

Weather Data and Time-Series Emotions Among High School Students

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Introduction

The rising awareness of developing and understanding emotional intelligence in pre-college education has created a large opportunity for data scientists to uncover ways in which student's emotions are affected and the dynamic nature of their existence. For this project, I intend to address two separate questions: *How do emotions in high school students at time t affect their emotions at time $t+1$? & How does the weather affect student's emotions at a given time period?* Insights gained from these analyses can affect the way teachers think about their students emotions, and further improve and optimize pre-college education.

The Dataset and Programming Language

In order to find a dataset that would help in answering the above questions, I collaborated with Julia Moeller in the Emotional Intelligence department. With her help, I procured a dataset of emotional responses from 472 different high school students in the Connecticut area (18,610 responses in total). Students were prompted to record their emotions three times per school day on their cell phone from May 9, 2016 to June 10, 2016. The average student age was 15.8, with 71.2% of sample responses coming from females. Grade levels are fairly equally represented, with the exception of 13.1% of responses coming from high school seniors (average: 25%). 13.8% of students came from low-income schools, and 86.2% came from middle-to-high income schools. Students were offered a \$40 Amazon gift card if they participated in more than 90% of the available surveys.

In answering the second part of my question, I needed to obtain detailed weather reports. To achieve this, I requested exports from the National Oceanic and Atmospheric Association (NOAA) <https://www.ncdc.noaa.gov/wct/>. In addition, I retrieved humidity and visibility measures from Weather Underground <https://www.wunderground.com/>. I chose to examine weather from Meriden Markham Municipal Airport and Sikorsky Municipal Airport, as one of those locations fell within 15 miles from all of the schools surveyed.

Almost all data analysis is performed using the R statistical computing language, with RStudio as an IDE. However, some network analysis and visualization is performed by using Gephy.

NOTE: For brevity's sake, some non-essential code will not be included in this document. However, a full RMarkdown script containing all code will come attached to this report.

Part 1: Time-Series Emotional Management

Before I would be able to run any analysis on the dataset. Substantial data cleaning had to be performed, in order to get the data into an operable state. One row of data is equivalent to one survey result.

```
## Reading in data from SPSS file and subsetting with columns that are necessary
## install.packages("foreign")
library(foreign) #Library that helps to read in SPSS files
options(warn=-1) #Non-vital warnings are suppressed
x <- read.spss(file = "dataset.sav", to.data.frame = T)
y <- x[x$BG_OR_ESM=="ESM",]
beep <- y[,709:740]
beep[6,] # An example of a row of data
```

```
## BG_OR_ESM EXPERIENCESAMPLINGVARIABLESBELOW Participant Date
## 519 ESM NA 19442 5/10/16
## Day Time Session_Name Responded Completed_Session
## 519 Tuesday 10:32:39_AM Day_survey 1 1
## Session_Instance Location Act_School Act_Home Act_Other LessonSubj
## 519 1 1 2 NA NA 3
## enthusiast_ESM happy_ESM interested_ESM curious_ESM calm_ESM
## 519 2 4 4 1 3
## relaxed_ESM frustrated_ESM anxious_ESM afraid_ESM tired_ESM sad_ESM
## 519 2 2 2 2 2 2
## bored_ESM stressed_ESM challenge_ESM skills_ESM choice interact1
## 519 3 2 3 3 3 1
```

Next, emotions are anonymized A-P, and a columns A2-P2 are initialized. A2-P2 will contain a participant's emotion A-P at time $t+1$. The **date_coded** column of the data frame will be used shortly to identify the relative date of an individuals series of responses.

Some entries were taken in the evening, however since the focus is to examine student's emotions in an education setting, those entries are removed.

Next, the data frame is split into a list, sorted by their participant ID. This ID is a way to collate all of the ESM responses from a given individual.

```
beep2 <- split(beep,beep$Participant)
```

