

wenqi_tod

d

```
##          timestamp          name gender          age
##  1: 7/18/2020 21:05:26      Rupa Gill Female      22 - 55 years
##  2: 7/18/2020 22:19:07 Kalpathy Sunderam  Male Older than 55 years
##  3: 7/18/2020 22:24:33 Chitra S Agastya Female      22 - 55 years
##  4: 7/18/2020 23:33:24      Ramani   Male        5 - 21 years
##  5: 7/19/2020 1:08:46    N Balakrishnan  Male Older than 55 years
## ---
## 107: 7/25/2020 8:42:20          Ravi   Male Older than 55 years
## 108: 7/25/2020 9:07:12          bajji  Male      22 - 55 years
## 109: 7/25/2020 9:17:46      Deeksha Female      5 - 21 years
## 110: 7/25/2020 9:28:44      Forrgot  Male      22 - 55 years
## 111: 7/25/2020 9:32:09      Adwita Female      5 - 21 years
##          music_training pre_treatment_score      time_of_day
##  1:          No training          7 8 PM - Midnight
##  2:          No training          8 8 PM - Midnight
##  3: more than 5 years of training      8 8 PM - Midnight
##  4:          No training          7 8 PM - Midnight
##  5:          No training          5      8 AM - Noon
## ---
## 107:          No training          0      4 PM - 8 PM
## 108:          1-2 years of training      6      4 AM - 8 AM
## 109:          3- 5 years of training      4      8 AM - Noon
## 110:          No training          6      4 PM - 8 PM
## 111: more than 5 years of training      5      8 AM - Noon
##          post_treatment_score treatment          email
##  1:          5          0      Rupagill@hotmail.com
##  2:          4          0      sunderamkh@yahoo.com
##  3:          9          1      chitra.agastya@gmail.com
##  4:          6          1      b,venkataramani@gmail.com
##  5:          3          0
## ---
## 107:          0          1      ravi 1962vs@gmail.com
## 108:          5          0      bajjisw4@gmail.com
## 109:          5          1
## 110:          7          1
## 111:          9          0
##          score_difference
##  1:          -2
##  2:          -4
##  3:          1
##  4:          -1
##  5:          -2
## ---
## 107:          0
## 108:          -1
## 109:          1
## 110:          1
## 111:          4
```

```
model_post_treatment_score <- lm(post_treatment_score ~ treatment, data = d)
model_score_difference <- lm(score_difference ~ treatment, data = d)
```

```
summary(model_post_treatment_score)
```

```
##
## Call:
## lm(formula = post_treatment_score ~ treatment, data = d)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -6.7458 -1.0171  0.2542  1.2542  3.7115
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   6.7458     0.2585  26.092  <2e-16 ***
## treatment    -0.4573     0.3777  -1.211   0.229
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.986 on 109 degrees of freedom
## Multiple R-squared:  0.01327,    Adjusted R-squared:  0.004216
## F-statistic: 1.466 on 1 and 109 DF,  p-value: 0.2286
```

```
summary(model_score_difference)
```

```
