Summary

Screen time usage is becoming an increasingly significant part of modern lifestyles.

With the rise of smartphones, tablets, and computers in daily routines, we aim to understand how much time university students spend on electronic devices, as well as how this relates to their health, habits, and overall digital well-being. We also explore which days tend to have the highest screen time and which types of applications are used the most.

Group 6

6710545873	Vorapop Prasertkul
6710545521	Chaiyapat Kumtho
6710545741	Pasin Tongtip
6710545989	Amornrit Sirikham

Data Collection

Survey Questions

- Age
- Gender
- Weight (kilogram)
- Heart rate while answering the questionnaire (times)
- Average sleep time per day (approximately)
- Sunday Screen Time
- Monday Screen Time
- Tuesday Screen Time
- Wednesday Screen Time
- Thursday Screen Time
- Friday Screen Time
- Saturday Screen Time
- Most used application types
- Number of notifications on Sunday (times)
- Number of notifications on Monday (times)
- Number of notifications on Tuesday (times)
- Number of notifications on Wednesday (times)
- Number of notifications on Thursday (times)
- Number of notifications on Friday (times)
- Number of notifications on Saturday (times)
- Left eye health
  - Abnormality
    - If it's nearsightedness (Myopia)
      - How short sights?
    - Else if it's farsightedness (Presbyopia)
      - How long sights?
    - Else if it's compound vision (both nearsightedness and farsightedness)
      - How short sights?
      - How long sights?
  - Other eye disorders (multiple selection)
- Right eye health
  - Abnormality
    - If it's nearsightedness (Myopia)
      - How short sights?
    - Else if it's farsightedness (Presbyopia)
      - How long sights?
    - Else if it's compound vision (both nearsightedness and farsightedness)
      - How short sights?
      - How long sights?
  - Other eye disorders (multiple selection)

Methodology

Probability

Screen time vs Age

y \ x	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	$\widehat{P}(Y)$	$y \cdot \widehat{P}(Y)$
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
7	0	0.0182	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0182	0.1273
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0.0182	0.0545	0	0.0182	0	0.0182	0.0364	0.0545	0.0182	0	0	0	0	0	0	0.2182	3.9273
19	0	0	0.0364	0.0545	0.0364	0.0182	0.0182	0.0364	0.0182	0	0	0.0182	0	0	0	0.2364	4.4909
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0182	0.0182	0.3636
21	0	0	0	0	0	0.0182	0.0182	0	0	0	0	0	0	0	0	0.0364	0.7636
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0.0182	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0182	0.4182
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0.0182	0	0	0	0	0	0	0	0	0	0	0.0182	0.4727
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0.0182	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0182	0.5273
30	0	0	0	0	0.0182	0	0	0	0	0	0	0	0	0	0	0.0182	0.5455
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0.0182	0	0	0	0	0	0	0	0	0	0	0	0	0.0182	0.5818
33	0	0	0.0182	0	0	0	0	0	0	0	0	0	0	0	0	0.0182	0.6000
34	0	0	0	0	0	0.0364	0	0	0	0	0	0	0	0	0	0.0364	1.2364
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	0	0	0.0182	0.0182	0	0	0	0	0	0	0	0	0	0	0	0.0364	1.3818
39	0	0	0	0	0	0.0182	0	0	0	0	0	0	0	0	0	0.0182	0.7091
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	0	0	0	0.0182	0	0	0	0	0	0	0	0	0	0	0	0.0182	0.7455
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	0	0.0182	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0182	0.7818
44	0	0	0	0.0182	0	0	0	0	0	0	0	0	0	0	0	0.0182	0.8000
45	0	0	0	0.0182	0	0	0.0545	0	0	0	0	0	0	0	0	0.0727	3.2727
46	0	0.0182	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0182	0.8364
47	0	0	0	0	0	0.0182	0	0	0	0	0	0	0	0	0	0.0182	0.8545
48	0.0182	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0182	0.8727
49	0	0	0.0182	0	0	0	0	0	0	0	0	0	0	0	0	0.0182	0.8909
50	0	0	0	0.0182	0	0	0	0	0	0	0	0	0	0	0	0.0182	0.9091
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0.0182	0	0	0	0	0	0	0	0	0	0	0.0182	1.0000
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0.0182	0.0182	0	0	0	0	0	0	0	0	0	0	0	0	0.0364	2.0727
$\widehat{P}(X)$	0.0545	0.1455	0.1273	0.1636	0.0909	0.1273	0.1273	0.0909	0.0364	0	0	0.0182	0	0	0.0182	$\widehat{E}(X)$	6.53636
midpoint	2.5000	3.5000	4.5000	5.5000	6.5000	7.5000	8.5000	9.5000	10.5000	11.5000	12.5000	13.5000	14.5000	15.5000	16.5000	$\widehat{E}(Y)$	29.18182
mid $\cdot \widehat{P}(X)$	0.1364	0.5091	0.5727	0.9000	0.5909	0.9545	1.0818	0.8636	0.3818	0	0	0.2455	0	0	0.3000		