The loop below fills in the **date_coded** column of the data frame, starting with '1' for each survey response recorded on the day a participant began the survey. An example Date vs. **date_coded** vector for a participant can be found below. This transformation just makes it easier to calculate t vs. $t+1$ correlations.

```
## Coding dates
M <- length(beep2) # Number of participants, 472
for(i in 1:M){
  N <- dim(beep2[[i]])[1] # Number of responses from an individual 'i'
  temp <- 1 # To signify 1st entry from a survey
  init <- as.numeric(beep2[[i]]$Date[1]) # The first date that someone responds to a survey
  for(j in 1:N){
    tempdate <- as.numeric(beep2[[i]]$Date[j])
    if(tempdate > init){ #If the date on entry j is the next day
      init <- tempdate # The counter 'init' become the new date
      temp <- temp + 1
    }
    beep2[[i]]$date_coded[j] <- temp
  }
}
beep2[[4]]$Date[1:10]
```

```
## [1] 5/10/16 5/10/16 5/10/16 5/10/16 5/11/16 5/11/16 5/12/16 5/12/16
## [9] 5/13/16 5/13/16
## 28 Levels: 5/10/16 5/11/16 5/12/16 5/13/16 5/16/16 ... 6/9/16
beep2[[4]]$date_coded[1:10]
```

```
## [1] 1 1 1 1 2 2 3 3 4 4
```

Looping through each participant and then their survey responses, A2-P2 values are recorded. If consecutive entries occur on different days, then A2-P2 are not recorded, since the interest is more-focused on within-day relationship between emotions. Including inter-day emotional carryover could pose problems to any underlying conclusions the data may present.

```

## Loop for filling in emotions at time t+1
for(i in 1:M){ # Number of participants
  N <- dim(beep2[[i]])[1] # Number of responses from participant 'i'
  if(N > 1){ # Cannot record emotion at t+1 if there is only one response
    for(j in 1:(N-1)){
      if(beep2[[i]]$date_coded[j]==
        beep2[[i]]$date_coded[j+1]){ # If the next session is in the same day
        beep2[[i]][j,35:50] <-
          beep2[[i]][(j+1),16:31] # Today's A2-P2 equals next session's A-P
      }
    }
  }
}
}

```

In order to interpret how well certain emotions are at predicting others, a coefficient matrix is created. This matrix records all

$$\beta$$

coefficient values of the linear regression:

$$E_{t+1} = \beta * E_t + C$$

for all emotion combinations A-P. Coefficients with a significance level below 0.05 are removed.

##	Enthusiastic2	Happy2	Interested2	Curious2	Calm2
## Enthusiastic	0.38548502	0.27445929	0.29574812	0.22058641	0.18862111
## Happy	0.25887987	0.42424620	0.24018161	0.10891643	0.27712679
## Interested	0.28420373	0.23063510	0.32992271	0.22869685	0.16173507
## Curious	0.24888296	0.12630974	0.29946749	0.35992064	0.07796044
## Calm	0.15898410	0.26781035	0.15875124	0.05855822	0.41694551
## Relaxed	0.18379640	0.28370181	0.17373230	0.04801084	0.38283238
## Frustrated	-0.04252047	-0.15014007	-0.04496931	0.05562897	-0.19107329
## Anxious	-0.02930561	-0.13231860	-0.02746401	0.05914663	-0.18515460
## Afraid	0.03305159	-0.12735769	NA	0.14365081	-0.19412033
## Tired	-0.09298235	-0.06987499	-0.07643181	-0.03738219	-0.09321943
## Sad	-0.07053614	-0.21801205	-0.08607173	0.04836273	-0.23626405
## Bored	-0.08929789	-0.07674009	-0.08807237	-0.04264221	-0.04679337
## Stressed	-0.09020600	-0.14275527	-0.09090085	NA	-0.20980764
## Challenged	NA	-0.05797434	NA	0.05335098	-0.11302788
## Skilled	0.08194971	0.11839820	0.08728312	0.03006216	0.13880673
## Choice	0.06225611	0.10807697	0.06321899	0.03110788	0.10352915
##	Relaxed2	Frustrated2	Anxious2	Afraid2	Tired2
## Enthusiastic	0.21372126	-0.07572315	-0.05831317	0.02001972	-0.17785782
## Happy	0.31295143	-0.17355674	-0.16643710	-0.08859437	-0.13693466
## Interested	0.18122455	-0.06067360	-0.02791683	NA	-0.13439334
## Curious	0.11239370	0.05662512	0.05418537	0.11215589	-0.10501984
## Calm	0.40083628	-0.21979409	-0.24702153	-0.15243560	-0.15569952
## Relaxed	0.39675071	-0.22795751	-0.24234315	-0.13494941	-0.16826395
## Frustrated	-0.19682085	0.38220701	0.31390160	0.18771074	0.20709815
## Anxious	-0.19050288	0.30382875	0.48344073	0.20329670	0.19618166
## Afraid	-0.17035736	0.31636444	0.32581096	0.41353712	0.05973055
## Tired	-0.10394839	0.15191944	0.15609503	0.01811688	0.57350907
## Sad	-0.24055012	0.34121197	0.30015791	0.25891438	0.19232055
## Bored	-0.06689353	0.10235269	0.09962953	0.02592106	0.25336321
## Stressed	-0.22739906	0.28049273	0.32318289	0.13501300	0.35258894
## Challenged	-0.11339840	0.16586429	0.17665617	0.11400576	0.08061561

