WIA 2003/WIB 2003
Probability and Statistics

Group Assignment
Group: Group 1 Project G

Title: Usage and Perception of Dating Apps Among Students in University of Malaya

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Introduction

The university is a great place to fall in love. It's the ideal place for different people with different interests and personalities to nurture love as there are no expectations or pressure. Yet, this is not always the case in the 21st century. Some people prefer to explore friendship or start their relationship in a different manner which is via online and this lead to the occurrence of dating apps which are widespread nowadays. This phenomenon lead to the questions that how well this trend performs on the society, especially among the university students.

Problem Statement

In this new day and age, a new method of meeting new friends has been invented. To get into a relationship, people are no longer going to blind dates, instead, they are swiping their phones left or right to get their possible partner. However, many people are critical of dating apps and they think that they are unreliable and ineffective, which makes them shy away from using dating apps as a potential method for getting to know other people.

Nearly three in ten Malaysians (29%) say that they would rather meet their future online than offline, showing how internet dating platforms have seemingly come a long way in shaking off their stigma (YouGov, 2017). However, the percentage of dating apps users in University of Malaya (UM) who really started a relationship with their online friend is not yet known. Hence, we decided to uncover this uncertainty.

Research Objective

1. To investigate the usage of dating apps among students in UM.
2. To find the opinion of UM students on the effectiveness and reliability of dating apps.

Research Question

1. Is UM students' use of dating apps similar to population of dating apps user based on YouGov's?
2. Are there any association or effect of gender and sexual orientation on the use of dating apps?
3. Does gender influence students' opinion towards the effectiveness and safeness of dating apps?

Research method

This study was carried out in University of Malaya, Kuala Lumpur, Malaysia. A total of 108 student respondents from various faculty participated in this survey. To carry out the research, simple random sampling technique was used. This ensures that each student have an equal chance of being selected as a respondent for this survey. The process of data collection was known as instrumentation. The type of instrument used in this survey was questionnaire survey. A questionnaire (see Appendix 5.1.1) with title "Survey on Usage and Perception of Dating Apps Among Students in University of Malaya" was designed to elicit information from the students. This questionnaire was spread through the medium of social media such as Facebook, WhatsApp

and siswamail in the form of Google Form. This questionnaire contained multiple choice and scale questions. SPSS was used to perform analysis using the data collected. Assumptions (see Appendix 5.1.3) for each test was examined before testing.

Hypotheses created

a) Hypothesis 1

H_0 : The number of students using dating apps are equal to 29% of the population. (YouGov, 2017) (Q5)

H_A : The number of students using dating apps are less than 29% of the population.

b) Hypothesis 2

H_0 : There is no significant association between the students' gender and their use of dating apps.

H_A : There is significant association between the students' gender and their use of dating apps.

c) Hypothesis 3

H_0 : There is no significant correlation between students' sexual orientation and their use of dating apps.

H_A : There is significant correlation between students' sexual orientation and their use of dating apps.

d) Hypothesis 4

H_0 : There is no significant difference between gender of students on their opinion towards the effectiveness of dating apps.

H_A : There is significant difference between gender of students on their opinion towards the effectiveness of dating apps.

e) Hypothesis 5

H_0 : There is no significant difference between gender of students on their opinion towards the safeness of dating apps.

H_A : There is significant difference between gender of students on their opinion towards the safeness of dating apps.

Result and discussion for each hypothesis

Result for Hypothesis 1

Descriptives

			Statistic	Std. Error
Have you used any dating app(s)?	Mean		.22	.040
	95% Confidence Interval for	Lower Bound	.14	

Figure 1.1 Mean from descriptive statistic

	Shapiro-Wilk		
	Statistic	df	Sig.
	.513	108	.000

Figure 1.2 Normality test

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between Have you used any dating app(s)? and Median of population using dating apps equals 0.	Related-Samples Sign Test	.000	Reject the null hypothesis.
2	The median of differences between Have you used any dating app(s)? and Median of population using dating apps equals 0.	Related-Samples Wilcoxon Signed Rank Test	.041	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

Figure 1.3 Hypothesis Test Summary

Related-Samples Sign Test Summary	
Total N	108
Test Statistic	84.000
Standard Error	5.196
Standardized Test Statistic	5.677
Asymptotic Sig.(2-sided test)	.000

1.3686E-8

Figure 1.4 One-sample Sign test Summary

Related-Samples Wilcoxon Signed Rank Test Summary	
Total N	108
Test Statistic	3570.000
Standard Error	306.276
Standardized Test Statistic	2.047
Asymptotic Sig.(2-sided test)	.041

Figure 1.5 One-sample Wilcoxon Signed Rank Test Summary

Normality test(Shapiro-Wilk test): p-value(2.7985E-17) was lower than 0.05, the data significantly deviated from a normal distribution.