Screen time vs Sleeping time

y \ x	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	$\widehat{P}(Y)$	midpoint	mid $\cdot\ \widehat{P}(Y)$
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
4 5	0	0	0	0	0	0	0	0.0364	0	0	0	0	0	0	0.0182	0.0545	4.5	0.2455
5 6	0	0	0	0.0182	0	0	0	0	0	0	0	0	0	0	0	0.0182	5.5	0.1000
6 7	0	0.0182	0.0182	0.0545	0.0545	0.0364	0.0545	0	0.0364	0	0	0	0	0	0	0.2727	6.5	1.7727
7 8	0.0182	0.0545	0.0909	0.0727	0.0364	0.0545	0.0545	0	0	0	0	0	0	0	0	0.3818	7.5	2.8636
8 9	0.0364	0.0545	0.0182	0.0182	0	0.0182	0.0182	0.0364	0	0	0	0	0	0	0	0.2000	8.5	1.7000
9 10	0	0.0182	0	0	0	0	0	0	0	0	0	0.0182	0	0	0	0.0364	9.5	0.3455
10 11	0	0	0	0	0	0.0182	0	0.0182	0	0	0	0	0	0	0	0.0364	10.5	0.3818
$\widehat{P}(X)$	0.0545	0.1455	0.1273	0.1636	0.0909	0.1273	0.1273	0.0909	0.0364	0	0	0.0182	0	0	0.0182			
midpoint	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5		$\widehat{E}(X)$	6.5364
mid $\cdot\ \widehat{P}(X)$	0.1364	0.5091	0.5727	0.9000	0.5909	0.9545	1.0818	0.8636	0.3818	0	0	0.2455	0	0	0.3000		$\widehat{E}(Y)$	7.4091

Screen time vs Notification

y \ x	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	$\widehat{P}(Y)$	midpoint	mid $\cdot\ \widehat{P}(Y)$
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
50 55	0	0	0	0	0	0	0.0182	0	0	0	0	0	0	0	0	0.0182	52.5	0.9545
55 60	0	0.0182	0	0	0	0.0182	0	0.0182	0	0	0	0	0	0	0	0.0545	57.5	3.1364
60 65	0	0	0.0182	0	0	0.0364	0	0	0	0	0	0	0	0	0	0.0545	62.5	3.4091
65 70	0	0	0	0	0.0182	0.0182	0.0182	0.0182	0	0	0	0	0	0	0	0.0727	67.5	4.9091
70 75	0	0.0182	0	0.0182	0.0182	0	0	0.0182	0	0	0	0	0	0	0	0.0727	72.5	5.2727
75 80	0	0.0364	0.0182	0	0	0	0	0	0	0	0	0	0	0	0	0.0545	77.5	4.2273
80 85	0.0182	0.0545	0.0364	0.0364	0.0182	0.0182	0.0182	0.0182	0	0	0	0	0	0	0	0.2182	82.5	18.0000
85 90	0.0182	0.0182	0.0364	0.0545	0.0364	0.0364	0.0545	0.0182	0.0182	0	0	0	0	0	0	0.2909	87.5	25.4545
90 95	0	0	0	0.0364	0	0	0.0182	0	0	0	0	0	0	0	0	0.0545	92.5	5.0455
95 100	0.0182	0	0	0	0	0	0	0	0	0	0	0.0182	0	0	0	0.0364	97.5	3.5455
100 105	0	0	0.0182	0	0	0	0	0	0.0182	0	0	0	0	0	0	0.0364	102.5	3.7273
105 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0182	0.0182	107.5	1.9545
110 115	0	0	0	0.0182	0	0	0	0	0	0	0	0	0	0	0	0.0182	112.5	2.0455
$\widehat{P}(X)$	0.0545	0.1455	0.1273	0.1636	0.0909	0.1273	0.1273	0.0909	0.0364	0	0	0.0182	0	0	0.0182			
midpoint	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5		$\widehat{E}(X)$	6.5364
mid $\cdot\ \widehat{P}(X)$	0.1364	0.5091	0.5727	0.9	0.5909	0.9545	1.0818	0.8636	0.3818	0	0	0.2455	0	0	0.3000		$\widehat{E}(Y)$	81.6818

