SAS TAS Study – Winter 2022

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**Statistical Analyses**

The data analyses were performed using the Python libraries Sklearn and Scipy. Internal consistency of the SAS and TAS surveys were measured with Cronbach’s Alpha Scores. Both scores were > .8 (TAS-.81, SAS-.87), conventionally considered very reliable. Numeric TAS and SAS scores were treated, almost exclusively, as target variables. In these cases, the label variables predictive influence was measured with two-sided Student’s T-Tests, when the labels were binary. When the label variables had > two categories, one-way ANOVAs were used. For the Age and hour\_usage quantitative variables, ordinary least squares regression was employed. The TAS and SAS scores were also transformed into binary categorical target variables using the criteria: TAS positive (≥61) and SAS-SV addicted (≥31 for males and ≥33 for females). In these cases, Chi-Squared tests of independence were used. There is precedent for these score thresholds in previous studies. The following label variables were used for predictive influence, both singularly and in tandem.

Age (quantitative)

Nationality:

Sex: Male=1, Female=2

Faculty: theoretical=1, practical=2

Academic Performance: pass=1, good=2, very good=3, excellent=4

Academic year: First grade=1, second grade=2, third grad=3, fourth=4, fifth=5, six=6, postgraduate=7

Marital status: single=1, married=2, divorce=3, widower=4

Environment: urban=1, rural=2, Mountain=3

Place of residence: family=1, friends=2, alone=3, student hostel=4

Income: low=1, middle=2, high=3

Frequency of smartphone change each year: 0-1/ 1-2/ 2-3/ ≥4

Monthly smartphone bill: Very low=1, low=2, Middle=3, high=4.

How many hours use mobile? (quantitative)

How often do you use social media sites: never=1, rarely=2, occasionally=3, frequently=4

Do you pay for attractions offered on social media (e.g., for games, fitness tips etc):

Results were as follows: p<.05\*is considered significant, while p<.01\*\* is considered highly significant.

**Overall SAS score mean+- sd: 35.45+-9.90**

**Overall TAS score mean+- sd: 59.18+-11.58**

**N=2606**

**T-Tests (2 sided)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Mean | Standard Deviation | N= | T= | Degrees of Freedom | p-value | 95% Confidence Interval for difference in means |
| Male SAS | 33.53 | 10.67 | 705 |  |  |  |  |
| Female SAS | 36.16 | 9.50 | 1911 |  |  |  |  |
|  |  |  |  | -5.75 | 1140 | <.0001\*\* | [-3.52, -1.73] |
| Male TAS | 56.75 | 12.76 |  |  |  |  |  |
| Female TAS | 60.08 | 10.98 |  |  |  |  |  |
|  |  |  |  | -6.13 | 1110 | <.0001\*\* | [-4.39, -2.26] |
| Theoretical (Faculty) SAS | 35.35 | 10.01 | 1221 |  |  |  |  |
| Practical SAS | 35.53 | 9.79 | 1395 |  |  |  |  |
|  |  |  |  | -.469 | 2552 | .64 NS | [-0.94, 0.58] |
| Theoretical TAS | 59.21 | 11.56 |  |  |  |  |  |
| Practical TAS | 59.16 | 11.60 |  |  |  |  |  |
|  |  |  |  | .114 | 2571 | .91 NS | [-0.84, 0.94] |
| Marital status - Single SAS | 35.19 | 9.98 | 2125 |  |  |  |  |
| Married SAS | 36.75 | 9.35 | 477 |  |  |  |  |
|  |  |  |  | -3.25 | 739 | .0012 \*\* | [-2.5, -0.62] |
| Marital status - Single TAS | 59.65 | 11.76 |  |  |  |  |  |
| Married TAS | 57.31 | 10.36 |  |  |  |  |  |
|  |  |  |  | 4.34 | 777 | <.0001\*\* | [1.28, 3.39] |
| pay\_attract – Yes SAS | 35.62 | 9.95 | 348 |  |  |  |  |
| pay\_attract – No SAS | 35.42 | 9.89 | 2268 |  |  |  |  |
|  |  |  |  | .353 | 459 | .72 NS | [-0.92, 1.33] |
| pay\_attract – Yes TAS | 60.03 | 13.69 |  |  |  |  |  |
| pay\_attract – No TAS | 59.05 | 11.22 |  |  |  |  |  |
|  |  |  |  | 1.27 | 422 | .204 NS | [-0.53, 2.49] |