One-Sample Wilcoxon Signed Rank Test: The standardized test value(z-value) = 2.047. Asymptotic significance value(p-value) = 0.041 (less than 0.05).

Sign Test (One Sample Sign Test): The standardized test value(z-value) = 5.677. Asymptotic significance value(p-value) = 0.000 (1.3686E-8, less than 0.05).

The p-value for both tests were less than the α value(0.05). Thus, **the null hypothesis is rejected**. The number of students using dating apps are not equal to 29% of the population.

From the descriptive statistic, the mean showed that only 22% of the students used dating apps. Although it was not statistical, the alternative hypothesis of less than 29% of students using dating apps is accepted.

Result for Hypothesis 2

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.527[a]	1	.060		
Continuity Correction[b]	2.700	1	.100		
Likelihood Ratio	3.485	1	.062		
Fisher's Exact Test				.099	.05
N of Valid Cases	108				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.00.

b. Computed only for a 2x2 table

Figure 2.1 Chi-Square and Fisher's Exact test result

		Have you used any dating apps?	
		Yes	No
Students' gender	Male	**14**	**31**
	Female	**10**	**53**

Figure 2.2 2x2 Contingency table with frequency in each category

Since the two variables tested ("Gender" and "Have you used dating apps") can be treated as two nominal variables, Chi-square Independence test was used to test the association between the two variables. The bar chart (Appendix 2.1.1) and the contingency table (Appendix 2.1.2) provided some information and more direct view about the association between the two variables. The Pearson Chi-Square p-value (Asymptotic significance(2-sided)) was 0.060 (greater than 0.05), which was not statistically significant. We used Fisher's Exact test to examine the significance of the association between the two variables as well. We have gotten the p-value equals to 0.099 (greater than 0.05). Thus, we concluded that there was no association found between gender and usage of dating apps. ($X^2(1) = 3.527$, $p = 0.060$). The usage of dating apps was not correlated or dependent on the gender. **The null hypothesis is not rejected.** However, we agreed that the result do not represent the overall population as the sample size is too small.

Result for Hypothesis 3

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.643[a]	1	.002		
Continuity Correction[b]	7.811	1	.005		
Likelihood Ratio	8.362	1	.004		
Fisher's Exact Test				.004	.00
N of Valid Cases	108				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.00.

b. Computed only for a 2x2 table

Figure 3.1 Chi-Square and Fisher's Exact test result

		Have you used any dating apps?	
		Yes	No
Students' sexual orientation	Heterosexual	**15**	**75**
	Non-heterosexual	**9**	**9**

Figure 3.2 2x2 Contingency table with frequency in each category

Chi-square Independence test was used to test the association between the two categorical variables. The bar chart contingency table (Appendix 3.1.3) provided some information and more direct view about the association between the two variables. The Pearson Chi-Square p-value (Asymptotic significance(2-sided)) is 0.002 (lower than 0.05), which was statistically significant. Also, we checked for the p-value of Fisher's Exact Test, the p-value was 0.004 (lower than 0.05). Both statistical significance tests were showing significant result, therefore we concluded that an association was found between sexual orientation of students and usage of dating apps. ($X^2(1) = 9.643$, $p = 0.002$). The sexual orientation and the usage of dating apps were correlated. **The null hypothesis is rejected.** However, we agreed that the result do not represent the overall population as the sample size is too small.

