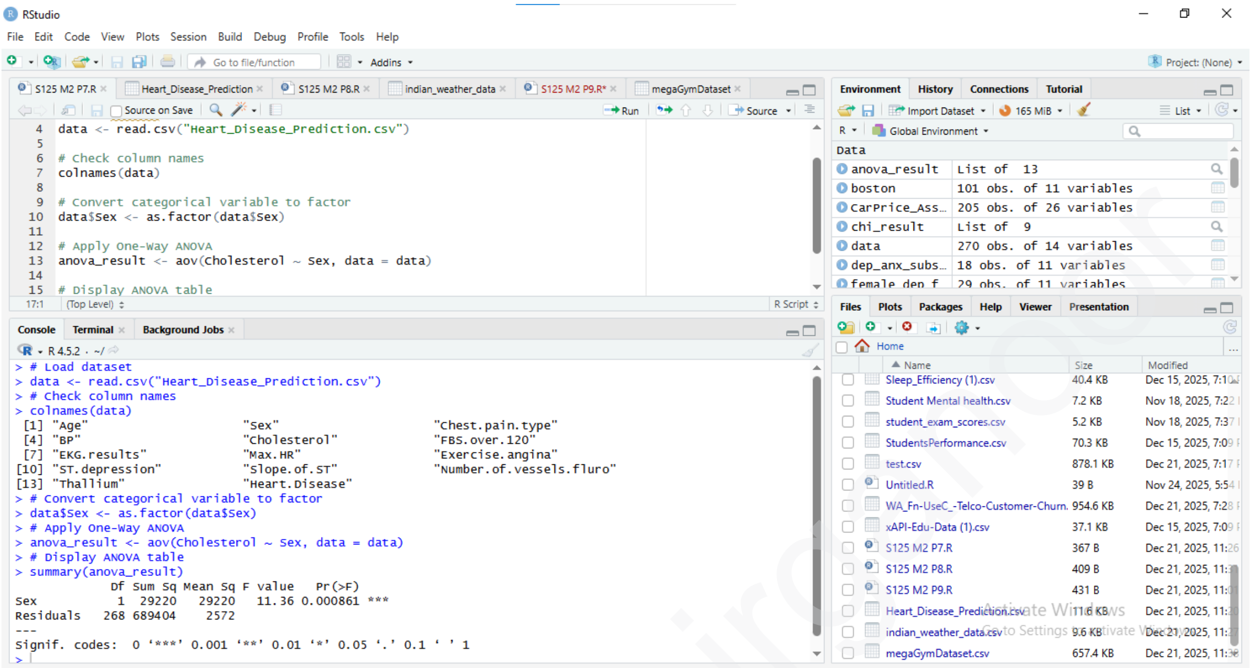
## 7 Performing one-way ANOVA using aov() (R).