**One-way ANOVAs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Mean | Standard Deviation | N= | F= | p-value  (that ≥ 2 means have a statistically significant difference) |
| Academic Year – 1st SAS | 36.32 | 10.18 | 140 |  |  |
| 2nd year SAS | 36.44 | 9.70 | 318 |  |  |
| 3rd year SAS | 34.26 | 10.20 | 355 |  |  |
| 4th year SAS | 33.95 | 10.25 | 569 |  |  |
| 5th year SAS | 36.63 | 9.45 | 373 |  |  |
| 6th year SAS | 35.92 | 9.77 | 345 |  |  |
| 7th year SAS | 35.90 | 9.48 | 516 |  |  |
|  |  |  |  | 4.99 | <.0001\*\* |
| Academic Year – 1st year TAS | 63.34 | 12.90 |  |  |  |
| 2nd year TAS | 61.07 | 12.80 |  |  |  |
| 3rd year TAS | 59.06 | 12.32 |  |  |  |
| 4th year TAS | 59.52 | 10.47 |  |  |  |
| 5th year TAS | 58.70 | 11.15 |  |  |  |
| 6th year TAS | 58.61 | 11.32 |  |  |  |
| 7th year TAS | 57.32 | 11.13 |  |  |  |
|  |  |  |  | 7.06 | <.0001\*\* |
| Place of Residence  Family SAS | 35.40 | 9.98 | 1812 |  |  |
| Friend SAS | 36.84 | 9.41 | 104 |  |  |
| Alone SAS | 34.02 | 10.46 | 46 |  |  |
| Hostel SAS | 35.45 | 9.69 | 654 |  |  |
|  |  |  |  | 1.01 | .39 NS |
| Place of Residence  Family TAS | 58.91 | 11.66 |  |  |  |
| Friend TAS | 60.07 | 9.85 |  |  |  |
| Alone TAS | 58.28 | 10.19 |  |  |  |
| Hostel TAS | 59.87 | 11.71 |  |  |  |
|  |  |  |  | 1.40 | .24 NS |
| low income SAS | 34.65 | 10.00 | 401 |  |  |
| middle income SAS | 35.73 | 9.87 | 2038 |  |  |
| high incomeSAS | 33.97 | 9.77 | 177 |  |  |
|  |  |  |  | 4.14 | .016\* |
| low income TAS | 60.27 | 14.09 |  |  |  |
| middle income TAS | 58.99 | 11.01 |  |  |  |
| high income TAS | 58.99 | 11.66 |  |  |  |
|  |  |  |  | 2.08 | .13 NS |
| Monthly Smartphone Bill  Very low - SAS | 33.05 | 10.54 | 593 |  |  |
| Low SAS | 34.82 | 9.27 | 737 |  |  |
| Middle SAS | 36.73 | 9.48 | 1082 |  |  |
| High SAS | 37.93 | 10.66 | 204 |  |  |
|  |  |  |  | 23.51 | <.0001\*\* |
| Monthly Smartphone Bill  Very low - TAS | 60.23 | 12.27 |  |  |  |
| Low TAS | 58.45 | 11.24 |  |  |  |
| Middle TAS | 58.93 | 11.00 |  |  |  |
| High TAS | 60.15 | 13.43 |  |  |  |
|  |  |  |  | 3.27 | .02\* |
| Oman SAS | 36.89 | 9.24 | 1619 |  |  |
| Egypt SAS | 36.78 | 9.45 | 489 |  |  |
| Pakistan SAS | 29.59 | 10.20 | 508 |  |  |
|  |  |  |  | 120.76 | <.0001\*\* |
| Oman TAS | 59.02 | 11.29 |  |  |  |
| Egypt TAS | 60.52 | 11.21 |  |  |  |
| Pakistan TAS | 58.41 | 12.73 |  |  |  |
|  |  |  |  | 4.57 | .0104\* |
| Yearly Smartphone Changes  0-1 SAS | 35.20 | 10.01 | 2188 |  |  |
| 1-2 SAS | 36.90 | 8.56 | 219 |  |  |
| 2-3 SAS | 35.88 | 10.57 | 115 |  |  |
| 4+ SAS | 37.38 | 8.87 | 94 |  |  |
|  |  |  |  | 3.33 | .019\* |
| Yearly Smartphone Changes  0-1 TAS | 59.22 | 11.51 |  |  |  |
| 1-2 TAS | 59.29 | 10.87 |  |  |  |
| 2-3 TAS | 61.32 | 13.54 |  |  |  |
| 4+ TAS | 55.39 | 11.56 |  |  |  |
|  |  |  |  | 4.70 | .003\*\* |
| Academic Performance  Pass SAS | 32.96 | 11.63 | 182 |  |  |
| Good SAS | 35.89 | 9.95 | 831 |  |  |
| Very Good SAS | 36.01 | 9.28 | 1207 |  |  |
| Excellent SAS | 33.95 | 10.43 | 396 |  |  |
|  |  |  |  | 8.80 | <.0001\*\* |
| Academic Performance  Pass TAS | 59.86 |  |  |  |  |
| Good TAS | 59.68 |  |  |  |  |
| Very Good TAS | 58.88 |  |  |  |  |
| Excellent TAS | 58.74 |  |  |  |  |
|  |  |  |  | 1.20 | .31 NS |
|  |  |  |  |  |  |
| Environment Urban SAS | 35.07 | 10.32 | 1600 |  |  |
| Rural SAS | 36.01 | 9.25 | 859 |  |  |
| Mountain SAS | 36.23 | 8.71 | 157 |  |  |
|  |  |  |  | 3.03 | .048\* |
| Environment Urban TAS | 59.45 | 11.67 |  |  |  |
| Rural TAS | 58.62 | 11.59 |  |  |  |
| Mountain TAS | 59.54 | 10.49 |  |  |  |
|  |  |  |  | 1.50 | .22 NS |
| Social Media Use Frequency  Never SAS | 28.10 | 10.51 | 94 |  |  |
| Rarely SAS | 29.07 | 9.43 | 251 |  |  |
| Occasionally SAS | 32.85 | 9.00 | 618 |  |  |
| Frequently SAS | 37.81 | 9.37 | 1653 |  |  |
|  |  |  |  | 109.66 | <.0001\*\* |
| Social Media Use Frequency  Never TAS | 62.70 | 14.37 |  |  |  |
| Rarely TAS | 57.0 | 12.30 |  |  |  |
| Occasionally TAS | 57.82 | 10.47 |  |  |  |
| Frequently TAS | 59.82 | 11.59 |  |  |  |
|  |  |  |  | 10.52 | <.0001\*\* |