##
## Call:
## lm(formula = score_difference ~ treatment, data = d)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -9.0577 -1.4068 -0.0577  0.9423  9.5932
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   0.4068     0.3564   1.141   0.256
## treatment    -0.3491     0.5208  -0.670   0.504
##
## Residual standard error: 2.738 on 109 degrees of freedom
## Multiple R-squared:  0.004105,    Adjusted R-squared:  -0.005031
## F-statistic: 0.4493 on 1 and 109 DF,  p-value: 0.5041
```

```
## Time of Day
```

```
# post-treatment score only
```

```
model_score_post_score_tod <- lm(post_treatment_score ~ treatment + time_of_day + treatment*time_of_day
summary(model_score_post_score_tod)
```

```
##
## Call:
## lm(formula = post_treatment_score ~ treatment + time_of_day +
##      treatment * time_of_day, data = d)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
```

```

## -7.1500 -1.1500 0.2727 0.8500 4.0909
##
## Coefficients:
##
## Estimate Std. Error t value Pr(>|t|)
## (Intercept) 5.000 2.053 2.436 0.0167
## treatment 2.000 2.903 0.689 0.4925
## time_of_day4 PM - 8 PM 2.150 2.103 1.022 0.3092
## time_of_day8 AM - Noon 1.727 2.144 0.806 0.4224
## time_of_day8 PM - Midnight 1.500 2.153 0.697 0.4876
## time_of_dayMidnight - 4 AM 3.000 2.903 1.033 0.3039
## time_of_dayNoon - 4 PM 1.437 2.116 0.679 0.4985
## treatment:time_of_day4 PM - 8 PM -2.842 2.994 -0.949 0.3447
## treatment:time_of_day8 AM - Noon -2.227 3.027 -0.736 0.4636
## treatment:time_of_day8 PM - Midnight -2.167 3.033 -0.714 0.4767
## treatment:time_of_dayMidnight - 4 AM -3.667 3.748 -0.978 0.3303
## treatment:time_of_dayNoon - 4 PM -2.528 3.012 -0.839 0.4033
##
## (Intercept) *
## treatment
## time_of_day4 PM - 8 PM
## time_of_day8 AM - Noon
## time_of_day8 PM - Midnight
## time_of_dayMidnight - 4 AM
## time_of_dayNoon - 4 PM
## treatment:time_of_day4 PM - 8 PM
## treatment:time_of_day8 AM - Noon
## treatment:time_of_day8 PM - Midnight
## treatment:time_of_dayMidnight - 4 AM
## treatment:time_of_dayNoon - 4 PM
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.053 on 99 degrees of freedom
## Multiple R-squared: 0.04237, Adjusted R-squared: -0.06403
## F-statistic: 0.3982 on 11 and 99 DF, p-value: 0.9538
# difference in scores
model_score_difference_tod <- lm(score_difference ~ treatment + time_of_day + treatment*time_of_day, data = d)
summary(model_score_difference_tod)

##
## Call:
## lm(formula = score_difference ~ treatment + time_of_day + treatment *
## time_of_day, data = d)
##
## Residuals:
## Min 1Q Median 3Q Max
## -7.1818 -1.1875 -0.1667 0.9115 9.9000
##
## Coefficients:
##
## Estimate Std. Error t value Pr(>|t|)
## (Intercept) -1.000 2.659 -0.376 0.7076
## treatment 8.000 3.760 2.128 0.0358
## time_of_day4 PM - 8 PM 1.400 2.724 0.514 0.6085
## time_of_day8 AM - Noon 2.000 2.777 0.720 0.4731

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## time_of_day8 PM - Midnight          1.100      2.788    0.395    0.6941