## Skilled	0.14301810	-0.06690179	-0.04153419	-0.09371221	NA
## Choice	0.11784903	-0.07277587	-0.04576415	-0.03215387	-0.07975354
##	Sad2	Bored2	Stressed2	Challenged2	Skilled2
## Enthusiastic	-0.08212603	-0.10990972	-0.17918001	NA	0.11349967
## Happy	-0.19793166	-0.08010860	-0.22373636	-0.04313684	0.15851867
## Interested	-0.08383347	-0.10344171	-0.13691902	0.02654282	0.12191616
## Curious	0.03950138	-0.07049390	-0.04460374	0.07947679	0.04831246
## Calm	-0.20286251	-0.04033605	-0.33102027	-0.09888520	0.18520071
## Relaxed	-0.20059924	-0.07043108	-0.33247266	-0.09541455	0.18669349
## Frustrated	0.25913150	0.13043103	0.37608496	0.10542462	-0.07404256
## Anxious	0.20574457	0.10756111	0.38547046	0.11780111	-0.02780427
## Afraid	0.31213062	0.03783211	0.26346148	0.12791272	-0.13090077
## Tired	0.11037986	0.22411151	0.34671172	0.03845611	NA
## Sad	0.48419183	0.13321452	0.34775828	0.11700479	-0.12982623
## Bored	0.10033140	0.29835026	0.16265238	NA	-0.03265194
## Stressed	0.20272758	0.16236655	0.54959237	0.10315850	-0.03841501
## Challenged	0.11549413	0.04383634	0.19856749	0.22265833	-0.05416894
## Skilled	-0.08455323	NA	-0.04439329	-0.04554566	0.50726355
## Choice	-0.04618993	-0.04909746	-0.09852736	-0.04107376	0.11462063
##	Choice2				
## Enthusiastic	0.10674689				
## Happy	0.15490288				
## Interested	0.10281306				
## Curious	0.07499673				
## Calm	0.17545899				
## Relaxed	0.17921760				
## Frustrated	-0.08203961				
## Anxious	-0.05318374				
## Afraid	-0.07642457				
## Tired	-0.04529785				
## Sad	-0.06640281				
## Bored	-0.06008066				
## Stressed	-0.09762712				
## Challenged	-0.06015926				
## Skilled	0.14155413				
## Choice	0.31995885				

These coefficients are now used to create a network analysis of emotions. The network was created by Julia Moeller in the network software Gephy. EXPLAIN HOW THE NETWORK DIAGRAM WORKS ONCE YOU GET IT.

Part 2: Emotions and Weather

Our next exploration hopes to glean insights about emotion dynamics at different types of weather. It is well-documented, however, that emotions on an individual level can be caused by many things, so we must proceed with caution as we attempt to draw our conclusions.

Before the data can be analyzed, the weather dataset must be merged with the ESM dataset. In order to merge weather data and ESM data, each ESM row was given an ID to determine which airport they would be sourcing the data from. This ID was based off of school. Columns were then created in the original ESM dataset to bring in the weather data. Weather & ESM data would be matched by date, and then empty weather columns in the ESM dataset would source their values from the weather data at a given airport at a given date.

Now that the data is cleaned and merged it is time to begin exploration on the dataset. This set contains

fourteen emotion measures and over twenty weather variables per observation, so we must hone our efforts. A two-pronged exploration approach is taken: numerical and visual. Using the mean emotion score as an initial measurement parameter, tables of means are constructed for each emotion at different: 1) average daily temperatures 2) daily humidity levels 3) daily visibility levels and 4) daily precipitation levels (rain). Then using the ggplot2 graphics package, these means are laid out on four separate plots in an effort to narrow the lens of focus.