Screen time vs Heart rate

y \ x	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	$\widehat{P}(Y)$	midpoint	mid $\cdot\ \widehat{P}(Y)$
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
25 35	0	0.0182	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0182	30	0.5455
35 45	0	0	0	0	0	0	0.0182	0	0	0	0	0	0	0	0	0.0182	40	0.7273
45 55	0	0.0909	0	0.0545	0.0182	0.0364	0.0182	0.0182	0	0	0	0	0	0	0.0182	0.2545	50	12.7273
55 65	0.0364	0.0182	0.0545	0.0727	0	0.0545	0.0727	0.0545	0.0182	0	0	0.0182	0	0	0	0.4	60	24.
65 75	0.0182	0	0.0364	0.0182	0.0364	0.0182	0	0.0182	0	0	0	0	0	0	0	0.1455	70	10.1818
75 85	0	0	0.0182	0	0.0364	0.0182	0.0182	0	0	0	0	0	0	0	0	0.0909	80	7.2727
85 95	0	0.0182	0.0182	0.0182	0	0	0	0	0	0	0	0	0	0	0	0.0545	90	4.9091
95 105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
105 115	0	0	0	0	0	0	0	0	0.0182	0	0	0	0	0	0	0.0182	110	2.
$\widehat{P}(X)$	0.0545	0.1455	0.1273	0.1636	0.0909	0.1273	0.1273	0.0909	0.0364	0	0	0.0182	0	0	0.0182			
midpoint	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5		$\widehat{E}(X)$	6.5364
mid $\cdot\ \widehat{P}(X)$	0.1364	0.5091	0.5727	0.9	0.5909	0.9545	1.0818	0.8636	0.3818	0	0	0.2455	0	0	0.3000		$\widehat{E}(Y)$	62.3636

Screen time vs Weight

		Age	Weight (Kg)	Heart Rate	Sleeping time (Hrs)	Average daily screen time (Hrs)	Average daily notification received
Count		55	55	55	55	55	55
Measure of Centrality	MEAN	29.182	61.97090909	80.89090909	7.310	6.577	103.751
	median	21.000	60	83	7.342	6.202	86.000
	mode	19	62.2	87	7.5	6.202380952	86
Measure of Dispersion	MIN	7.000	25.7	51	4.500	2.236	6.429
	MAX	57.000	111.1	111	10.533	16.671	357.000
	range	50.000	85.400	60.000	6.033	14.436	350.571
	variance	175.4478	194.3140	168.4323	1.4176	7.9495	5585.474088
	SD	13.2457	13.9397	12.9781	1.1906	2.8195	74.7360
	cv	0.4539	0.2249	0.1604	0.1629	0.4287	0.7203
	MAD	11.7752	9.9298	9.9451	0.8687	2.2193	56.00727273
	quartile1 (Q1)	19	52.5	73	6.5	4.569047619	49.14285714
	quartile3 (Q3)	43	67	88	8	8.316666667	146.7142857
	IQR	24	14.5	15	1.5	3.747619048	97.57142857
Outliers	Q1-1.5IQR	-17	30.75	50.5	4.25	-1.052380952	-97.21428571
	Q3+1.5IQR	79	88.75	110.5	10.25	13.93809524	293.0714286
	Outliers (based on IQR) If no outlier, answer None.	None	25.7, 93, 111.1	111	10.417, 10.533	16.671	294.857, 357.000
	MEAN-3SD	-10.5552	20.1519	41.9565	3.7379	-1.8814	-120.4574
	MEAN+3SD	68.9188	103.7899	119.8254	10.8818	15.0355	327.9587
	Outliers (based on SD) If no outlier, answer None.	None	111.1	None	None	16.671	357.000
	Mean after removing outliers based on IQR. If no outlier, type NA	NA	61.12692308	80.3333	7.1904	6.3901	95.367
	SD after removing outliers based on IQR. If no outlier, type NA	NA	10.63094107	12.4173	1.0355	2.4782	61.58689353

Statistics

Goodness of Fit test

1. **Data set : Average screen duration**

   Type of distribution : Normal distribution

   Known parameter : 0

   Unknown parameter (m) : 2, which are μ, σ

   H_0 : Screen duration is normally distributed with $\mu = 6.5771$ and $\sigma = 2.8195$