Result for Hypothesis 4

Tests of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
In your opinion, how effective are dating apps?	.866	108	.000

Figure 4.1 Normality test

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
In your opinion, how effective are dating apps?	Based on Mean	.009	1	106	.926
	Based on Median	.011	1	106	.915
	Based on Median and with adjusted df	.011	1	105.710	.915
	Based on trimmed mean	.034	1	106	.855

Figure 4.2 Non-parametric version of test of Homogeneity of Variance

Ranks

	what is your gender	N	Mean Rank	Sum of Ranks
In your opinion, how effective are dating apps?	male	45	54.09	2434.00
	female	63	54.79	3452.00
	Total	108		

Figure 4.3 Mann-Whitney U test Mean Ranks Table

Test Statistics[a]

	In your opinion, how effective are dating apps?
Mann-Whitney U	1399.000
Wilcoxon W	2434.000
Z	-.124
Asymp. Sig. (2-tailed)	.901

a. Grouping Variable: what is your gender

Figure 4.4 Mann-Whitney U test summary

Descriptives

	what is your gender		Statistic	Std. Error
In your opinion, how effective are dating apps?	male	Mean	2.69	.142
		Median	3.00	
	female	Mean	2.73	.126
		Median	3.00	

Figure 4.5 Median

Normality test: The p-value(1.8462E-8) of Shapiro-Wilk test was less than 0.05, this statistically significant result indicated that the data was not normally distributed. By examining on the bar chart from descriptive statistic, we could see that the data was not distributed normally (Appendix 4.1.1).

Test on homogeneity of variance: The Levene Statistic values for both “based on median” and “based on median and with adjusted df” were the same, 0.011. As well as the p-values, which were both 0.915, we can assume that there was no statistically significant difference between the variances of two groups of data. The variances of the two groups are assumed to be homogenous.

Mann-Whitney U test: Although there was a difference between number of male and female students, we focused on the mean rank. The mean ranks for male(54.09) and female(54.78) were similar, which numerically showed that they have similar rating on the effectiveness of dating apps. The U value was 1399.000, and the Asymptotic significance value(p-value) was 0.901, which was far greater than 0.05. Therefore, the **null hypothesis is not rejected**. There is high possibility that there is no statistically significant difference between gender on the effectiveness of dating apps. The median was 3.00 for both male and female, most of the respondents think the dating apps were moderately effective in looking for partner.

Result for Hypothesis 5

Test of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
In your opinion, how safe are dating apps?	.859	108	.000

Figure 3.1 Normality test

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
In your opinion, how safe are dating apps?	Based on Mean	.053	1	106	.818
	Based on Median	.001	1	106	.979
	Based on Median and with adjusted df	.001	1	105.469	.979
	Based on trimmed mean	.000	1	106	.993

Figure 5.2 Non-parametric version of test of Homogeneity of Variance

Ranks

	what is your gender	N	Mean Rank
In your opinion, how safe are dating apps?	male	45	60.47
	female	63	50.24
	Total	108	

Figure5.3 Kruskal-Wallis H test Mean Ranks Table

Test Statistics[a,b]

	In your opinion, how safe are dating apps?
Kruskal-Wallis H	3.115
df	1
Asymp. Sig.	.078

a. Kruskal Wallis Test

b. Grouping Variable: what is your gender

Figure 5.4 Kruskal-Wallis H test summary

Descriptives

	what is your gender		Statistic	Std. Error
In your opinion, how safe are dating apps?	male	Mean	2.36	.128
		Median	2.00	
	female	Mean	2.08	.120
		Median	2.00	

Figure 5.5 Median

Normality test: The p-value(9.8161E-9) was lower than 0.05. The data for these two groups were not distributed normally.

Test on homogeneity of variance: The Levene statistic values and the p-values from the "based on median and with adjusted df" were 0.001 and 0.979 respectively, as the p-value was greater than 0.05, the variances were homogenous. The assumption of similar data distributions has been confirmed.

Kruskal-Willis test: the mean rank of both male and female showed significant difference. Male students tended to give higher rating on the safety usage of dating apps. However, the p-value equals to 0.078, which basically means there is a 7.8% chance of finding our sample results if gender does not have any effect in the opinion on the safeness of dating apps. The p-value was still higher than 0.05, showing no statistically significant difference. **The null hypothesis is not rejected** despite of the difference shown in the mean ranks. Based on the median, both male and female thought that the dating apps were unsafe.

No post hoc test is conducted as we only have two variables in used.

Extra

Test for correlation between the students'opinion towards the effectiveness and the safeness of dating apps.