## time_of_dayMidnight - 4 AM          3.000      3.760    0.798    0.4268
## time_of_dayNoon - 4 PM              1.188      2.740    0.433    0.6657
## treatment:time_of_day4 PM - 8 PM    -7.323      3.877   -1.889    0.0618
## treatment:time_of_day8 AM - Noon     -8.667      3.920   -2.211    0.0293
## treatment:time_of_day8 PM - Midnight -7.933      3.928   -2.020    0.0461
## treatment:time_of_dayMidnight - 4 AM -11.333      4.854   -2.335    0.0216
## treatment:time_of_dayNoon - 4 PM     -10.006      3.901   -2.565    0.0118
##
## (Intercept)
## treatment *
## time_of_day4 PM - 8 PM
## time_of_day8 AM - Noon
## time_of_day8 PM - Midnight
## time_of_dayMidnight - 4 AM
## time_of_dayNoon - 4 PM
## treatment:time_of_day4 PM - 8 PM .
## treatment:time_of_day8 AM - Noon *
## treatment:time_of_day8 PM - Midnight *
## treatment:time_of_dayMidnight - 4 AM *
## treatment:time_of_dayNoon - 4 PM *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.659 on 99 degrees of freedom
## Multiple R-squared:  0.1472, Adjusted R-squared:  0.0524
## F-statistic: 1.553 on 11 and 99 DF, p-value: 0.1249

# difference in scores
model_score_difference_tod2 <- lm(score_difference ~ treatment + time_of_day , data = d)
summary(model_score_difference_tod2)

##
## Call:
## lm(formula = score_difference ~ treatment + time_of_day, data = d)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -8.156 -1.333  0.028  1.191  9.666
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      3.1808     1.9405   1.639   0.104
## treatment        -0.3615     0.5248  -0.689   0.492
## time_of_day4 PM - 8 PM -2.3717     1.9809  -1.197   0.234
## time_of_day8 AM - Noon -2.3400     2.0046  -1.167   0.246
## time_of_day8 PM - Midnight -2.8472     2.0083  -1.418   0.159
## time_of_dayMidnight - 4 AM -3.4096     2.3585  -1.446   0.151
## time_of_dayNoon - 4 PM  -3.6631     1.9932  -1.838   0.069 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.719 on 104 degrees of freedom
## Multiple R-squared:  0.06277, Adjusted R-squared:  0.008704
## F-statistic: 1.161 on 6 and 104 DF, p-value: 0.333

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```

# difference in scores
model_score_difference_tod3 <- lm(score_difference ~ treatment + time_of_day + age + treatment*time_of_
summary(model_score_difference_tod3)

##
## Call:
## lm(formula = score_difference ~ treatment + time_of_day + age +
##      treatment * time_of_day, data = d)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -6.596 -1.317 -0.191  1.324  9.871
##
## Coefficients:
##                                Estimate Std. Error t value Pr(>|t|)
## (Intercept)                   -1.0000     2.6726  -0.374   0.7091
## treatment                      8.0000     3.7797   2.117   0.0369
## time_of_day4 PM - 8 PM         1.4721     2.7476   0.536   0.5933
## time_of_day8 AM - Noon         2.3127     2.8167   0.821   0.4136
## time_of_day8 PM - Midnight     1.1292     2.8124   0.402   0.6889
## time_of_dayMidnight - 4 AM     3.0000     3.7797   0.794   0.4293
## time_of_dayNoon - 4 PM         1.1610     2.7578   0.421   0.6747
## age5 - 21 years                0.1414     0.6701   0.211   0.8334
## ageOlder than 55 years        -0.7161     0.7937  -0.902   0.3691
## treatment:time_of_day4 PM - 8 PM -7.2625     3.8983  -1.863   0.0655
## treatment:time_of_day8 AM - Noon -9.0264     3.9581  -2.281   0.0248
## treatment:time_of_day8 PM - Midnight -7.9382     3.9493  -2.010   0.0472
## treatment:time_of_dayMidnight - 4 AM -11.0946     4.8867  -2.270   0.0254
## treatment:time_of_dayNoon - 4 PM  -9.8490     3.9258  -2.509   0.0138
##
## (Intercept)
## treatment                      *
## time_of_day4 PM - 8 PM
## time_of_day8 AM - Noon
## time_of_day8 PM - Midnight
## time_of_dayMidnight - 4 AM
## time_of_dayNoon - 4 PM
## age5 - 21 years
## ageOlder than 55 years
## treatment:time_of_day4 PM - 8 PM      .
## treatment:time_of_day8 AM - Noon      *
## treatment:time_of_day8 PM - Midnight *
## treatment:time_of_dayMidnight - 4 AM *
## treatment:time_of_dayNoon - 4 PM      *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.673 on 97 degrees of freedom
## Multiple R-squared:  0.1555, Adjusted R-squared:  0.0423
## F-statistic: 1.374 on 13 and 97 DF,  p-value: 0.1861

# difference in scores
model_score_difference_tod4 <- lm(score_difference ~ treatment + time_of_day + age + treatment*time_of_
summary(model_score_difference_tod4)

```

```
##
## Call:
## lm(formula = score_difference ~ treatment + time_of_day + age +
##     treatment * time_of_day + treatment * age, data = d)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -6.7801 -1.3205 -0.0182  1.2221  9.6984
##
## Coefficients:
##                                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)                        -1.0000     2.6908  -0.372   0.7110