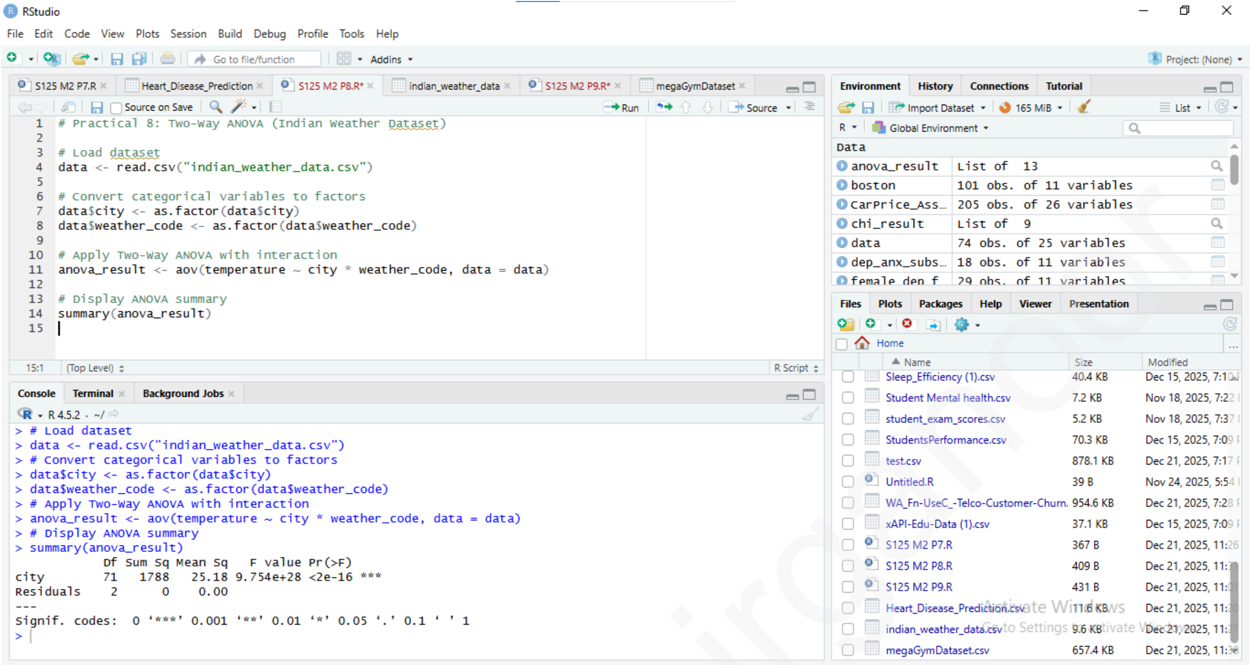
```r
data <- read.csv("Heart_Disease_Prediction.csv")

# Check column names
colnames(data)

# Convert categorical variable to factor
data$Sex <- as.factor(data$Sex)

# Apply One-Way ANOVA
anova_result <- aov(Cholesterol ~ Sex, data = data)

# Display ANOVA table
```

```
> # Load dataset
> data <- read.csv("Heart_Disease_Prediction.csv")
> # Check column names
> colnames(data)
 [1] "Age"                     "Sex"                     "Chest.pain.type"
 [4] "BP"                      "Cholesterol"             "FBS.over.120"
 [7] "EKG.results"             "Max.HR"                  "Exercise.angina"
[10] "ST.depression"           "Slope.of.ST"             "Number.of.vessels.fluro"
[13] "Thallium"                "Heart.Disease"
> # Convert categorical variable to factor
> data$Sex <- as.factor(data$Sex)
> # Apply One-Way ANOVA
> anova_result <- aov(Cholesterol ~ Sex, data = data)
> # Display ANOVA table
> summary(anova_result)
             Df Sum Sq Mean Sq F value   Pr(>F)    
Sex           1  29220   29220   11.36 0.000861 ***
Residuals   268 689404    2572                     
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
> 
```

| Data | |
|---|---|
| anova_result | List of 13 |
| boston | 101 obs. of 11 variables |
| CarPrice_Ass… | 205 obs. of 26 variables |
| chi_result | List of 9 |
| data | 270 obs. of 14 variables |
| dep_anx_subs… | 18 obs. of 11 variables |
| female_dep_f | 29 obs. of 11 variables |

| Name | Size | Modified |
|---|---|---|
| Sleep_Efficiency (1).csv | 40.4 KB | Dec 15, 2025, 7:10 |
| Student Mental health.csv | 7.2 KB | Nov 18, 2025, 7:22 |
| student_exam_scores.csv | 5.2 KB | Nov 18, 2025, 7:37 |
| StudentsPerformance.csv | 70.3 KB | Dec 15, 2025, 7:09 |
| test.csv | 878.1 KB | Dec 21, 2025, 7:17 |
| Untitled.R | 39 B | Nov 24, 2025, 5:54 |
| WA_Fn-UseC_-Telco-Customer-Churn. | 954.6 KB | Dec 21, 2025, 7:28 |
| xAPI-Edu-Data (1).csv | 37.1 KB | Dec 15, 2025, 7:09 |
| S125 M2 P7.R | 367 B | Dec 21, 2025, 11:26 |
| S125 M2 P8.R | 409 B | Dec 21, 2025, 11:3 |
| S125 M2 P9.R | 431 B | Dec 21, 2025, 11:0 |
| Heart_Disease_Prediction.csv | 11.6 KB | Dec 21, 2025, 11:20 |
| indian_weather_data.csv | 9.6 KB | Dec 21, 2025, 11:27 |
| megaGymDataset.csv | 657.4 KB | Dec 21, 2025, 11:38 |

