

American obesity and Multiple Indicators

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Abstract

The obesity rate of a country is vital for society. The Behavioral Risk Factor Surveillance System from CDC provide a valuable opportunity to analysis the obesity rate of American. The reason..., The effect of obesity...

introduction

The obesity rate of a country is vital for society and plays such an indisputably important role in human life. The rising obesity rates in developed countries have brought continuous challenges to their policymakers. The United States of America, as one of the most powerful nations around the world, has been facing the highest obesity rate overall OECD Countries in the past decades(Marion Devaux and Colombo (2017)).Over 36.2% of population is obese in 2017. Further investigation into what causes such a high rate and how the obesity rate impacts individuals' lives is urgent.

A regular daily routine, including sleep and exercise, are essential to a healthy life(Karen R. Segal (1989)). We all know that energy is counted in calories. Too many calories in but fewer calories burned will cause energy imbalance and lead to obesity. Highly active and sedentary individuals have a significant difference in their weight if we remove other factors and group them appropriately. Mental health is straightly related to one's obesity as well. Individuals with PTSD were 5% less likely to have healthy diets(Berk-Clark C (2017)). In the long run, it will destroy various body functions, resulting in the accumulation of fat in the body, thereby causing obesity. Besides, pregnancy for women and alcohol for men are also very strong relevance to the obesity rate. The recent data and analysis from the mentioned factors conducted in America remain inadequate.

This paper examines... The remaining part of the paper was organized into ...

data

Should I keep the model with only 2 factors and show it on a graph or fit a model with 7 or 8 factors just like sta302 did? Here is some work.

```
head(data_full)
```

```
##   X_BMI5 INCOME2 EDUCA SLEPTIM1 MENTHLTH GENHLTH EXERANY2 AVEDRNK3 SEXVAR
## 1    2837      7     6      8     88      2      1      1      1
## 2    2918      8     6      6     88      2      1      2      2
## 3    1813      8     6      8     88      1      1      1      1
## 4    2890      5     5      7      5      2      2      1      2
## 5    2582      7     4      8     30      4      1      1      1
## 6    3166      8     6      5     88      2      1      2      1
```

" _BMI5 _BMI5CAT

SEXVAR INCOME2 EDUCA SLEPTIM1 MENTHLTH GENHLTH EXERANY2 ALCDAY5 AVEDRNK3"
hope to get some help on how to do the model QAQ.