**Chi-Squared Tests of Independence**

|  |  |  |
| --- | --- | --- |
|  | SAS addicted | SAS Not addicted |
| TAS Positive | 817 | 318 |
| TAS Negative | 878 | 603 |

Chi- Squared = 44.86 p< .0001\*\*

**Alexythemia vs. Smartphone addicted ChiSq p value= 2.333463533617033e-12**

|  |  |  |
| --- | --- | --- |
|  | SAS addicted | SAS Not addicted |
| Male | 440 | 265 |
| Female | 1255 | 656 |

Chi- Squared = 2.26 p= .13 NS

|  |  |  |
| --- | --- | --- |
|  | TAS Positive | TAS Negative |
| Male | 262 | 443 |
| Female | 873 | 1038 |

Chi- Squared = 14.87 p= .00011\*\*

|  |  |  |
| --- | --- | --- |
|  | SAS addicted | SAS Not addicted |
| Theoretical Faculty | 913 | 482 |
| Practical | 782 | 439 |

Chi-Squared = .50 p = .48 NS

|  |  |  |
| --- | --- | --- |
|  | TAS Positive | TAS Negative |
| Theoretical Faculty | 538 | 683 |
| Practical | 597 | 798 |

Chi-Squared = .38 p = .54 NS

|  |  |  |
| --- | --- | --- |
|  | SAS addicted | SAS Not addicted |
| Academic Year  1st | 100 | 40 |
| 2nd | 210 | 108 |
| 3rd | 216 | 139 |
| 4th | 313 | 256 |
| 5th | 266 | 107 |
| 6th | 234 | 111 |
| 7th | 356 | 160 |