   H_a : Screen duration is not normally distributed with $\mu = 6.5771$ and $\sigma = 2.8195$

   Number of cells with the expected number of samples (k) : 7

   Test static $\chi^2 = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i} = 2.1452$

   Significant level (α) : 0.05

   Degree of freedom 1 (ν_1) : $k - 1 - m = 7 - 1 - 2 \Rightarrow 4$

   Cutoff of non-rejection region : 9.4877

   Degree of freedom 2 (ν_2) : $k - 1 = 7 - 1 \Rightarrow 6$

   Cutoff of rejection region : 12.592

   Non-rejection regions : $\chi^2 < \chi^2_{0.05,4} = 9.4877$

   Rejection regions : $\chi^2 \geq \chi^2_{0.05,6} = 12.592$

   Rejection decision : Don't need to reject null hypothesis

   Conclusion : Screen duration is normally distributed with $\mu = 6.5771$ and $\sigma = 2.8195$

2. **Data set : Average Sleeping Duration**

Type of distribution : Normal distribution

Known parameter : 0

Unknown parameter (m) : 2, which are μ, σ

H_0 : Screen duration is normally distributed with $\mu = 7.3098$ and $\sigma = 1.1906$

H_a : Screen duration is not normally distributed with $\mu = 7.3098$ and $\sigma = 1.1906$

Number of cells with the expected number of samples (k) : 4

Test static $\chi^2 = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i} = 2.2647$

Significant level (α) : 0.05

Degree of freedom 1 (ν_1) : $k - 1 - m = 4 - 1 - 2 \Rightarrow 1$

Cutoff of non-rejection region : 3.8415

Degree of freedom 2 (ν_2) : $k - 1 = 4 - 1 \Rightarrow 3$

Cutoff of rejection region : 7.8147

Non-rejection regions : $\chi^2 < \chi^2_{0.05,1} = 3.8415$

Rejection regions : $\chi^2 \geq \chi^2_{0.05,3} = 7.8147$

Rejection decision : Don't need to reject null hypothesis

Conclusion : Screen duration is normally distributed with $\mu = 7.3098$ and $\sigma = 1.1906$

3. **Data set : Weight**

Type of distribution : Normal distribution

Known parameter : 0

Unknown parameter (m) : 2, which are μ, σ

H_0 : Screen duration is normally distributed with $\mu = 61.9709$ and $\sigma = 13.9397$

H_a : Screen duration is not normally distributed with $\mu = 61.9709$ and $\sigma = 13.9397$

Number of cells with the expected number of samples (k) : 7

Test static $\chi^2 = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i} = 7.6892$

Significant level (α) : 0.05

Degree of freedom 1 (ν_1) : $k - 1 - m = 7 - 1 - 2 \Rightarrow 4$

Cutoff of non-rejection region : 9.4877

Degree of freedom 2 (ν_2) : $k - 1 = 7 - 1 \Rightarrow 6$

Cutoff of rejection region : 12.592

Non-rejection regions : $\chi^2 < \chi^2_{0.05,4} = 9.4877$

Rejection regions : $\chi^2 \geq \chi^2_{0.05,6} = 12.592$

Rejection decision : Don't need to reject null hypothesis

Conclusion : Screen duration is normally distributed with $\mu = 61.9709$ and $\sigma = 13.9397$

4. **Data set : Average Notification**

Type of distribution : Normal distribution

Known parameter : 0

Unknown parameter (m) : 2, which are μ, σ

H_0 : Screen duration is normally distributed with $\mu = 103.7506$ and $\sigma = 74.7360$

H_a : Screen duration is not normally distributed with $\mu = 103.7506$ and $\sigma = 74.7360$

Number of cells with the expected number of samples (k) : 7

Test static $\chi^2 = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i} = 3.5875$

Significant level (α) : 0.05

Degree of freedom 1 (ν_1) : $k - 1 - m = 7 - 1 - 2 \Rightarrow 4$

Cutoff of non-rejection region : 9.4877

Degree of freedom 2 (ν_2) : $k - 1 = 7 - 1 \Rightarrow 6$

Cutoff of rejection region : 12.592

Non-rejection regions : $\chi^2 < \chi^2_{0.05,4} = 9.4877$

Rejection regions : $\chi^2 \geq \chi^2_{0.05,6} = 12.592$

Rejection decision : Don't need to reject null hypothesis

Conclusion : Screen duration is normally distributed with $\mu = 103.7506$ and $\sigma = 74.7360$

Conclusion

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Appendix

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