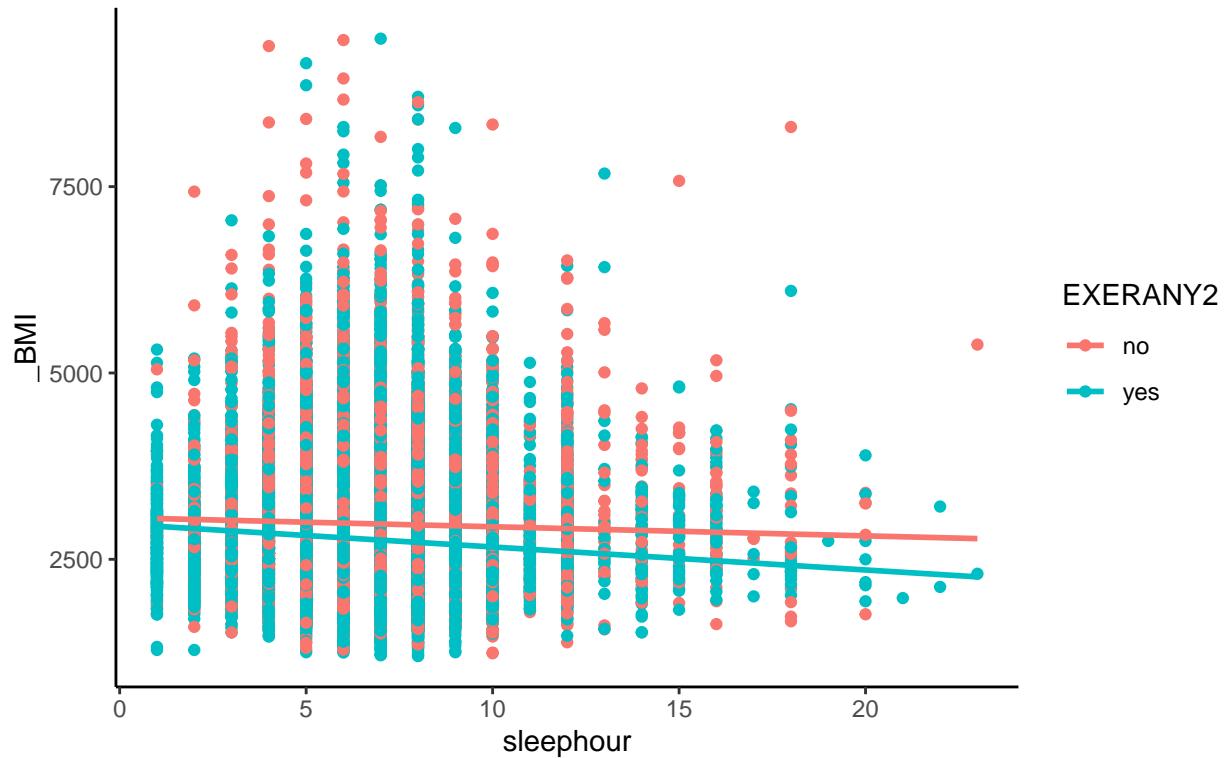
```
##
## Call:
## lm(formula = X_BMI5 ~ SLEPTIM1 + EXERANY2, data = data_full)
##
## Residuals:
##       Min     1Q Median     3Q    Max
## -2182.5 -396.0 -100.0  289.7 6722.0
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 2604.4848    4.4872 580.431 < 2e-16 ***
## SLEPTIM1     -1.6799    0.2596 -6.472  9.7e-11 ***
## EXERANY2     170.2333   3.3105  51.422 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 589.3 on 180824 degrees of freedom
## Multiple R-squared:  0.01451, Adjusted R-squared:  0.0145
## F-statistic:  1331 on 2 and 180824 DF, p-value: < 2.2e-16
##
## SLEPTIM1 EXERANY2
## 1.001787 1.001787
##
## # A tibble: 180,827 x 15
##   X_BMI5 INCOME2 EDUCA SLEPTIM1 MENTHLTH GENHLTH EXERANY2 AVEDRNK3 SEXVAR
##   <int>    <int> <int>    <int>    <int>    <int>    <int>    <int>
## 1    1    2837      7     6      8     88      2      1      1
## 2    2    2918      8     6      6     88      2      1      2
## 3    3    1813      8     6      8     88      1      1      1
## 4    4    2890      5     5      7      5      2      2      1
## 5    5    2582      7     4      8     30      4      1      1
## 6    6    3166      8     6      5     88      2      1      2
```

```

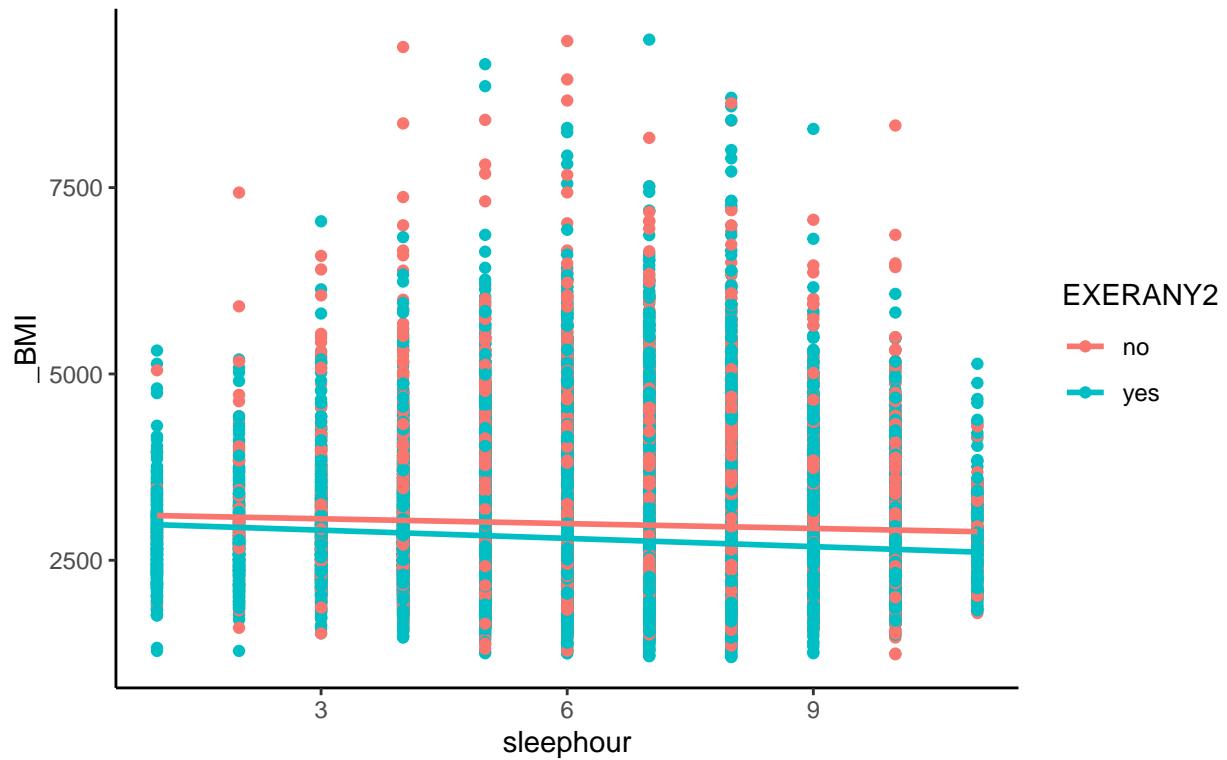
## 7 3067     8     4     8     4     4     1     1     2
## 8 1902     8     5     9     5     2     1     1     2
## 9 3897    77     2     6    88     3     2    88     2
## 10 2260    8     4     8    10     2     2     1     2
## # ... with 180,817 more rows, and 6 more variables: .fitted <dbl>,
## #   .resid <dbl>, .hat <dbl>, .sigma <dbl>, .cooks.d <dbl>, .std.resid <dbl>

