Dependent variable:

|  |  |  |
| --- | --- | --- |
|  | Continuous | Not continuous (binary, counts, ...) |
| Independent | General Linear Model  -- T-test  -- ANOVA, AVCOVA  -- SLR  -- MLR | Generalized Linear Model  -- Logistic regression  -- Poisson regression  -- Negative Binomial regression |
| Not independent | General Linear Mixed Model (LMM) | Generalized Linear Mixed Model  -- Linear Mixed-effects Logistic regression  -- Linear Mixed-effects Poisson regression  -- Linear Mixed-effects NB regression |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Independent Variable | | | | | |
|  | 0 Indep Variable | 1 IV w/ 2 levels (Indep) | 1 IV with 2 or more levels (Indep) | 1 IV with 2 levels (dep) | 1 IV with 2 or more (dep) | 2 or more IV's (ind) |
| Interval and normal | One sample t-test | Indep 2 sample t-test | One-way ANOVA | Paired t-test | One-way Repeated Measures ANOVA | Factorial ANOVA |
| Ordinal or Interval | One sample median test | Wilcoxon-Mann Whitney test | Krusked-Wallis test | Wilcoxon signed ranks test | Friedman test | Logistic Regression |
| Categorical | Chi-square Goodness of fit test | - Chi-square test  - Fisher's exact test | Chi-square test | McNemar | Repeated Measures Logistic Regression | Logistic Regression |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parametric | One Sample T-test | Ind T-test | Dep t-test | One way ANOVA (Ind) | One-way ANOVA (dep) |
| Non-Parametric | - One-sample Median test  -Sign test | Wilcoxon-Mann Whitney test | Wilcoxon signed-rank test | Krusked-Wallis test | Friedman test |
| R | library(BSDA), SIGN.test(Y, md = 25)  md = median | Wilcox.test(Y~A)  - y is numeric  - A: a factor  Wilcox.test(y, A) | Wilcox.test(y1, y2, paired = T) | krusked.test(y~A)  -- y: numeric  -- A: factor | Friedman.test(y~A|B)  -- y: response  -- A: grouping factor  -- B: blocking factor |
| SAS | PROC univariate; data = aa;  mu0 = 25;  var age;  run; | PROC npar1way data = aa; Wilcoxon;  class sex;  var age;  run; | Data;  Diff = road-write;  proc univariate;  Var Diff;  run; | proc npar1way data = aa;  Wilcoxon;  class sex;  Var age;  run | prof freq data=aa;  Table id\*time\*y/cmh2 scores=rank;  noprint;  run; |

Assumption: Variable is at least ordinal.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Correlation | | |
|  | Pearson | Spearman's | Kendall's |
| Dist | Continuous & Normal | Both variables are at least ordinal | at least ordinal |
| SAS | proc corr data = aa;  Var X1 X2;  run; | proc corr data = aa Spearman;  Var X1 X2;  run; | proc corr data = aa Kendall;  Var X1 X2;  run; |
| R | cor.test(x1, x2) | cor.test(x1, x2, method = 'Spearman') | cor.test(x1,x2, method = 'Kendall') |

Assumptions

|  |  |  |
| --- | --- | --- |
| 1. Indep t-test | 2. Paired t-test | 3. ANOVA |
| -- Continuous  -- Two independent groups  -- Independent observations  -- No outliers  -- Normally distributed | -- Distribution of the differences between scores should be normal  -- Use the differences between scores to check normality | -- Equal variance (Homoscedasticity)  -- Normality of residuals (Not the raw data)  -- Independence of errors  -- No significant outliers |

|  |  |  |
| --- | --- | --- |
| 4. RM ANOVA | 5. Regression | 6. Chi-square test |
| -- No significant outlier  -- Multivariate Normality and equal variance  -- Sphericity  -- if violated  -- Greenhouse and Geisser  -- Huynh and Feldt  -- MANOVA | -- Linearity  -- Independence  -- Normality  -- Equal variance  -- No multi-collearity | -- ordinal or normal  -- independent |

Assumption test

|  |  |  |  |
| --- | --- | --- | --- |
| 1. Normality | 2. Equal Variance | 3. Outlier | 4. Multi-collearity |
| -- shapiro-wilk test  shapiro.test: extreme sample size  -- Kolmoqorov-Smirov (Ks.test)  -- Lilliefors  -- Anderson-darling  -- D'Agostino's K-squared  -- Chen-Shapiro | -- Levine’s test | -- boxplot  -- QQplot  -- histogram | -- Correlation > 0.9  -- VIF > 10  -- vif(model)  -- Tolerance (1/VIF) < 0.1  Remedy  -- Centering |

Wide format: SLR, MLR, ANOVA, ANCOVA, MANOVA, MANCOVA

Long format: Linear mixed-effects model

6 area: LaIPS RaIPS LmUPS RmUPS LpIPS RpIPS

4 conditions: WatchStatic\_other, WatchDynamic\_own, WatchStatic\_own, WatchStatic\_typed

Dependent variable (DV): Action(Y)

Fixed: Area, Condition, Group

Random: SubID

RQ1:

DV: action (Y)

Fixed: Area, Condition, Group

Random: SubID

-- Comparing 6-group

-- Comparing 4 conditions

-- Comparing group

-- Comparing area within condition

-- Comparing conditions within area

RQ2: (continuous, check multi-collinearity)

DV: action (Y)

Fixed: Age, 7 behaviors test scores -> 8 independent variables

Random: SubID

-- EDA

-- Graph

-- Assumption

-- Finalized model

MC (Model Comparison)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SubID | Group | Age | Area | Condition | Action(Y) |
| 1 |  |  | LaIPS | WDy\_other |  |
| 1 |  |  | LaIPS | WDy\_own |  |
| 1 |  |  | LaIPS | WStatic\_own |  |
| 1 |  |  | LaIPS | WStatic\_typed |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| 1 |  |  | RyIPS |  |  |
| 2 |  |  |  |  |  |
| 2 |  |  |  |  |  |
| 2 |  |  |  |  |  |