Analysis of Coping Strategies, Symptoms, Support, and Health Status in Cancer Patients

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Contents

Packages

```
knitr::opts_chunk$set(echo = TRUE)
library(haven)
library(QuantPsyc)
```

```
## Loading required package: boot

## Loading required package: dplyr

##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union

## Loading required package: purrr

## Loading required package: MASS

##
## Attaching package: 'MASS'

## The following object is masked from 'package:dplyr':
##
##     select
```

```
## 
## Attaching package: 'QuantPsyc'
## The following object is masked from 'package:base':
## 
##     norm
library(psych)

## 
## Attaching package: 'psych'
## The following object is masked from 'package:boot':
## 
##     logit
library(dplyr)
library(knitr)
library(ggcorrplot)

## Loading required package: ggplot2
## 
## Attaching package: 'ggplot2'
## The following objects are masked from 'package:psych':
## 
##     %+%, alpha
library(corrplot)

## corrplot 0.92 loaded
library(moonBook)
library(ggplot2)
```

The Data

The data consists of the the demographics, health status, total trauma symptoms, physical symptoms, coping strategies, support systems, and treatment of female patients with breast cancer in a particular study.

The data was collected into an SPSS file, where it was cleaned for missing values.

```
#Delete rows with missing values in SPSS using 'Select Cases:If' and NMISS() function
#Import the data set
Breast_Cancer_Dataset <- read_sav("Breast_Cancer_Dataset.sav")
View(Breast_Cancer_Dataset)
#Rename the data set as df
df <- Breast_Cancer_Dataset
```

Correlation Study

Question: What is the correlation between physical symptoms and health status in female patients with breast cancer?

Goal: The aim of this study was to investigate the relationship between the number of physical symptoms related to a breast cancer diagnosis (MSAS_TOT1) and the participant's current health status (Health_Status) by conducting a correlation test.

Hypothesis: I hypothesized that there would be a significant, negative correlation between physical symptoms and health status. Thus, as the number of physical symptoms of cancer increased, the participant's health status would decrease.
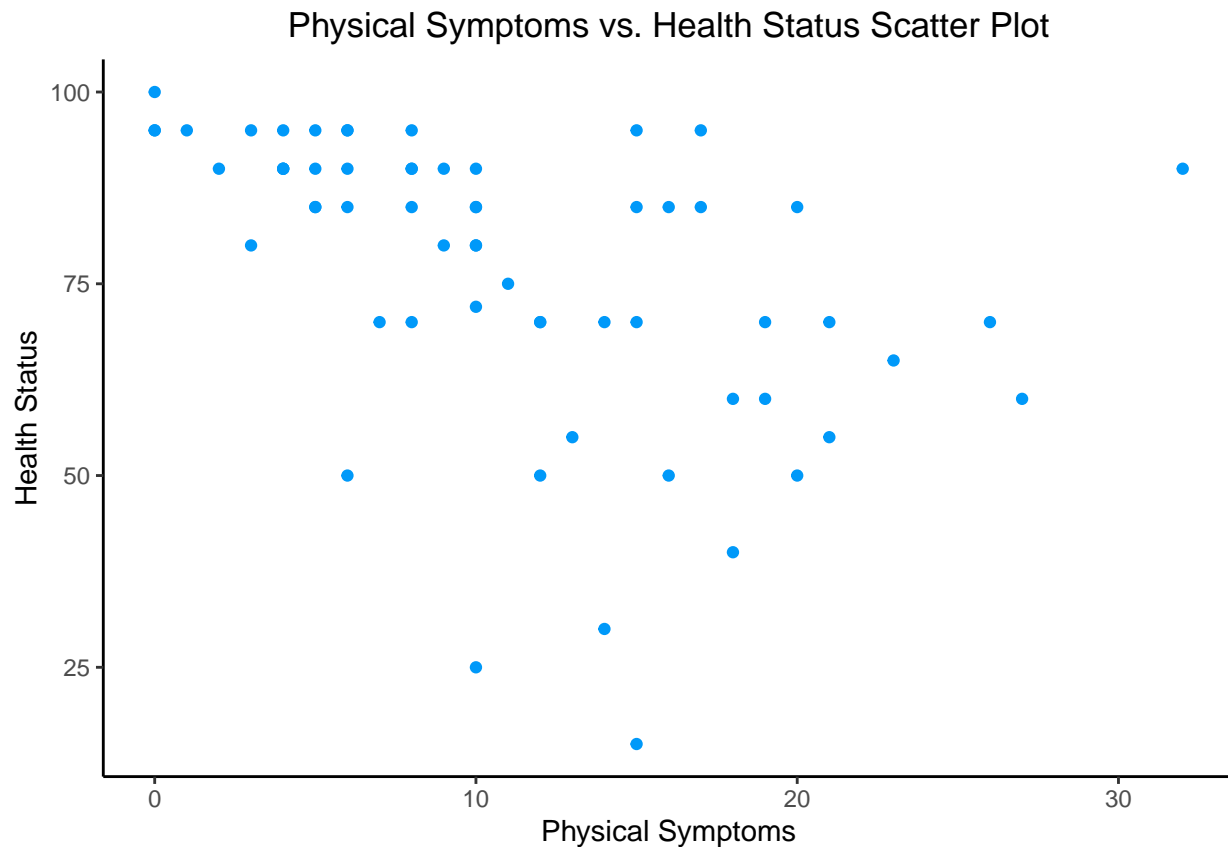
Correlation Test

```
#Run correlation test
cor.test(df$MSAS_TOT1, df$Health_Status)
```

```
##
##  Pearson's product-moment correlation
##
## data:  df$MSAS_TOT1 and df$Health_Status
## t = -3.8831, df = 60, p-value = 0.0002596
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  -0.6276566 -0.2233782
## sample estimates:
##        cor
## -0.4481432
```