ChiSq = 41.56 p<.0001\*\*

|  |  |  |
| --- | --- | --- |
|  | TAS Positive | TAS Negative |
| Academic Year  1st | 77 | 63 |
| 2nd | 160 | 158 |
| 3rd | 161 | 194 |
| 4th | 243 | 326 |
| 5th | 149 | 224 |
| 6th | 153 | 192 |
| 7th | 192 | 324 |

ChiSq = 24.51 p<.0004\*\*

**OLS Regression Tests**

SAS\_total ~ Age

R-squared: 0.003

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | coefficient | Std error | t | P>|t| | 95% CI |
| const | 32.1 | 1.249 | 25.71 | <.0001\*\* | [29.66 ,34.55] |
| Age | .1481 | .055 | 2.711 | .0007\*\* | [.041,0.255] |

TAS\_total ~Age

R-squared: 0.018

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | coefficient | Std error | t | P>|t| | 95% CI |
| const | 69.07 | 1.45 | 47.63 | <.0001\*\* | [66.27 ,71.92] |
| Age | -0.4378 | .063 | -6.90 | .0007\*\* | [-.562, -.313] |

TAS\_total ~ SAS\_total

R-squared: 0.050

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | coefficient | Std error | t | P>|t| | 95% CI |
| const | 49.88 | .821 | 60.75 | <.0001\*\* | [48.27, 51.49] |
| SAS\_total | .2625 | .022 | 11.768 | <.0001\*\* | [.219, 306] |

Chart, scatter chart

Description automatically generated

TAS\_total ~ hour\_usage

R-squared: .010

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | coefficient | Std error | t | P>|t| | 95% CI |
| const | 57.52 | .399 | 144.168 | <.0001\*\* | [56.73 58.30] |
| Hour\_usage | .2632 | .052 | 5.046 | <.0001\*\* | [.161, .365] |

Although R-squared values were low for the four OLS Regressions that were run, there were definite underlying relationships. When treating total SAS score as a predictor of total TAS score, a positive association was uncovered (+.2625additional points of TAS score/ each additional point of SAS score). Positive correlations were also found in SAS\_total ~ Age (+.1481 SAS pts/ additional year of age) and TAS\_total ~ hour\_usage(+.2632 TAS pts/additional hour of Smartphone use). A negative relationship was uncovered in TAS\_total ~Age (-.4378 TAS pts/ additional year of age).

**Mutivariate Linear Regression Tests**

SAS\_total ~ (Age + Sex + Faculty + Academic Performance + Marital Status + Environment + Place of Residence + Income + Pay for Attractions + Nationality)

|  |  |
| --- | --- |
| Feature/Label | Feature Importance Score |
| Age | .308 Greatest |
| Sex | .039 |
| Faculty | .072 |
| Academic Performance | .117 |
| Marital Status | .040 |
| Environment | .07058 |
| Place of Residence | .00757 Least |
| Income | .089 3rd |
| Pay for (Smartphone) Attractions | .054 |
| Nationality | .14 2nd |

TAS\_total ~ (Age + Sex + Faculty + Academic Performance + Marital Status + Environment + Place of Residence + Income + Hours of Usage + Social Media Frequency+ Pay for Attractions + Nationality+ Frequency of Yearly Smartphone Changes)

|  |  |
| --- | --- |
| Feature/Label | Feature Importance Score |
| Age | .191 2nd |
| Sex | .032 |
| Faculty | .060 |
| Academic Performance | .106 3rd |
| Marital Status | .028 Least |
| Environment | .062 |
| Place of Residence | .053 |
| Income | .063 |
| Hours of Usage | .195 Greatest |
| Social Media Frequency | .07925 |
| Pay for (Smartphone) Attractions | .038 |
| Nationality | .042 |
| Frequency of Yearly Smartphone  Changes | .052 |

Multivariate Regressions were run for the two numerical target variables, SAS Total and TAS Total. Thirteen of the predictor variables were used for the TAS total while ten were used for the SAS total. Hours of Usage, Social Media Frequency and Frequency of Annual Smartphone changes were not used for the SAS model due to associations with one another. A cross validated Random Forest Regressor with five folds was used for each model. Feature importance scores for all the predictor variables are listed in the tables above.