## 8 Performing two-way ANOVA using  aov() (R).



```
# Practical 8: Two-Way ANOVA (Indian Weather Dataset)

# Load dataset
data <- read.csv("indian_weather_data.csv")

# Convert categorical variables to factors
data$city <- as.factor(data$city)
data$weather_code <- as.factor(data$weather_code)

# Apply Two-Way ANOVA with interaction
anova_result <- aov(temperature ~ city * weather_code, data = data)

# Display ANOVA summary
summary(anova_result)
```

```
> # Load dataset
> data <- read.csv("indian_weather_data.csv")
> # Convert categorical variables to factors
> data$city <- as.factor(data$city)
> data$weather_code <- as.factor(data$weather_code)
> # Apply Two-Way ANOVA with interaction
> anova_result <- aov(temperature ~ city * weather_code, data = data)
> # Display ANOVA summary
> summary(anova_result)
            Df Sum Sq Mean Sq   F value Pr(>F)    
city        71   1788   25.18 9.754e+28 <2e-16 ***
Residuals    2      0    0.00                     
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
> 
```

| Data | |
|---|---|
| anova_result | List of 13 |
| boston | 101 obs. of 11 variables |
| CarPrice_Ass… | 205 obs. of 26 variables |
| chi_result | List of 9 |
| data | 74 obs. of 25 variables |
| dep_anx_subs… | 18 obs. of 11 variables |
| female_dep_f | 29 obs. of 11 variables |

| Name | Size | Modified |
|---|---|---|
| Sleep_Efficiency (1).csv | 40.4 KB | Dec 15, 2025, 7:10 |
| Student Mental health.csv | 7.2 KB | Nov 18, 2025, 7:22 |
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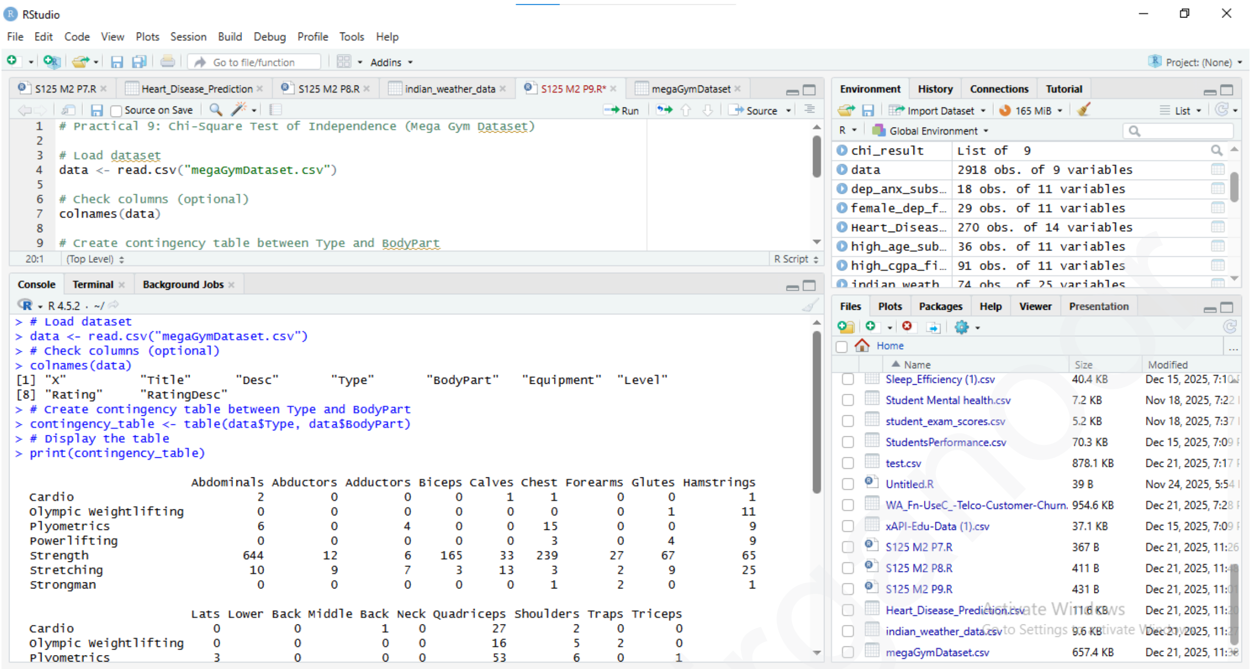
| S125 M2 P7.R | 367 B | Dec 21, 2025, 11:26 |
| S125 M2 P8.R | 409 B | Dec 21, 2025, 11:31 |
| S125 M2 P9.R | 431 B | Dec 21, 2025, 11:01 |
| Heart_Disease_Prediction.csv | 11.6 KB | Dec 21, 2025, 11:20 |
| indian_weather_data.csv | 9.6 KB | Dec 21, 2025, 11:27 |
| megaGymDataset.csv | 657.4 KB | Dec 21, 2025, 11:38 |