Results: The results of the correlation test indicated that there was a significant, negative correlation between physical symptoms and health status (r = -.398, p = .001). However, the correlation between physical symptoms and health status was weak.

Scatter Plot

```
ggplot(df, aes(x = MSAS_TOT1, y = Health_Status)) +
  geom_point(color = "#0099f9") +
  theme_classic() +
  labs(title = "Physical Symptoms vs. Health Status Scatter Plot", x = "Physical Symptoms", y = "Health
  theme(plot.title = element_text(hjust = 0.5))
```

## Physical Symptoms vs. Health Status Scatter Plot

Correlation Matrix of Study Variables

```
cor.mat <- cor(df %>% dplyr::select(MSAS_TOT1, Health_Status, IOES_TOT1, AVOID_COP, APPCOP),
               use = "pairwise.complete.obs")
View(cor.mat)
round(cor.mat, 3)
```

```
##               MSAS_TOT1 Health_Status IOES_TOT1 AVOID_COP APPCOP
## MSAS_TOT1         1.000        -0.448     0.459     0.331  0.115
## Health_Status    -0.448         1.000    -0.278    -0.193 -0.034
## IOES_TOT1         0.459        -0.278     1.000     0.596  0.077
## AVOID_COP         0.331        -0.193     0.596     1.000  0.307
## APPCOP            0.115        -0.034     0.077     0.307  1.000
```

Visualization of Correlation Matrix

```
corrplot(cor.mat, method = "circle", type = "lower", order = "hclust")
```
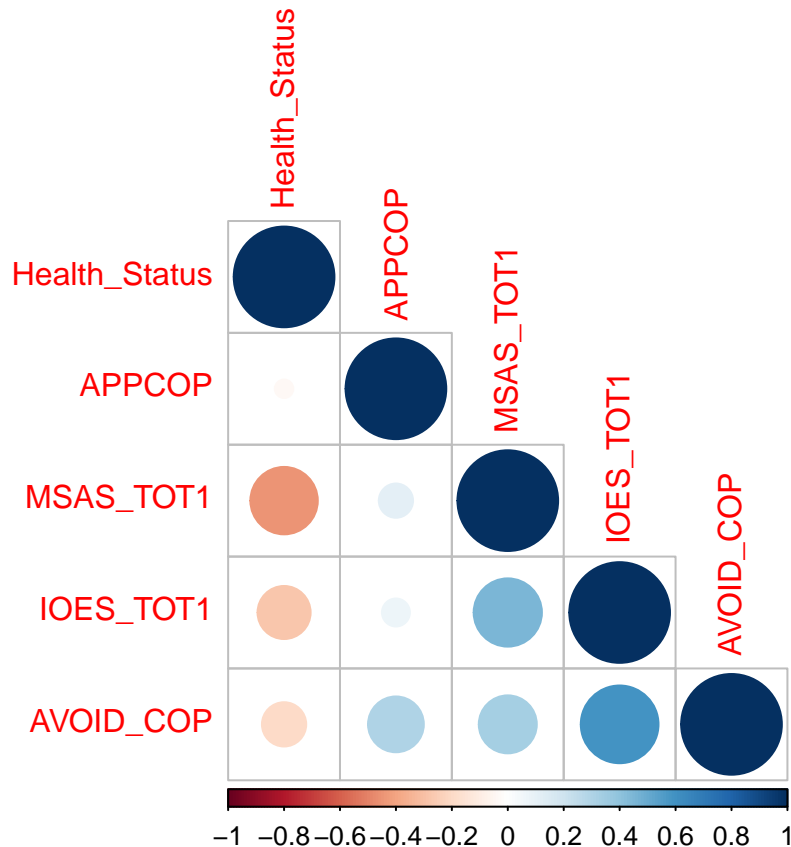
Positive correlations are displayed in blue, while negative correlations are displayed in red. Color intensity and the size of the circle are proportional to the correlation coefficients. There is a relatively strong positive correlation between avoidance coping (AVOID_COP) and total trauma symptoms (IOES_TOT1) and a relatively strong negative correlation between approach coping (APPCOP) and physical symptoms of cancer (MSAS_TOT1).