```

Relationship between the Age (in years) of respondent and Average diastolic blood pressure value in different sex

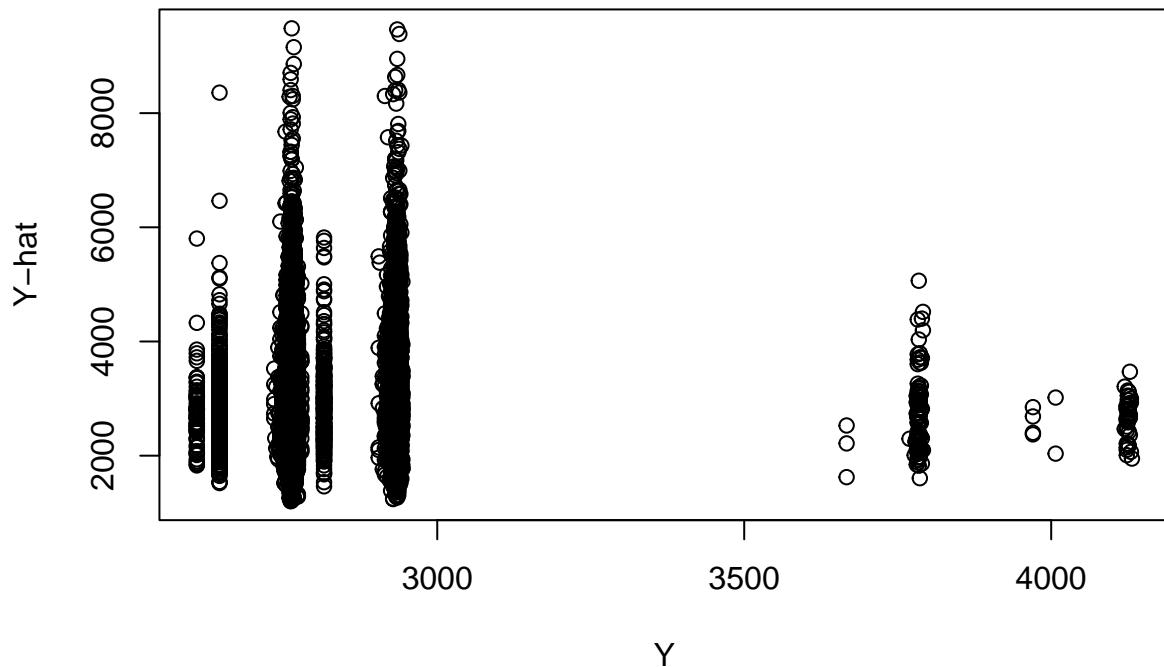


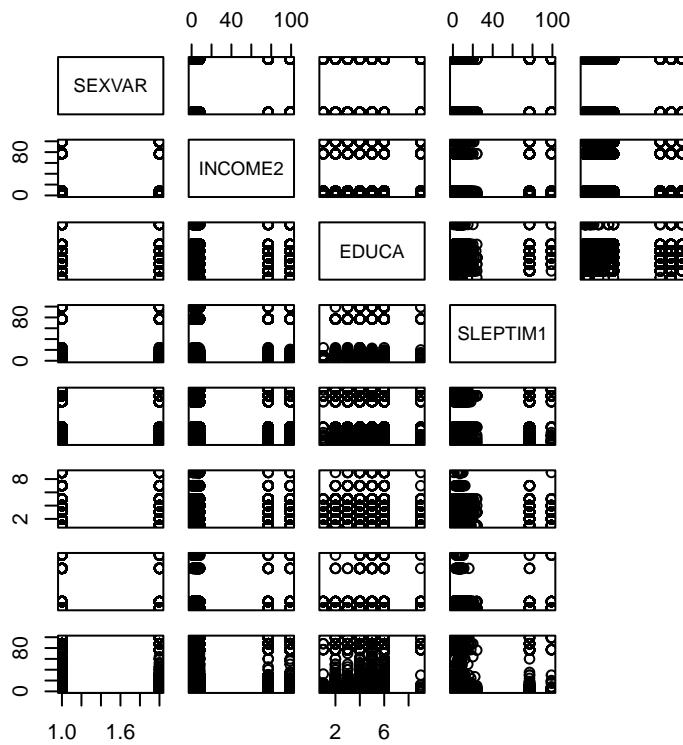
Relationship between the Age (in years) of respondent and Average diastolic blood pressure value in different sex



full model

Y v.s. \hat{Y} -hat



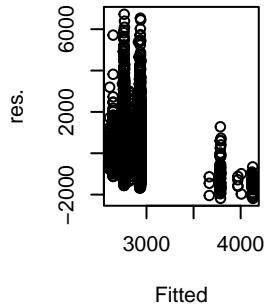


```

## bcPower Transformations to Multinormality
##   Est Power Rounded Pwr Wald Lwr Bnd Wald Upr Bnd
## Y1 -0.6286     -0.63    -0.6463    -0.6109
## Y2 -0.4429     -0.44    -0.4660    -0.4198
## Y3 -0.3678     -0.37    -0.3710    -0.3646
## Y4  2.1496      2.15    2.1296    2.1696
## Y5 -0.2688     -0.27    -0.2730    -0.2646
## Y6  0.7024      0.70    0.6971    0.7077
## Y7  0.3591      0.36    0.3495    0.3686
## Y8 -8.2732     -8.27   -8.3135   -8.2328
## Y9 -0.7813     -0.78   -0.7877   -0.7748
##
## Likelihood ratio test that transformation parameters are equal to 0
## (all log transformations)
##                               LRT df      pval
## LR test, lambda = (0 0 0 0 0 0 0 0) 605323.4 9 < 2.22e-16
## 
## Likelihood ratio test that no transformations are needed
##                               LRT df      pval
## LR test, lambda = (1 1 1 1 1 1 1 1) 2216621 9 < 2.22e-16

