**Assignment 2: Data Analysis**

Nicholas Graziani

Australian Catholic University

PSYC311: Research Design & Statistics 3

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Tutor: David Norton

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**Data Analysis Part A**

**Results**

A Pearson correlational analysis was conducted comparing all variables, with results shown in Table 1 alongside means and standard deviations for each of the variables. The analysis revealed a strong positive significant correlation between intuitive eating and body appreciation. It also revealed a weak positive significant correlation between body appreciation and exercise for health-related reasons, as well as between intuitive eating and exercise for health-related reasons. The Pearson correlational analysis also revealed a moderate negative correlation between intuitive eating and dichotomous thinking. Additionally, the analysis also revealed a weak negative non-significant correlation between exercise for health-related reasons and dichotomous thinking, and a strong negative significant correlation between dichotomous thinking and body appreciation.

**Table 1**

*Descriptive Statistics and Pearson Correlations for Intuitive Eating, Body Appreciation, Exercise for Health-Related Reasons, and Dichotomous Thinking.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | Pearson Correlation | | | |
| Variable | *M* | *SD* | Intuitive Eating | Body Appreciation | Exercise for Health-Related Reasons | Dichotomous Thinking |
| Intuitive Eating | 3.3 | 0.9 | \_ | .517\*\* | .252\*\* | -.412\*\* |
| Body Appreciation | 3.1 | 0.9 | .517\*\* | \_ | .217\*\* | -.542\*\* |
| Exercise for Health-Related Reasons | 5.4 | 1.4 | .252\*\* | .217\*\* | \_ | -.050 |
| Dichotomous Thinking | 25.4 | 8.3 | -.412\*\* | -.542\*\* | -.050 | \_ |

Note: \**p*<.05, \*\**p*<.001

The assumption of Independence of Errors was met, with a Durbin-Watson statistic of 1.85. The assumption of normality was also met; the histogram appears to be normally distributed and there is no systematic or obvious snaking on the P-P plot. The z-pred and z-resid scatterplot shows no evidence of violations of linearity or homoscedasticity as there are no systematic (curvilinear) deviations around the zero line. There is also no strong evidence of fanning at either end of the scatterplot, with relatively few outliers exerting too much influence according to Mahalanobis Distance, Cook’s Distance, and Leverage values. Thus, the assumptions of linearity and homoscedasticity were met. Additionally, there is no evidence of multicollinearity as both tolerance and VIF are within acceptable ranges for all variables. Thus, there is no cause for concern regarding assumptions of normality within the analyses.

Conducting multiple hierarchical regression analyses revealed that the first model, which used Body Appreciation and Exercising for Health-Related Reasons, was significant, *F*(2, 310) = 62.68, *p* < .001. The model demonstrated that body appreciation with exercising for health-related reasons acted as a significant predictor and accounted for 29% of the variance in subjective wellbeing (*R*² = .29). The second model, which included Body Appreciation, exercising for health-related reasons, and dichotomous thinking as predictors also accounted for a significant proportion of the variance in subjective wellbeing (*R*² = .32), *F*(3, 309) = 47.68, *p*<.001. The second model also revealed that the addition of dichotomous thinking significantly increased the proportion of variance in subjective wellbeing accounted for by the model (∆*R*² = .03), *Fchange*(1, 309) = 12.87, *p* < .001.

Coefficients of the multiple hierarchical regression analyses shown in Table 2 demonstrate that all variables made significant contributions to the model. Table 2 also shows that body appreciation is the highest contributor in the model, with exercise for health-related reasons as the second-biggest contributor to the model, and dichotomous thinking contributing only a small, negative contribution. Furthermore, Table 2 shows that the largest proportion of unique variance in intuitive eating is accounted for by body appreciation, with dichotomous thinking and exercise for health-related reasons each accounting for only a small proportion of the unique variance in intuitive eating score.

**Table 2**

*Coefficients of the Multiple Hierarchical Regression Analyses.*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | *B* | *SE B* | | *β* | | *sr2* | |
| Step 1 |  |  |  | |  | |  |
| Constant | 1.36\*\* |  | .20 | |  | |  |
| Body Appreciation | .46\* |  | .05 | | .49 | | .22 |
| Exercise for Health-Related Reasons | .09\*\* |  | .03 | | .15 | | .02 |
| Step 2 |  |  |  | |  | |  |
| Constant | 2.17\*\* |  | .3 | |  | |  |
| Body Appreciation | .36\*\* |  | .06 | | .37 | | .09 |
| Exercise for Health-Related Reasons | .10\*\* |  | .03 | | .16 | | .02 |
| Dichotomous Thinking | -.02\*\* |  | .006 | | -.20 | | .03 |

Note: \**p*<.05, \*\**p*<.001

Note: R2=.53, for Step 1, ∆R2=.07

**Discussion**

The results of the Pearson correlational analysis demonstrate that dichotomous thinking had a negative moderate significant correlation with body appreciation and exercise for health-related reasons, which was congruent to the hypothesis that they would be negatively correlated. Reviewing the results of the multiple hierarchical regression analyses showed that little variance in intuitive eating can be accounted for by dichotomous thinking when controlling for body appreciation and health-related reasons. The results of the multiple hierarchical regression are congruent with the expectation that body appreciation and exercise for health-related reasons would be sound predictors for intuitive eating. However, the results also indicate that dichotomous thinking does not significantly improve the prediction of intuitive eating over and above a model including only body appreciation and exercising for health-related reasons, though all variables made a statistically significant contribution to the model. It can therefore be concluded that dichotomous thinking is not a sound predictor of intuitive eating.