## treatment                          8.0000     3.8054   2.102   0.0382
## time_of_day4 PM - 8 PM              1.6310     2.7742   0.588   0.5580
## time_of_day8 AM - Noon              2.4620     2.8591   0.861   0.3913
## time_of_day8 PM - Midnight          1.3016     2.8395   0.458   0.6477
## time_of_dayMidnight - 4 AM          3.0000     3.8054   0.788   0.4325
## time_of_dayNoon - 4 PM              1.2545     2.7788   0.451   0.6527
## age5 - 21 years                    -0.3571     0.9055  -0.394   0.6942
## ageOlder than 55 years              -0.9450     1.1049  -0.855   0.3946
## treatment:time_of_day4 PM - 8 PM   -7.6156     3.9545  -1.926   0.0571
## treatment:time_of_day8 AM - Noon   -9.3812     4.0165  -2.336   0.0216
## treatment:time_of_day8 PM - Midnight -8.2835     3.9984  -2.072   0.0410
## treatment:time_of_dayMidnight - 4 AM -11.1697     4.9279  -2.267   0.0257
## treatment:time_of_dayNoon - 4 PM   -9.9834     3.9579  -2.522   0.0133
## treatment:age5 - 21 years           1.1147     1.3583   0.821   0.4139
## treatment:ageOlder than 55 years    0.4540     1.6001   0.284   0.7772
##
## (Intercept)
## treatment *
## time_of_day4 PM - 8 PM
## time_of_day8 AM - Noon
## time_of_day8 PM - Midnight
## time_of_dayMidnight - 4 AM
## time_of_dayNoon - 4 PM
## age5 - 21 years
## ageOlder than 55 years
## treatment:time_of_day4 PM - 8 PM .
## treatment:time_of_day8 AM - Noon *
## treatment:time_of_day8 PM - Midnight *
## treatment:time_of_dayMidnight - 4 AM *
## treatment:time_of_dayNoon - 4 PM *
## treatment:age5 - 21 years
## treatment:ageOlder than 55 years
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.691 on 95 degrees of freedom
## Multiple R-squared:  0.1616, Adjusted R-squared:  0.02923
## F-statistic: 1.221 on 15 and 95 DF, p-value: 0.2702
# difference in scores
model_score_difference_tod5 <- lm(score_difference ~ treatment + time_of_day + music_training + treatment
summary(model_score_difference_tod5)
```

```
##
## Call:
## lm(formula = score_difference ~ treatment + time_of_day + music_training +
##     treatment * time_of_day, data = d)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -7.0504 -1.5986 -0.0902  1.0939  9.9138
##
## Coefficients:
##                                     Estimate Std. Error t value
## (Intercept)                       -1.0000     2.6477   -0.378
## treatment                          8.5276     3.8687    2.204
## time_of_day4 PM - 8 PM              1.3357     2.8240    0.473
## time_of_day8 AM - Noon              1.4934     2.8744    0.520
## time_of_day8 PM - Midnight          1.0862     2.8782    0.377
## time_of_dayMidnight - 4 AM          3.5276     3.8687    0.912
## time_of_dayNoon - 4 PM              1.3004     2.8250    0.460
## music_training3- 5 years of training -0.5276     0.9726   -0.542
## music_trainingmore than 5 years of training -0.4119     0.9284   -0.444
## music_trainingNo training           0.6649     0.8810    0.755
## treatment:time_of_day4 PM - 8 PM    -7.7935     3.9879   -1.954
## treatment:time_of_day8 AM - Noon    -8.4702     4.0267   -2.104
## treatment:time_of_day8 PM - Midnight -8.5236     4.0554   -2.102
## treatment:time_of_dayMidnight - 4 AM -12.4728     5.0847   -2.453
## treatment:time_of_dayNoon - 4 PM   -10.7776     4.0180   -2.682
##                                     Pr(>|t|)
## (Intercept)                       0.70650
## treatment                          0.02990 *
## time_of_day4 PM - 8 PM              0.63731
## time_of_day8 AM - Noon              0.60457
## time_of_day8 PM - Midnight          0.70670
## time_of_dayMidnight - 4 AM          0.36414
## time_of_dayNoon - 4 PM              0.64632
## music_training3- 5 years of training 0.58878
## music_trainingmore than 5 years of training 0.65825
## music_trainingNo training           0.45223
## treatment:time_of_day4 PM - 8 PM    0.05358 .
## treatment:time_of_day8 AM - Noon    0.03803 *
## treatment:time_of_day8 PM - Midnight 0.03819 *
## treatment:time_of_dayMidnight - 4 AM 0.01597 *
## treatment:time_of_dayNoon - 4 PM    0.00861 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.648 on 96 degrees of freedom
## Multiple R-squared:  0.1797, Adjusted R-squared:  0.06009
## F-statistic: 1.502 on 14 and 96 DF, p-value: 0.1248
```