Correlations

			In your opinion, how effective are dating apps?	In your opinion how safe are dating apps?
Spearman's rho	In your opinion, how effective are dating apps?	Correlation Coefficient	1.000	.498
		Sig. (2-tailed)	.	.00
		N	108	10
	In your opinion, how safe are dating apps?	Correlation Coefficient	.498**	1.00
		Sig. (2-tailed)	.000	
		N	108	10

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 6.1 Spearman Rank Correlation test summary

A Spearman Rank Correlation test was conducted to examine the association between the effectiveness and safeness of dating apps. The result ($\rho(106) = 0.498$, $p = 0.000$) showed that there was significant correlation and a medium positive correlation between them.

Conclusion

In this study, several non-parametric tests were applied due to the unnormalized distribution of data and the heterogenous variance of data among groups. This study found out that **there was difference in UM students' use of dating apps when compared to the YouGov's study of population of online dating apps users** in Malaysia. **The use of dating apps among UM students was significantly correlated with their sexual orientation** however the effect of gender of students on the use of dating apps was not statistically significant, which meant **that there was no statistical significant association between the gender of students and their use of dating apps**. Similarly, students' gender did not have statistically significant effect on their opinion towards the effectiveness and safeness of dating apps. The greater the user think the dating apps are effective, the greater is their rating on the safeness of dating apps. However, as mentioned the data collected was not normally distributed, therefore the findings and results were not somehow reliable. More respondents should be collected randomly in order to get the normally distributed data.

References

3 in 10 Malaysians have used internet dating. (2017, November 23). Retrieved November 10, 2019, from https://my.yougov.com/en-my/news/2017/11/23/internet-dating/

Ali, Z., & Bhaskar, S. B. (2016). Basic statistical tools in research and data analysis. *Indian journal of anaesthesia*, *60*(9), 662–669. doi:10.4103/0019-5049.190623

Creswell, J. W. (2003). Research design: Qualitative, quantitative, and mixed methods approaches (2nd ed.). Thousand Oaks, CA: Sage Publications.

Dr. Todd Grande. (n.d). Home[Youtube Channel]. Retrieved from https://www.youtube.com/user/RioGrande51

Fritz, Catherine & Morris, Peter & Richler, Jennifer. (2011). Effect Size Estimates: Current Use, Calculations, and Interpretation. Journal of experimental psychology. General. 141. 2-18. 10.1037/a0024338

How2stats. (n.d). Home[Youtube Channel]. Retrieved from https://www.youtube.com/user/how2stats

Independent t-test for two samples. (n.d.). Retrieved November 15, 2019, from https://statistics.laerd.com/statistical-guides/independent-t-test-statistical-guide.php

Mann-Whitney U test in SPSS (cont...). (n.d.). Retrieved November 2, 2019, from https://statistics.laerd.com/premium-sample/mwut/mann-whitney-test-in-spss-4.php

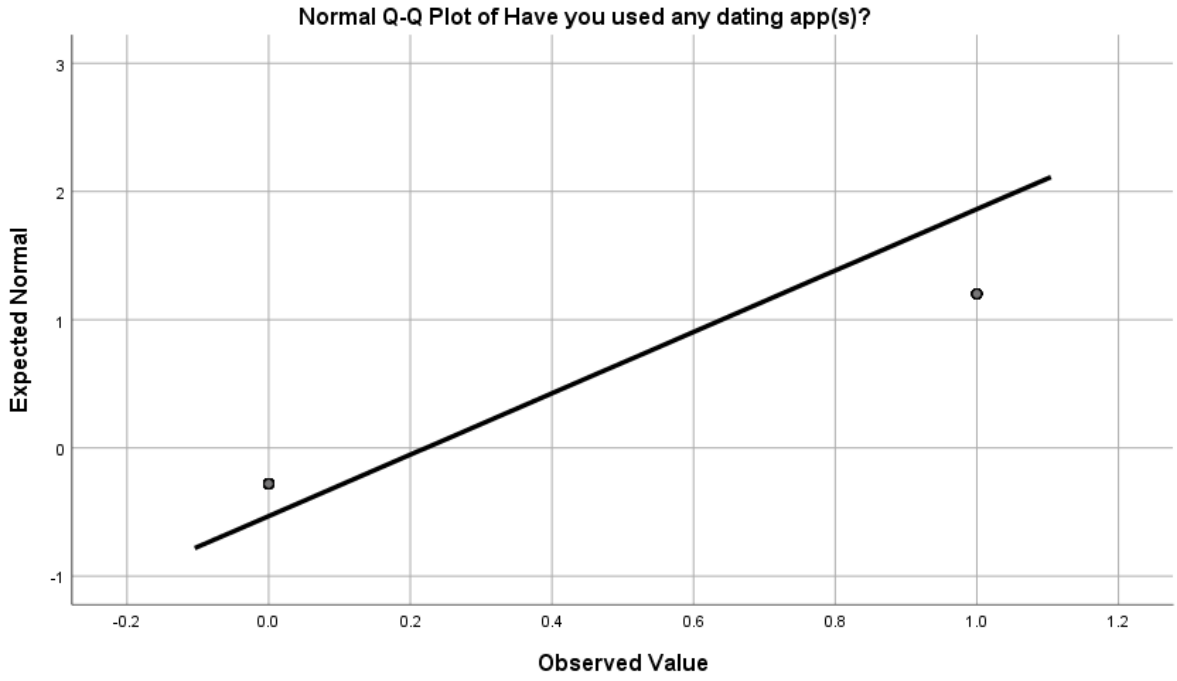
Rumsey, D. J. (June, 2016). “Types of Statistical Data: Numerical, Categorical, and Ordinal,” *Statistics For Dummies*. (2nd ed.). Retrieved from https://www.dummies.com/education/math/statistics/types-of-statistical-data-numerical-categorical-and-ordinal/