Below is an example of how the means are calculated and laid out at the various temperatures. Code for other weather parameters is included in the R markdown.

```
cols <- 17
count <- 1
temps <- unique(esm$tempavg) # All the unique temperatures recorded
temps

## [1] 57 59 62 58 53 61 67 73 69 74 71 66 65 63 72

em_avg_temp <- matrix(ncol = cols,nrow=length(temps)) # Creating empty matrix
for(i in temps){
  em_avg_temp[count,1] <- i # First row is the temperature
  em_avg_temp[count,2] <- length(which(esm$tempavg==i)) # Second is # of observations
  em_avg_temp[count,3:cols] <-
    colMeans(esm[esm$tempavg==i,724:738], na.rm=T) #Column means are taken from subsetted data
  count <- count+1 # Move onto the next row in matrix
}
em_avg_temp <- em_avg_temp[order(em_avg_temp[,1]),] # Order matrix by ascending temp
em_avg_temp_df <- as.data.frame(em_avg_temp) # Make it a dataframe
colnames(em_avg_temp_df) <- c("tempavg","num_obs",names(esm)[724:738]) #Naming columns
em_avg_temp_df

##      tempavg num_obs enthusiast_ESM happy_ESM interested_ESM curious_ESM
## 1         53     956       1.911392   2.368201         2.025175     1.780726
## 2         57     659       2.056962   2.443975         2.309979     2.010638
## 3         58    2904       1.976007   2.420172         2.047576     1.774457
## 4         59    1970       1.976422   2.407202         2.085357     1.869958
## 5         61    1005       2.013106   2.458442         2.096859     1.822222
## 6         62    2885       1.871264   2.316007         1.994480     1.768310
## 7         63     748       1.914035   2.356766         2.000000     1.773852
## 8         65     970       1.951589   2.375000         2.013575     1.760968
## 9         66      58       2.068182   2.720930         2.227273     1.674419
## 10        67     982       1.900815   2.324288         2.027100     1.758152
## 11        69    1803       2.000740   2.513694         2.062268     1.705403
## 12        71     901       1.931193   2.294656         2.007657     1.749618
## 13        72     595       1.911162   2.311364         1.911162     1.746575
## 14        73    1938       1.929300   2.319756         1.970708     1.747613
## 15        74     236       1.942529   2.261364         1.887640     1.685393
##      calm_ESM relaxed_ESM frustrated_ESM anxious_ESM afraid_ESM tired_ESM
## 1  2.461752   2.301543       1.906031   2.021008     1.441176   2.895105
## 2  2.614894   2.458422       1.867238   2.072034     1.407249   2.963907
## 3  2.476902   2.374319       1.909379   1.992290     1.482556   2.771041
## 4  2.476784   2.371349       1.896600   2.013889     1.478834   2.785863
## 5  2.449673   2.392157       1.789267   1.938320     1.473890   2.644444
## 6  2.356057   2.245509       1.941962   2.050138     1.528302   2.821445
## 7  2.338028   2.317460       1.992970   2.126538     1.640845   2.670194
## 8  2.330827   2.268477       2.007519   2.058559     1.652108   2.621988
```