# MVLU COLLEGE

# Subject:-Data Analysis with SAS / SPSS /R

## 9 Conducting Chi-square tests using chisq.test() (R).



```r
# Practical 9: Chi-Square Test of Independence (Mega Gym Dataset)

# Load dataset
data <- read.csv("megaGymDataset.csv")

# Check columns (optional)
colnames(data)

# Create contingency table between Type and BodyPart
```

```
> # Load dataset
> data <- read.csv("megaGymDataset.csv")
> # Check columns (optional)
> colnames(data)
[1] "X"          "Title"      "Desc"       "Type"       "BodyPart"   "Equipment"  "Level"
[8] "Rating"     "RatingDesc"
> # Create contingency table between Type and BodyPart
> contingency_table <- table(data$Type, data$BodyPart)
> # Display the table
> print(contingency_table)

                      Abdominals Abductors Adductors Biceps Calves Chest Forearms Glutes Hamstrings
  Cardio                       2         0         0      0      1     1        0      0          1
  Olympic Weightlifting        0         0         0      0      0     0        0      1         11
  Plyometrics                  6         0         4      0      0    15        0      0          9
  Powerlifting                 0         0         0      0      0     3        0      4          9
  Strength                   644        12         6    165     33   239       27     67         65
  Stretching                  10         9         7      3     13     3        2      9         25
  Strongman                    0         0         0      0      0     1        2      0          1

                      Lats Lower Back Middle Back Neck Quadriceps Shoulders Traps Triceps
  Cardio                 0          0           1    0         27         2     0       0
  Olympic Weightlifting  0          0           0    0         16         5     2       0
  Plyometrics            3          0           0    0         53         6     0       1
```

| | |
|---|---|
| chi_result | List of 9 |
| data | 2918 obs. of 9 variables |
| dep_anx_subs… | 18 obs. of 11 variables |
| female_dep_f… | 29 obs. of 11 variables |
| Heart_Diseas… | 270 obs. of 14 variables |
| high_age_sub… | 36 obs. of 11 variables |
| high_cgpa_fi… | 91 obs. of 11 variables |
| indian_weath… | 74 obs. of 25 variables |