Sign Test using SPSS Statistics. (n.d.). Retrieved November 15, 2019, from https://statistics.laerd.com/spss-tutorials/sign-test-using-spss-statistics.php

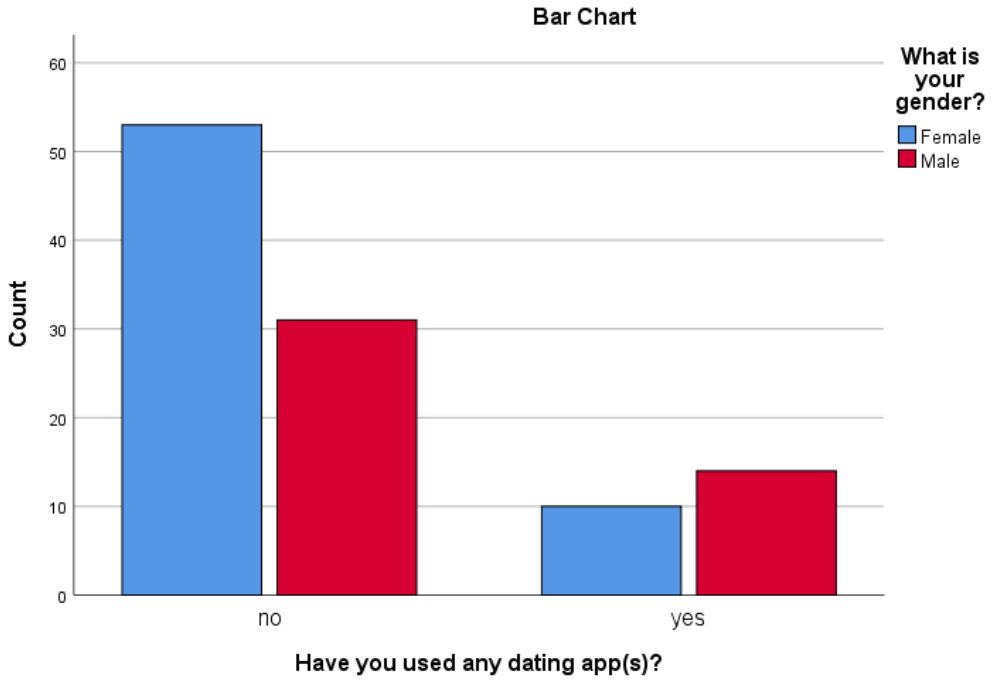
SPSS Mann-Whitney Test – Simple Example. (n.d.). Retrieved November 17, 2019, from https://www.spss-tutorials.com/spss-mann-whitney-test-simple-example/

Appendix

1.1.1) Normal Q-Q plot for hypothesis 1



2.1.1) Bar chart for hypothesis 2



2.1.2) Contingency table (with row percentages and frequencies) for hypothesis 2, chi-square test