Simple Linear Regression Analysis

Question: Is avoidance coping a significant predictor of health status in female patients with breast cancer?

Goal: The aim of this study was to investigate whether avoidance coping (AVOID_COP) is a significant predictor of health status (Health_Status) in female patients with breast cancer. Prior research has demonstrated that avoidance coping (efforts oriented toward denying or avoiding dealing directly with stressful demands) is associated with distress and depression.

Hypothesis: I hypothesized that avoidance coping would be a significant, negative predictor of health status. Thus, as avoidance coping increased, the patient's health status would decrease.

```
#Run simple linear regression by regressing health status on avoidance coping
slr <- lm(Health_Status ~ AVOID_COP, data = df)
summary(slr)
```

```
##
## Call:
## lm(formula = Health_Status ~ AVOID_COP, data = df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
```

```
## -57.756  -9.930    6.915   13.145   28.804
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  90.7946     9.6359   9.423 1.93e-13 ***
## AVOID_COP    -0.8200     0.5378  -1.525    0.133
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 18.83 on 60 degrees of freedom
## Multiple R-squared:  0.03729,    Adjusted R-squared:  0.02125
## F-statistic: 2.324 on 1 and 60 DF,  p-value: 0.1326
```

```
#Confidence intervals for parameters
confint(slr)
```

```
##                  2.5 %      97.5 %
## (Intercept) 71.520057 110.069231
## AVOID_COP   -1.895808    0.255905
```

```
#Standardized regression coefficient
lm.beta(slr)
```

```
##   AVOID_COP
## -0.1931081
```

Results: The results of the simple linear regression analysis indicated that as avoidance coping increased by one point on the scale, health status decreased by 0.843 points (95% CI [-1.897, 0.211], $p > .05$). Additionally, as avoidance coping increased by one standard deviation, health status decreased by 0.197 standard deviation units. However, the results of the simple linear regression analysis indicated that avoidance coping did not explain a significant proportion of the variance in health status ($r^2 = 0.039$, $p > .05$). Thus, our hypothesis was not supported, as avoidance coping was not a significant predictor of health status.

Visualization of Simple Linear Regression

```
ggplot(df, aes(y = Health_Status, x = AVOID_COP)) +
  geom_smooth(method = "lm") +
  geom_point(color = "#0099f9") +
  theme_classic() +
  labs(title = "Health Status Regressed on Avoidance Coping", x = "Avoidance Coping", y = "Health Statu
  theme(plot.title = element_text(hjust = 0.5))
```

```
## `geom_smooth()` using formula = 'y ~ x'
```