| Name | Size | Modified |
|---|---|---|
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| Student Mental health.csv | 7.2 KB | Nov 18, 2025, 7:22 |
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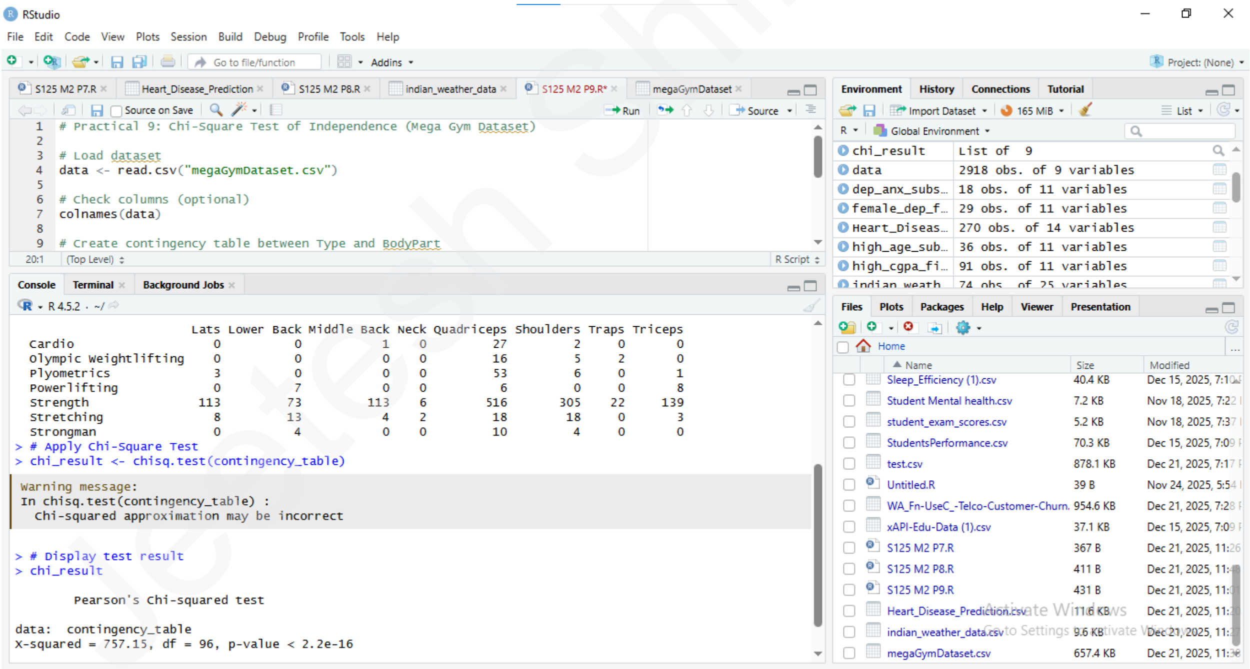
| xAPI-Edu-Data (1).csv | 37.1 KB | Dec 15, 2025, 7:09 |
| S125 M2 P7.R | 367 B | Dec 21, 2025, 11:26 |
| S125 M2 P8.R | 411 B | Dec 21, 2025, 11:48 |
| S125 M2 P9.R | 431 B | Dec 21, 2025, 11:01 |
| Heart_Disease_Prediction.csv | 11.6 KB | Dec 21, 2025, 11:20 |
| indian_weather_data.csv | 9.6 KB | Dec 21, 2025, 11:27 |
| megaGymDataset.csv | 657.4 KB | Dec 21, 2025, 11:38 |



```r
# Practical 9: Chi-Square Test of Independence (Mega Gym Dataset)

# Load dataset
data <- read.csv("megaGymDataset.csv")

# Check columns (optional)
colnames(data)

# Create contingency table between Type and BodyPart
```

```
                      Lats Lower Back Middle Back Neck Quadriceps Shoulders Traps Triceps
  Cardio                 0          0           1    0         27         2     0       0
  Olympic Weightlifting  0          0           0    0         16         5     2       0
  Plyometrics            3          0           0    0         53         6     0       1
  Powerlifting           0          7           0    0          6         0     0       8
  Strength             113         73         113    6        516       305    22     139
  Stretching             8         13           4    2         18        18     0       3
  Strongman              0          4           0    0         10         4     0       0
> # Apply Chi-Square Test
> chi_result <- chisq.test(contingency_table)

Warning message:
In chisq.test(contingency_table) :
  Chi-squared approximation may be incorrect

> # Display test result
> chi_result

        Pearson's Chi-squared test

data:  contingency_table
X-squared = 757.15, df = 96, p-value < 2.2e-16
```

| | |
|---|---|
| chi_result | List of 9 |
| data | 2918 obs. of 9 variables |
| dep_anx_subs… | 18 obs. of 11 variables |
| female_dep_f… | 29 obs. of 11 variables |
| Heart_Diseas… | 270 obs. of 14 variables |
| high_age_sub… | 36 obs. of 11 variables |
| high_cgpa_fi… | 91 obs. of 11 variables |
| indian_weath… | 74 obs. of 25 variables |

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Jeetesh Shirganoor
S125