Have you used any dating app(s)? * What is your gender? Crosstabulation

			What is your gender?		
			Female	Male	Total
Have you used any dating app(s)?	no	Count	53	31	84
		% within Have you used any dating app(s)?	63.1%	36.9%	100.0%
		% within What is your gender?	84.1%	68.9%	77.8%
		% of Total	49.1%	28.7%	77.8%
	yes	Count	10	14	24
		% within Have you used any dating app(s)?	41.7%	58.3%	100.0%
		% within What is your gender?	15.9%	31.1%	22.2%
		% of Total	9.3%	13.0%	22.2%
Total		Count	63	45	108
		% within Have you used any dating app(s)?	58.3%	41.7%	100.0%
		% within What is your gender?	100.0%	100.0%	100.0%
		% of Total	58.3%	41.7%	100.0%

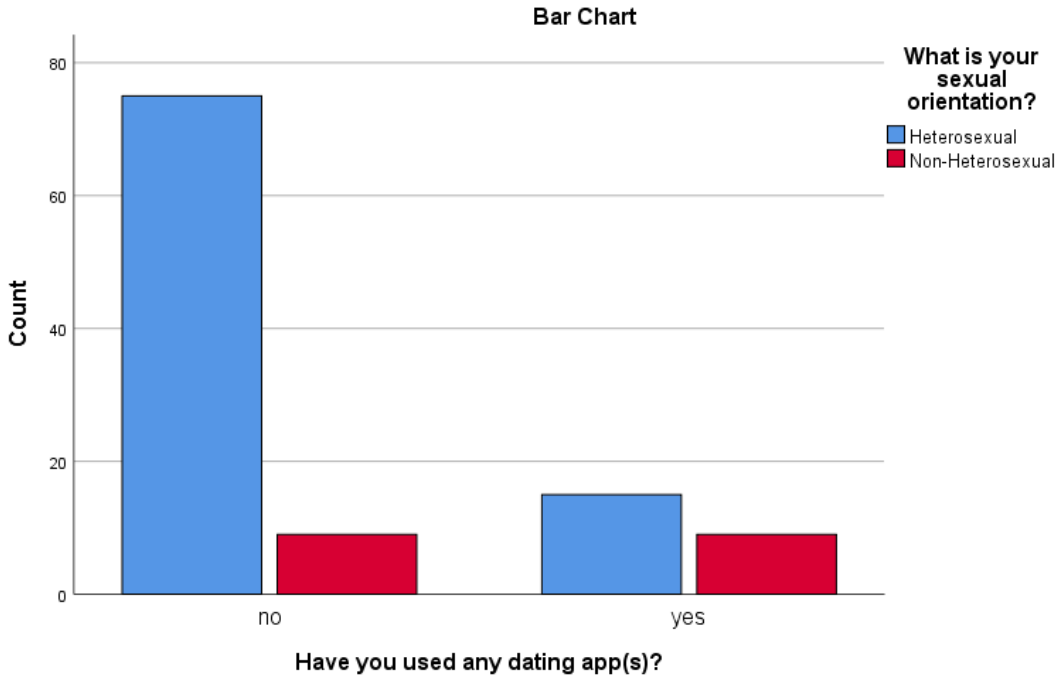
3.1.1) Normality test with sexual orientation involved

Tests of Normality

	What is your sexual orientation?	Shapiro-Wilk		
		Statistic	df	Sig.
Have you used any dating app(s)?	Heterose	.449	90	.000
	Non-Hete	.642	18	.000

a. Lilliefors Significance Correction

3.1.2) Histogram of the frequency of heterosexual / non-heterosexual versus usage of dating apps