Health Status Regressed on Avoidance Coping
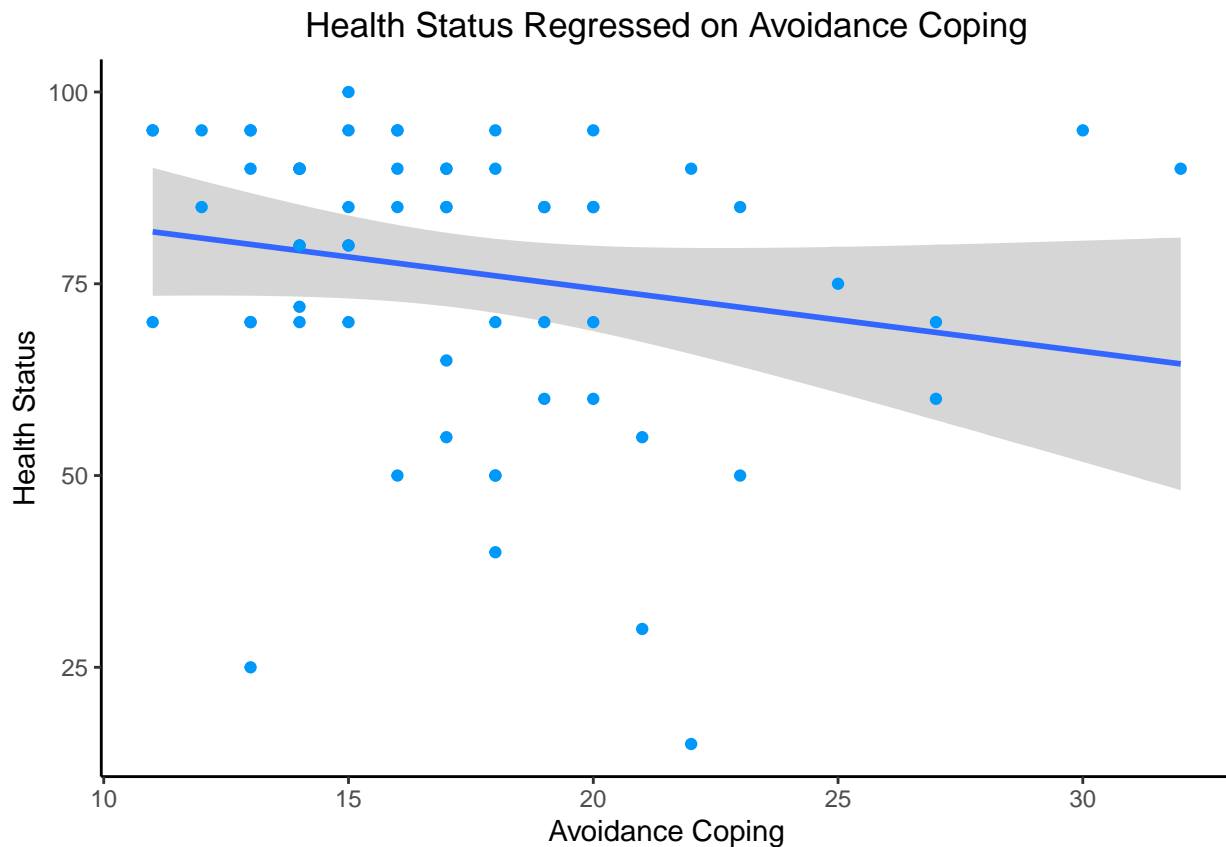
Simultaneous Multiple Linear Regression Analysis

Question: Are avoidance coping and approach coping significant predictors of cancer-related trauma among female patients with breast cancer?

Goal: The aim of the study was to investigate avoidance coping (AVOID_COP) and approach coping (APPCOP) as predictors of cancer-related trauma (IOES_TOT1) in female patients with breast cancer.

Hypothesis: I hypothesized that avoidance coping would be a significant positive predictor of cancer-related trauma, and approach coping would be a significant negative predictor of cancer-related trauma.

```
#Run multiple linear regression by regressing cancer-related trauma on avoidance and approach coping
mlr <- lm(IOES_TOT1 ~ AVOID_COP + APPCOP, data = df)
summary(mlr)
```

```
##
## Call:
## lm(formula = IOES_TOT1 ~ AVOID_COP + APPCOP, data = df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.95914 -0.41414 -0.01626  0.46826  0.87114
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -0.158983   0.337193  -0.471    0.639
## AVOID_COP    0.089154   0.015363   5.803 2.74e-07 ***
## APPCOP      -0.006960   0.006485  -1.073    0.287
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.512 on 59 degrees of freedom
## Multiple R-squared:  0.3672, Adjusted R-squared:  0.3457
## F-statistic: 17.11 on 2 and 59 DF,  p-value: 1.375e-06
```

```
#Confidence intervals for parameters
confint(mlr)
```

```
##                   2.5 %      97.5 %
## (Intercept) -0.83370519 0.515739635
## AVOID_COP    0.05841310 0.119895561
## APPCOP      -0.01993564 0.006015318
```

```
#Standardized regression coefficient
lm.beta(mlr)
```

```
##  AVOID_COP     APPCOP
##  0.6314869 -0.1167990
```

Unstandardized regression equation: Cancer-Related Trauma = -0.156 + 0.089(Avoidance Coping) - 0.007(Approach Coping).

Results: The regression model accounted for a significant proportion of the variance in cancer-related trauma in female patients with breast cancer, such that the optimal linear combination of avoidance coping and approach coping accounted for 33.9% of the variance in cancer-related trauma ($R\hat{}2adjusted = 0.339$, $F(2, 62) = 17.41$, $p < .001$).

