was wider among female participants, which may be partially attributable to the larger female sample size

A bivariate distribution was used to examine the relationship between Negative Affect and three key predictors: Socially Prescribed Perfectionism (SPP), Conscientiousness, and Sex. This visualization allowed for the identification of trends, directions, and patterns in these relationships. Negative Affect is seen to be positively associated with high SPP, negatively associated with Conscientiousness, and higher in females (0) than males (1) (see Figure 1).

**Figure 1**

Relationships Between Negative Affect and Predictor Variables

A graph of negative and affect

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*Note.* This figure illustrates the bivariate relationships between negative affect and the three predictor variables: socially prescribed perfectionism, conscientiousness, and sex.

Statistical Assumptions

Before conducting the regression analysis, statistical assumptions were examined. The assumption of normality for the residuals was assessed graphically and statistically. The histogram of residuals suggested a roughly symmetric distribution with a slight right skew. The residual dependence plot (R-D plot) displayed a curved pattern, indicating a violation of linearity. However, the scale-location (S-L) plot exhibited only a slight increase in slope, suggesting minor heteroskedasticity. The Shapiro-Wilk test of normality (W = 0.981, p = .071) did not indicate a significant departure from normality, implying that the assumption was met. (see Figure 2).

**Figure 2**

Diagnostic Plots for Regression Analysis

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*Note.* These diagnostic plots assess the assumptions of the regression model, including normality of residuals, homoscedasticity, and linearity.

**Model selection**

In Hypothesis 1, the full model explains 27.00% of variance in negative affect as opposed to 0.00% in the reduced model, and the model with the predictor potentially predicting up to 1.48-point differential of negative affect. In Hypothesis 2, the full model explains 27.00% of variance in negative affect as opposed to 18.50% in the reduced model, and the model with the predictor that potentially predict up to 0.64-point differential of negative affect. In both Hypothesis 1 and 2, the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) of the full model are lower than the reduced model, and the Bayes factor of the full model is greater than 100. Hence, the full model is a better fit in both Hypotheses 1 and 2 (see Tables 2 and 3).

**Table 2**

Comparison of Reduced and Full Models for Hypothesis 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model** | **AIC** | **BIC** | **Bayes Factor** | **RÂ²** |
| Reduced | 368.29 | 374.04 | 0.00 | 0.00 |
| Full | 333.25 | 347.63 | 543039.50 | 0.27 |

**Table 3**

Comparison of Reduced and Full Models for Hypothesis 2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model** | **AIC** | **BIC** | **Bayes Factor** | **RÂ²** |
| Reduced | 345.6 | 357.1 | 0.009 | 0.185 |
| Full | 333.3 | 347.6 | 111.4 | 0.269 |

Regression Analysis

A multiple regression analysis was conducted to examine the predictive effects of conscientiousness, socially prescribed perfectionism (SPP), and sex on negative affect. The results indicate that conscientiousness is a significant negative predictor of negative affect (*B* = -0.26, 95% CI [-0.37, -0.14]). Socially prescribed perfectionism (SPP) is a significant positive predictor (*B* = 0.20, 95% CI [0.10, 0.31]). Sex also negatively predicts negative affect, though its confidence interval includes zero ([-1.16, 0.01]), suggesting that this effect is weaker and possibly not significant. Table 4 presents the unstandardized regression coefficients, standard errors (SE), and 95% confidence intervals.

Table 4

Multiple Regression Analysis Predicting Negative Affect

|  |  |  |  |
| --- | --- | --- | --- |
| **Predictors** | **Estimate** | **SE** | **95% CI (LL, UL)** |
| Conscientiousness | -0.26 | 0.06 | (-0.37, -0.14) |
| SPP | 0.20 | 0.05 | (0.10, 0.31) |
| Sex | -0.58 | 0.21 | (-1.16, 0.01) |

*Note.* CI = confidence interval; LL = lower limit; UL = upper limit.

**Semi-Partial R² Analysis**

To further examine the unique contribution of each predictor, semi-partial *R²* values were calculated. The results indicate that conscientiousness accounts for the largest unique variance (14.0%), followed by SPP (8.7%), and sex (4.3%) (see Table 5).

**Table 5**

Semi-Partial R² Values for Each Predictor

|  |  |
| --- | --- |
| **Predictor** | **Semi-Partial R² (%)** |
| Conscientiousness | 14 |
| SPP | 8.7 |
| Sex | 4.3 |

# Discussion

The present study examined the relationships between sex, conscientiousness, socially prescribed perfectionism (SPP), and negative affect, with a particular focus on determining the incremental validity of SPP beyond the effects of sex and conscientiousness. Our findings provide support for both hypotheses, demonstrating that not only do these three predictors collectively account for a significant portion of the variance in negative affect, but most notably, our results support the hypothesis that socially prescribed perfectionism contributes uniquely to negative affect, even after controlling for sex and conscientiousness. SPP accounted for 8.70% of the unique variance in negative affect, highlighting its considerable role.

The results confirm previous research regarding the negative relationship between conscientiousness and negative affect and sex differences in negative affect which suggest that women tend to report higher levels of negative affect than men, although the confidence interval for sex included zero in our study, indicating some uncertainty in this relationship. Furthermore, sex accounted for 4.30% of the unique variance in negative affect, representing the smallest contribution among our three predictors.

# Conclusion

This study investigated how sex, conscientiousness, and socially prescribed perfectionism (SPP)—influence negative emotions in individuals. Our findings show that people who are more conscientious tend to experience fewer negative emotions, while those with higher socially prescribed perfectionism report more negative emotions. Women in our sample reported somewhat more negative emotions than men. Importantly, socially prescribed perfectionism predicted negative emotions even after accounting for sex and conscientiousness, suggesting that it plays a unique role in emotional well-being that cannot be explained by these other factors alone.