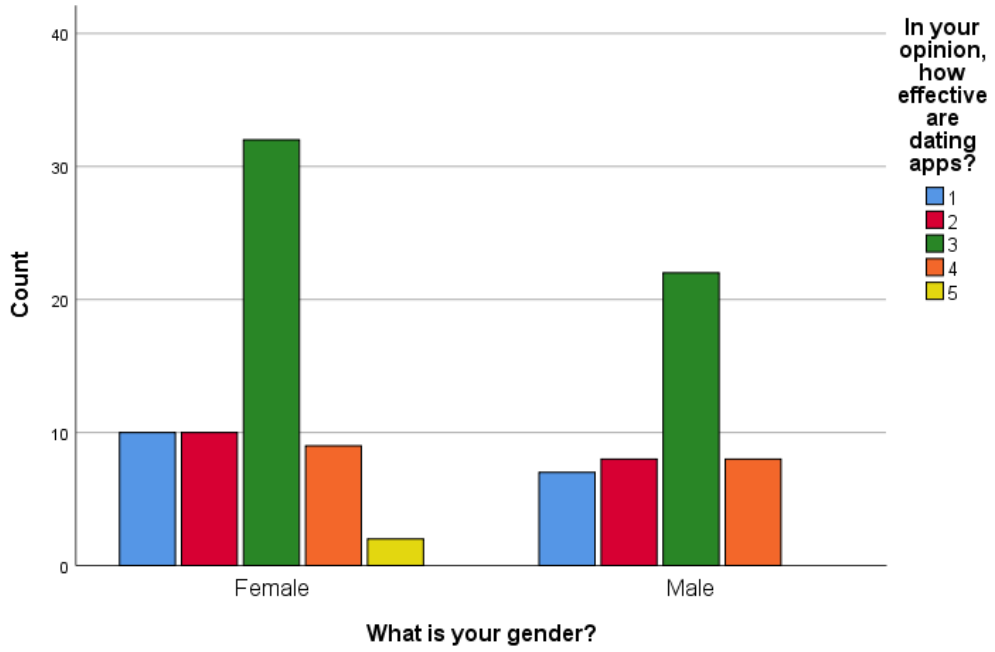


3.1.3) Contingency Table for hypothesis 3, chi-square test

Have you used any dating app(s)? * What is your sexual orientation? Crosstabulation

			What is your sexual orientation?		
			Heterosexual	Non-Heterosexual	Total
Have you used any dating app(s)?	no	Count	75	9	84
		% within Have you used any dating app(s)?	89.3%	10.7%	100.0%
		% within What is your sexual orientation?	83.3%	50.0%	77.8%
		% of Total	69.4%	8.3%	77.8%
	yes	Count	15	9	24
		% within Have you used any dating app(s)?	62.5%	37.5%	100.0%
		% within What is your sexual orientation?	16.7%	50.0%	22.2%
		% of Total	13.9%	8.3%	22.2%
Total		Count	90	18	108
		% within Have you used any dating app(s)?	83.3%	16.7%	100.0%
		% within What is your sexual orientation?	100.0%	100.0%	100.0%
		% of Total	83.3%	16.7%	100.0%

4.1.1) Histogram of the frequency of male / female on their opinion on effectiveness of dating apps


40
30
20
10
0
Count
Female
Male
What is your gender?
In your opinion, how effective are dating apps?
1
2
3
4
5

5.1.1) Questionnaire "Survey on Usage and Perception of Dating Apps Among Students in University of Malaya (UM)"

1. What is your gender? (M/F)
2. Which faculty are you from?
3. What is your year of study?
4. What is your sexual orientation?
5. Have you used dating apps? Y or N

If the answer from Q5 is Yes, jump to the Section A, else jump to Section B

Section A

6. What do you use dating apps for?
7. How long have you used dating app(s)?

- Less than 1 month
- 1-3 months
- 4-6 months
- More than 6 months

8. Select the dating app(s) you have used.

- Tinder
- Bumble
- OkCupid
- JustDating
- Happn
- Mingle2
- MiChat
- Dating.com
- AsianDating
- SweetRing
- iPair
- WeDate
- Paktor
- TanTan
- MoMo
- Soul
- Badoo
- Blued
- Zoe
- FEM
- Her
- LGBT Dating
- Wapa (Lesbian Dating)
- Facebook dating
- Other (Please specify): _____