Avoidance coping was a significant, positive predictor of cancer-related trauma. As avoidance coping increased by one point on the scale, cancer-related trauma increased by 0.089 points (CI 95% [0.059, 0.119], $p < .01$). However, approach coping was not a significant predictor of cancer-related trauma (CI 95% [-0.020, 0.005], $p > .05$).

Thus, my hypothesis was not fully supported.

Visualization of Multiple Linear Regression

```
ggplot(df, aes(y = IOES_TOT1, x = AVOID_COP)) +
  geom_smooth(method = "lm") +
  geom_point(color = "#0099f9") +
  theme_classic() +
  labs(title = "Cancer-Related Trauma Regressed on Avoidance Coping", x = "Avoidance Coping", y = "Canc
  theme(plot.title = element_text(hjust = 0.5))
```

```
## `geom_smooth()` using formula = 'y ~ x'
```

Cancer−Related Trauma Regressed on Avoidance Coping
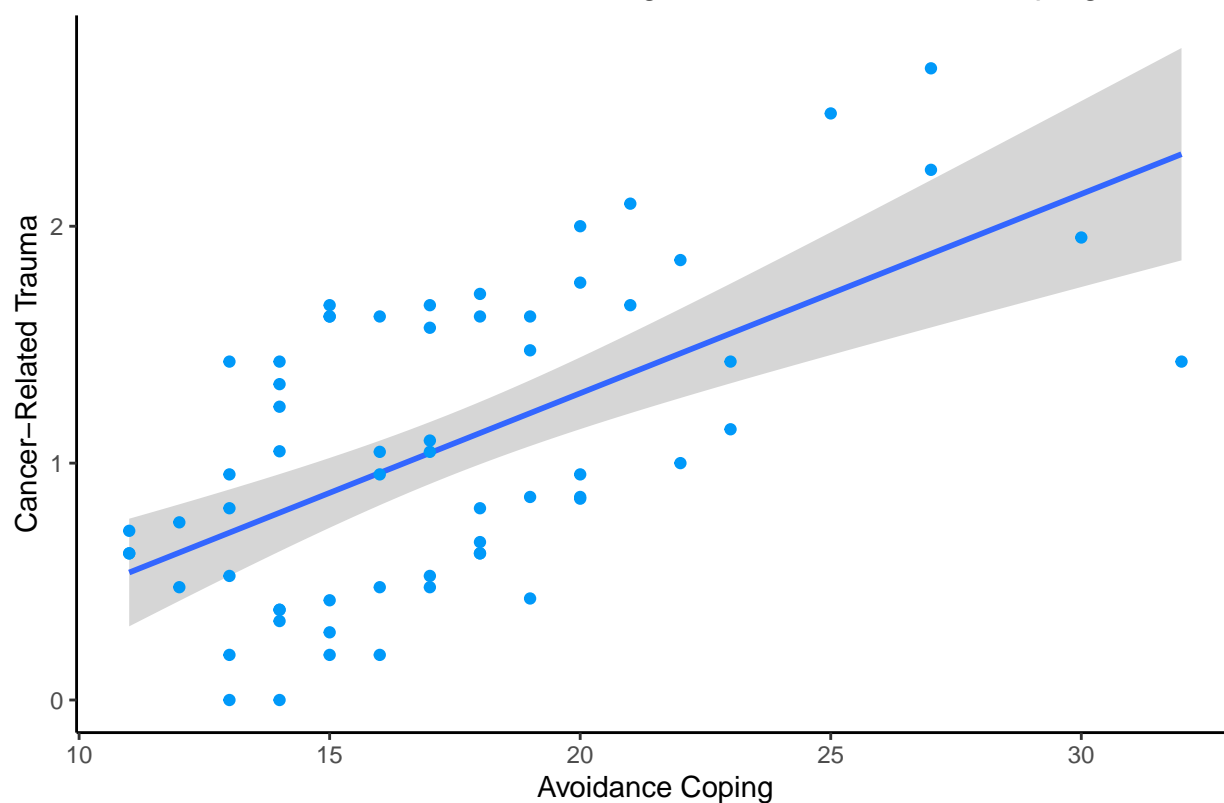
```r
ggplot(df, aes(y = IOES_TOT1, x = APPCOP)) +
  geom_smooth(method = "lm") +
  geom_point(color = "#0099f9") +
  theme_classic() +
  labs(title = "Cancer-Related Trauma Regressed on Approach Coping", x = "Approach Coping", y = "Cancer-
  theme(plot.title = element_text(hjust = 0.5))
```

```
## `geom_smooth()` using formula = 'y ~ x'
```

Cancer−Related Trauma Regressed on Approach Coping