**Data Analysis Part B**

**Results**

Figure 1 shows total manual dexterity scores for each group condition, both with gender split groups and scores from the gender groups combined. The table seems to demonstrate that male participants were more receptive to the app-based intervention than female participants, and that female participants were more receptive to the physio-based treatment than male participants. In the control groups, however, the total scores for male and females seem to be the same. However, looking at the total scores also seems to indicate that male participants were equally as receptive to the app-based treatment as they were to the physio treatment. Overall, physio scores seem to be much higher than the other group conditions when observing total scores, though the female physio treatment group report the highest mean when looking and gender-split groups, as shown in Table 1. Of the combined groups, physio still retains the highest mean, with males reporting a higher mean score in the physio treatment group than in the app-based treatment group, indicating at a glance a more pronounced effect in the physio treatment.

**Figure 1**

*A bar graph showing total dexterity scores for each group condition and split by gender*

**Table 1**

*Means, Standard Deviations, and group sizes for each group condition and split by gender*

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | *M* | *SD* | *n* |
| Female Physio Treatment | 8.4 | 1.1 | 5 |
| Male Physio Treatment | 5.6 | .55 | 5 |
| Total Physio Treatment | 7.0 | 1.7 | 10 |
| Female App Treatment | 2.8 | .84 | 5 |
| Male App Treatment | 5.3 | .84 | 5 |
| Total App Treatment | 4.0 | 1.5 | 10 |
| Female Control | 3.0 | 1.6 | 5 |
| Male Control | 3.0 | 1.0 | 5 |
| Total Control | 3.0 | 1.2 | 10 |

A two-way between-subjects ANOVA was conducted in order to test the main effects for the treatments, as well as the interaction between the treatments. First, the relevant assumptions were checked. The assumption of the dependent variable being continuous on an interval or ratio scale was met by the design of the study, as was the assumption of independence of observations. A Shapiro-Wilk test for normality revealed that normality was violated in only the male physio treatment group. The study therefore proceeded with caution. Furthermore, a Levene’s test of equality of error variances revealed that the assumption of homogeneity of variance was met.

The two-way between-subjects ANOVA revealed no significant difference in dexterity across genders, *F*(1, 24) = 0.12, *p* = .729, partial η² =.01. However, the analysis did reveal a significant difference in dexterity scores across treatment groups, *F*(2, 24) = 40.00, *p* < .001, partial η² =.77, as well as a significant difference in dexterity score when comparing genders and treatment groups *F*(2, 24) = 15.63, *p* < .001, partial η² =.57.

Conducting *t*-tests revealed showed a significant difference between male and female physio groups, with the female physio group scoring significantly higher than the male physio group, *t*(8) = -4.95, *p* = .001. The *t*-test results showed no significant difference between male and female control groups, *t*(8) = 0.00, *p* = 1.000. Additionally, *t*-test results showed a significant difference between male and female app groups, with the male app group scoring significantly higher than the female app group, *t*(8) = 4.54, *p* = .002.

Follow-up Bonferroni post-hoc tests were conducted, revealing a significant difference between the female control group and the female physio treatment group, *p* < .001, as well as a significant difference between the female physio treatment group and the female app treatment group, *p* < .001. There was no significant difference found between the female control group and the female app treatment group, *p* = 1.000. A significant difference was shown between the male control group and the male physio treatment group, *p* = .001, as well as between the male control group and the male app treatment group, *p* = .003. No significant difference was found between the male app treatment group and the male physio treatment group, *p* = 1.000.

**Discussion**

The results of the analyses conducted found that, averaged across gender, there was no evidence supporting the hypothesis that app-based exercise programs lead to the same improvements in dexterity as weekly individual physio treatment. Physio treatment was instead found to have significantly better improvements in dexterity. However, there was evidence suggesting a significant difference between both app-based and weekly individual physio treatments between male and female participants. The male app group showed significantly higher results than the female app group, and the female physio group showed significantly higher results than the male physio group. The hypothesis that both treatment groups would be more effective than no treatment at all was supported by post-hoc comparisons for both male and female participants with the exception of the female control group and the female app treatment group. Additionally, the hypothesis that male participants will respond better to the app-based treatment than female participants was also supported. The research findings did not support the hypothesis that there would be no significant difference between male and female participants in the physio treatment group.