## 9	2.744186	2.795455	1.581395	1.909091	1.651163	2.181818
## 10	2.361789	2.282993	1.881954	1.994573	1.489824	2.728997
## 11	2.548889	2.549556	1.765185	1.910569	1.446006	2.585799
## 12	2.315549	2.303817	2.015267	2.085366	1.623476	2.611280
## 13	2.364253	2.304545	1.974828	2.078475	1.675057	2.625000
## 14	2.336283	2.273224	1.971311	2.065395	1.569775	2.699320
## 15	2.375000	2.261364	1.704545	1.943820	1.488636	2.348315
##	sad_ESM	bored_ESM	stressed_ESM	challenge_ESM	skills_ESM	
## 1	1.626928	2.406425	2.395775	1.841880	2.589158	
## 2	1.615711	2.419831	2.513800	1.817391	2.676087	
## 3	1.626304	2.335601	2.362443	1.834328	2.593664	
## 4	1.674548	2.367177	2.382536	1.905063	2.606892	
## 5	1.566406	2.258486	2.273560	1.828229	2.666223	
## 6	1.678309	2.410764	2.469238	1.874534	2.610462	
## 7	1.680141	2.277385	2.505300	1.996396	2.693841	
## 8	1.666163	2.255287	2.457831	1.981538	2.706790	
## 9	1.431818	2.023810	1.840909	1.627907	2.418605	
## 10	1.659864	2.359079	2.369418	1.951923	2.663912	
## 11	1.594235	2.172694	2.218519	1.713855	2.726244	
## 12	1.776758	2.287023	2.435976	1.911491	2.721617	
## 13	1.766440	2.309795	2.430524	1.941725	2.646370	
## 14	1.716814	2.353741	2.437926	1.859710	2.663209	
## 15	1.516854	2.284091	2.227273	1.875000	2.988636	
##	visibility	num_obs	enthusiast_ESM	happy_ESM	interested_ESM	curious_ESM
## 1	5	834	1.983713	2.526829	2.034202	1.700813
## 2	6	982	1.900815	2.324288	2.027100	1.758152
## 3	7	819	1.988764	2.511218	2.072464	1.768000
## 4	8	595	1.911162	2.311364	1.911162	1.746575
## 5	9	2644	1.921209	2.377293	2.022829	1.743411
## 6	10	12736	1.952121	2.372334	2.042442	1.797711
##	calm_ESM	relaxed_ESM	frustrated_ESM	anxious_ESM	afraid_ESM	tired_ESM
## 1	2.627642	2.631494	1.697561	1.816260	1.428339	2.531707
## 2	2.361789	2.282993	1.881954	1.994573	1.489824	2.728997
## 3	2.547352	2.461415	1.861736	1.980769	1.426282	2.790735
## 4	2.364253	2.304545	1.974828	2.078475	1.675057	2.625000
## 5	2.371585	2.345084	1.919603	2.027737	1.527282	2.759682
## 6	2.418945	2.322128	1.922632	2.033782	1.523407	2.738039
##	sad_ESM	bored_ESM	stressed_ESM	challenge_ESM	skills_ESM	
## 1	1.595779	2.066775	2.144951	1.618421	2.761120	
## 2	1.659864	2.359079	2.369418	1.951923	2.663912	
## 3	1.589085	2.343548	2.334936	1.847154	2.636808	
## 4	1.766440	2.309795	2.430524	1.941725	2.646370	
## 5	1.641229	2.326227	2.404762	1.876138	2.667343	
## 6	1.665918	2.345192	2.408187	1.869844	2.635495	
##	humidity	num_obs	enthusiast_ESM	happy_ESM	interested_ESM	curious_ESM
## 1	42	158	1.880342	2.448276	2.051282	1.732759
## 2	43	956	1.911392	2.368201	2.025175	1.780726
## 3	47	798	1.942244	2.411184	2.108731	1.888704
## 4	51	120	2.000000	2.200000	2.388889	2.285714
## 5	54	659	2.056962	2.443975	2.309979	2.010638
## 6	57	235	1.942529	2.261364	1.887640	1.685393
## 7	58	2924	1.966216	2.386384	2.054554	1.788618
## 8	59	1005	2.013106	2.458442	2.096859	1.822222