```

Res v.s. Fitted

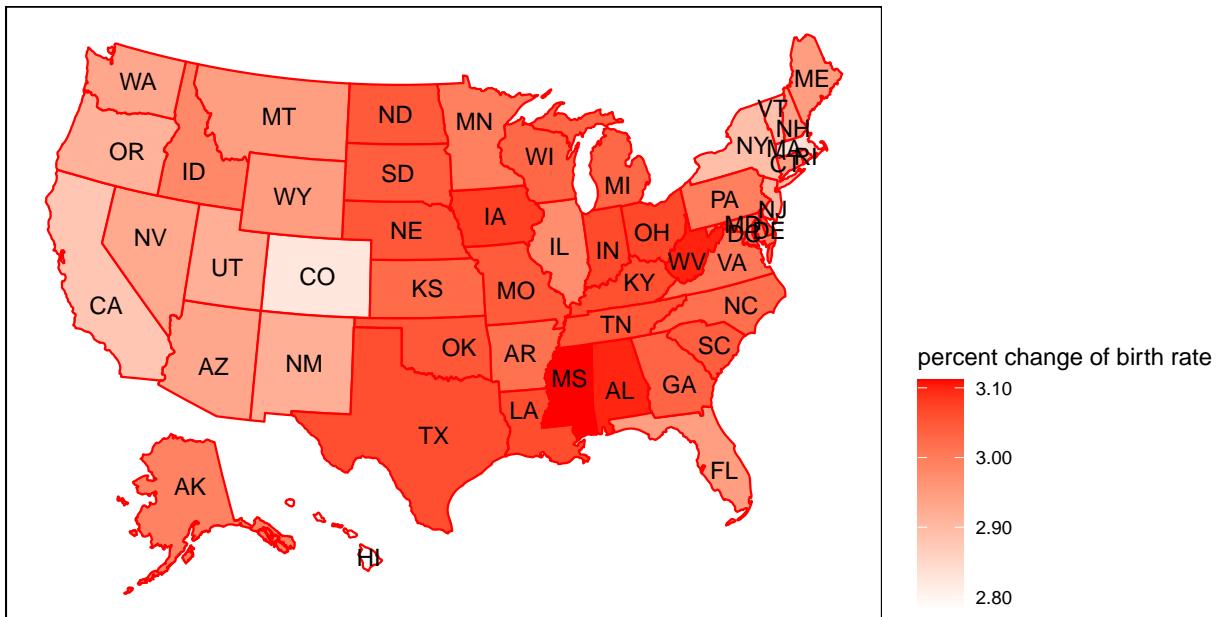


```
##  
## Call:  
## lm(formula = X_BMI5 ~ SEXVAR + SLEPTIM1 + GENHLTH + EXERANY2 +  
##       INCOME2 + EDUCA + MENTHLTH + AVEDRNK3, data = data_full_mutated)  
##  
## Residuals:  
##      Min        1Q     Median        3Q       Max  
## -0.0095461 -0.0011548  0.0000145  0.0011681  0.0101522  
##  
## Coefficients:  
##              Estimate Std. Error t value Pr(>|t|)  
## (Intercept) 2.241e-02 5.068e-05 442.082 < 2e-16 ***  
## SEXVAR      -1.150e-03 3.033e-05 -37.905 < 2e-16 ***  
## SLEPTIM1    7.480e-06 8.003e-07   9.347 < 2e-16 ***  
## GENHLTH    -1.999e-03 2.348e-05 -85.132 < 2e-16 ***  
## EXERANY2    3.577e-04 1.189e-05  30.078 < 2e-16 ***  
## INCOME2     -2.840e-04 3.110e-05  -9.134 < 2e-16 ***  
## EDUCA       3.979e-06 4.916e-07   8.096 5.73e-16 ***  
## MENTHLTH   -2.958e-06 5.876e-07  -5.035 4.78e-07 ***  
## AVEDRNK3    1.283e-04 1.343e-05   9.551 < 2e-16 ***  
## ---  
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
##  
## Residual standard error: 0.001816 on 180818 degrees of freedom  
## Multiple R-squared:  0.0682, Adjusted R-squared:  0.06816  
## F-statistic: 1654 on 8 and 180818 DF,  p-value: < 2.2e-16
```

```
## SEXVAR SLEPTIM1 GENHLTH EXERANY2 INCOME2      EDUCA MENTHLTH AVEDRNK3
## 1.079466 1.003233 1.103803 1.083785 1.039414 1.111816 1.052735 1.076966
```

DIABETE4 MARITAL CVDINFR4

average obesity in each state



Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [appropriate data year or years].

Berk-Clark C, Walls J van den, Secrest S. 2017. "Association Between Posttraumatic Stress Disorder and Lack of Exercise, Poor Diet, Obesity, and Co-Occurring Smoking: A Systematic Review and Meta-Analysis." <https://www.oecd.org/els/health-systems/Obesity-Update-2017.pdf>.

Karen R. Segal, F. Xavier Pi-Sunyer. 1989. "Exercise and Obesity" 73. <https://doi.org/https://doi.org/10.1037/he00000593>.

Marion Devaux, Yevgeniy Goryakin, Sahara Graf, and Francesca Colombo. 2017. "Obesity Update 2017 - OECD." <https://www.oecd.org/els/health-systems/Obesity-Update-2017.pdf>.