9. How comfortable is your experience in using dating apps? (Likert scale, 5)

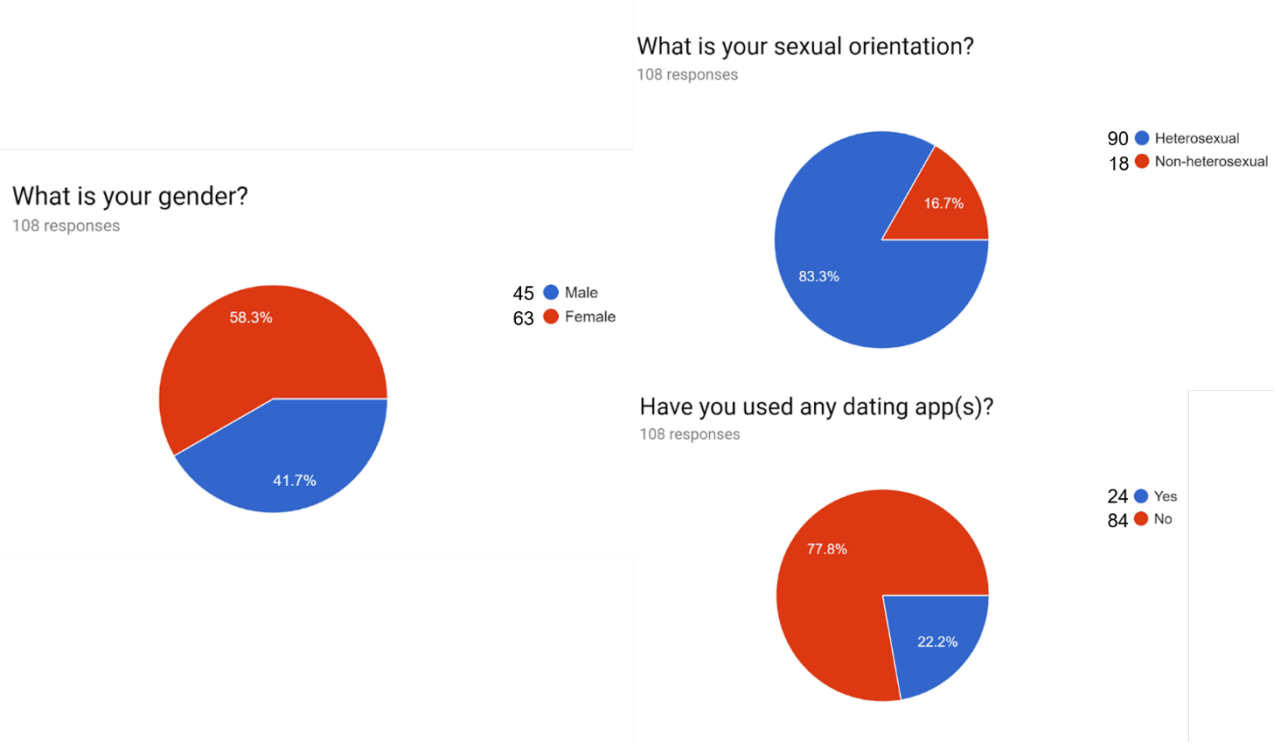
Section B

10. What is your reason behind not using dating app?
11. Would you ever use dating apps in the future? (yes/no/maybe)

End of branch

12. Do you believe that it is possible to get a genuinely sincere partner through a dating app? (Yes/no/maybe)
13. In your opinion, how effective are dating apps? (Likert scale, 5)
14. In your opinion, how safe are dating apps? (Likert scale, 5)
    (Here we are referring to getting harassed or abused online.)
15. In your opinion, how secure are dating apps? (Likert scale, 5)

5.1.2) Summary of demographic data



5.1.3) Assumptions of the statistical test used

Assumptions made for Sign test

- The dependent variable should be measured on a continuous (interval or ratio) or ordinal level.
- The independent variable should consist of two categorical, "related group" or "matched pairs".
- The paired observations for each participant need to be independent.
- The difference scores (differences between the paired observations) are from a continuous distribution.

Assumptions made for Wilcoxon Signed Rank test

- Dependent variable should be measured at the ordinal or continuous level.
- Independent variable should consist of two categorical groups which are related or matched pairs.
- Data distribution of the two related groups should be symmetrical.

Assumptions made for Chi-Square Independence test

- The two variables should be measured at ordinal or nominal level (categorical data).
- The two variables should consist of two or more categorical, independent groups.
- Expected frequencies of more than 5 for each group in each variable.

Assumptions made for Fisher's Exact test

- The sample that has been drawn from the population is done by the process of random sampling.
- Individual observations are independent.

Assumptions made for Mann-Whitney U test

- Dependent variable should be measured at the ordinal or continuous level.
- Independent variable should consist of two categorical, independent groups.
- Independence of observations, there is no relationship between the observations in each group or between the groups themselves.
- Data distribution for both groups of the independent variable should have same or similar shape.

Assumptions made for Kruskal-Wallis H test

- Dependent variable should be measured at the ordinal or continuous level.
- Independent variable should consist of two or more categorical, independent groups.
- Independence of observations, there is no relationship between the observations in each group or between the groups themselves.
- Data distribution for both groups of the independent variable should have same or similar shape.