## 9	61	1052	2.001248	2.413233	2.053885	1.837703
## 10	62	1028	1.944730	2.367137	1.978149	1.750643
## 11	64	2102	1.875661	2.286847	1.939615	1.735411
## 12	65	982	1.900815	2.324288	2.027100	1.758152
## 13	67	1496	1.923147	2.301370	1.968864	1.748399
## 14	70	4	1.000000	1.000000	1.000000	1.000000
## 15	74	969	2.014925	2.502717	2.085714	1.709239
## 16	76	794	1.971572	2.385382	2.038333	1.780936
## 17	83	1027	1.823980	2.266242	1.973316	1.755754
## 18	84	834	1.983713	2.526829	2.034202	1.700813
## 19	86	819	1.988764	2.511218	2.072464	1.768000
## 20	87	648	1.935614	2.366935	2.008114	1.774848
##	calm_ESM	relaxed_ESM	frustrated_ESM	anxious_ESM	afraid_ESM	tired_ESM
## 1	2.534483	2.547009	1.801724	2.008547	1.632479	2.296610
## 2	2.461752	2.301543	1.906031	2.021008	1.441176	2.895105
## 3	2.479407	2.365289	1.910744	2.039604	1.466227	2.892916
## 4	2.470588	2.588235	1.970588	2.314286	1.558824	3.114286
## 5	2.614894	2.458422	1.867238	2.072034	1.407249	2.963907
## 6	2.375000	2.261364	1.704545	1.943820	1.488636	2.348315
## 7	2.420839	2.308631	1.919530	2.038357	1.536134	2.692377
## 8	2.449673	2.392157	1.789267	1.938320	1.473890	2.644444
## 9	2.475062	2.366708	1.882793	1.981227	1.485000	2.690387
## 10	2.483290	2.353925	1.909091	1.939433	1.442308	2.871630
## 11	2.305703	2.225914	1.994020	2.116711	1.595096	2.746190
## 12	2.361789	2.282993	1.881954	1.994573	1.489824	2.728997
## 13	2.335155	2.304110	1.999084	2.082577	1.644099	2.616788
## 14	1.000000	1.000000	1.000000	2.000000	1.000000	3.000000
## 15	2.482993	2.480978	1.821769	1.989160	1.460705	2.630936
## 16	2.330017	2.270000	2.023256	2.046434	1.635607	2.635607
## 17	2.295019	2.242347	1.959184	1.996178	1.516582	2.908163
## 18	2.627642	2.631494	1.697561	1.816260	1.428339	2.531707
## 19	2.547352	2.461415	1.861736	1.980769	1.426282	2.790735
## 20	2.327273	2.305668	2.002016	2.135081	1.643725	2.716024
##	sad_ESM	bored_ESM	stressed_ESM	challenge_ESM	skills_ESM	
## 1	1.521368	2.139130	2.162393	1.815789	2.684211	
## 2	1.626928	2.406425	2.395775	1.841880	2.589158	
## 3	1.656198	2.425041	2.505766	1.899160	2.579832	
## 4	1.800000	2.382353	2.371429	1.970588	2.470588	
## 5	1.615711	2.419831	2.513800	1.817391	2.676087	
## 6	1.516854	2.284091	2.227273	1.875000	2.988636	
## 7	1.642309	2.338295	2.419748	1.840037	2.609153	
## 8	1.566406	2.258486	2.273560	1.828229	2.666223	
## 9	1.682957	2.322459	2.289638	1.906683	2.633039	
## 10	1.652510	2.374359	2.367609	1.865711	2.551499	
## 11	1.747020	2.387823	2.477800	1.871553	2.652554	
## 12	1.659864	2.359079	2.369418	1.951923	2.663912	
## 13	1.772603	2.296161	2.433790	1.923579	2.691589	
## 14	1.000000	1.000000	1.000000	1.000000	1.000000	
## 15	1.592944	2.260459	2.279891	1.794444	2.696801	
## 16	1.689482	2.265442	2.454243	1.989796	2.699659	
## 17	1.652229	2.412516	2.444727	1.870801	2.637306	
## 18	1.595779	2.066775	2.144951	1.618421	2.761120	
## 19	1.589085	2.343548	2.334936	1.847154	2.636808	
## 20	1.695565	2.288032	2.527383	2.006198	2.671518	

##	rain	num_obs	enthusiast_ESM	happy_ESM	interested_ESM	curious_ESM
## 1	0.00	14120	1.958708	2.382047	2.045216	1.792077
## 2	0.04	986	1.862903	2.288978	1.975741	1.739247
## 3	0.07	176	1.761905	2.274194	1.777778	1.571429
## 4	0.09	648	1.935614	2.366935	2.008114	1.774848
## 5	0.17	819	1.988764	2.511218	2.072464	1.768000
## 6	0.34	1027	1.823980	2.266242	1.973316	1.755754
## 7	1.23	834	1.983713	2.526829	2.034202	1.700813
##	calm_ESM	relaxed_ESM	frustrated_ESM	anxious_ESM	afraid_ESM	tired_ESM
## 1	2.426771	2.340034	1.911188	2.022445	1.516681	2.724816
## 2	2.289367	2.184388	1.979784	2.125337	1.587366	2.763122
## 3	2.338710	2.253968	1.857143	2.174603	1.809524	2.492063
## 4	2.327273	2.305668	2.002016	2.135081	1.643725	2.716024
## 5	2.547352	2.461415	1.861736	1.980769	1.426282	2.790735
## 6	2.295019	2.242347	1.959184	1.996178	1.516582	2.908163
## 7	2.627642	2.631494	1.697561	1.816260	1.428339	2.531707
##	sad_ESM	bored_ESM	stressed_ESM	challenge_ESM	skills_ESM	
## 1	1.659432	2.334448	2.390747	1.872620	2.642934	
## 2	1.757047	2.420699	2.493960	1.877551	2.614130	
## 3	1.444444	2.158730	2.492063	1.903226	2.774194	
## 4	1.695565	2.288032	2.527383	2.006198	2.671518	
## 5	1.589085	2.343548	2.334936	1.847154	2.636808	
## 6	1.652229	2.412516	2.444727	1.870801	2.637306	
## 7	1.595779	2.066775	2.144951	1.618421	2.761120	