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## The Effects Of Dating Applications On Mental Health Since The COVID-19 Pandemic

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# **The Effects Of Dating Applications On Mental Health Since The COVID-19 Pandemic**

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## ABSTRACT

In response to the increase of online dating platforms since the COVID-19 pandemic, it is crucial to investigate the effects on the well-being of users. This study intends to explore the impact of dating applications on the mental health of university students since COVID-19, since the usage rate of dating applications are high among young adults. Using quick response (QR) codes, a purposive sampling technique will be used to conduct an online survey of 383 participants from selected universities in Singapore. With our key independent variable of dating app usage and control variables consisting of demographics, COVID-19 stressors, social support, mental health history, and technology use, we will perform t-tests and regression analysis to determine the significance on our dependent variable of mental health. In evaluating the preliminary results, the t-test suggests that no significant difference exists between the contentment levels of dating app users and non-users. Similarly, regression analysis examining the influence of dating app use on family relationships suggests a positive impact of the use of dating apps on these relationships. The findings of this study will determine mental health outcomes following from increased usage rates of dating applications and not only help inform app users of these implications as they continue to use the dating platforms, but also make available additional user information for app developers.

*Keywords:* COVID-19, Mental health, Dating applications, University students, Singapore

# CHAPTER 1

## INTRODUCTION AND REVIEW OF RELATED RESEARCH

### INTRODUCTION

#### **Problem**

The COVID-19 pandemic has drastically altered daily life, with individuals spending more time on technology, including dating applications. This shift has raised concerns about the potential effects of dating apps on mental health.

#### **Background**

Dating applications have become increasingly popular, particularly among young adults, with a majority of users seeking romantic relationships or casual encounters (Hawkins, 2022). However, the use of dating apps has also been linked to negative psychological outcomes, such as low self-esteem, body shaming, and feelings of rejection (Tiggemann & Slater, 2014).

The COVID-19 pandemic has led to social isolation and increased screen time, with individuals relying more on technology to connect with others (Pandya & Lodha, 2021). This shift has led to an increase in the use of dating apps, with many seeking to alleviate boredom and meet new people during lockdown. According to Dietzel et al. (2021), dating application Tinder has received 11% more swipes per user and 42% more matches in the year 2020, making it the app's busiest year.

Despite this increase in use, it is not yet clear how dating apps affected mental health during the pandemic and if positive or negative impacts were heightened by COVID-19.

Although many previous studies conducted on this topic have linked negative mental health effects to dating apps, this study aims to distinguish whether these negative effects outweigh the possible positive benefits.

### **Significance of the Study**

This study aims to evaluate how the usage of dating applications since COVID-19 has affected the mental health of users. Subsequently, the dependent variable is mental health, the independent variable is dating application usage, and the control variables consist of demographics, social support, mental health history, COVID-19 stressors, and technology use. Our null hypothesis states that there will be no impact of dating applications on the mental health of users, and our alternative hypothesis states that there will be an impact of dating applications on the mental health of users. We will use purposive sampling to select our sample of 383 university students from three schools located in Singapore and conduct an online survey distributed throughout the campuses using quick response (QR) codes. The preliminary results of the pilot survey attached in Appendix A suggest that mental health outcomes associated with the usage of dating apps may not be negative, and positive outcomes may in fact exist. The final results of this study can provide insight into the potential effects of online dating on mental health during a global crisis such as COVID-19, and help inform app developers, as well as current and future users, about the implications or benefits of this type of communication. Further exploring this issue can also contribute to the broad research field of how individual well-being is impacted by technology.

## LITERATURE REVIEW

While many studies provide some insight into the impact of dating applications on mental health, there are still significant gaps in the understanding of this issue. There is limited research addressing the impact of dating applications on mental health specifically during the COVID-19 pandemic. This review examines existing literature on documented connections between dating platforms and mental health.

### **Negative Impacts**

Previous research in this area has found an overwhelming amount of evidence that dating applications contribute to negative mental health outcomes. Along with a less-perceived need for responsibility (Chisom, 2021), a higher propensity for catfishing (Toma, CL et al., 2008), body image concerns, an increase in risky sexual encounters (Castro & Barrada, 2020), and attachment issues (Chin et al., 2019), commonly used indicators to evaluate mental well-being throughout the relevant research include high stress levels, anxiety, and depression.

A study conducted by Ting and McLachlan (2022) examining intimate relationships that included digital dating across genders during COVID-19, provided cross-sectional data on how being young, single, and having higher levels of stress was an indicator of increased dating-app usage during COVID-19 lockdowns. According to this study, the stress created by the pandemic was a key factor in the high usage rates of dating apps.

Further supporting claims regarding depression (Holtzhausen et al., 2020), focusing on “swipe-based dating applications (SBDA)”, evaluated how certain types of dating platforms influence mood behaviors differently, linking to negative mental health results. With 437 subjects found online, data was collected over a three-month span from a cross-sectional survey

that measured SBDA use and distress scores. Various analysis methods including Chi-squared and Anova-tests found a positive correlation between users of SBDA and certain forms of distress including depression (Holtzhausen et al., 2020).

According to Echevarria et al. (2022), 88.4% of college students using dating apps have experienced “dating app facilitated sexual violence (DAFSV)”, and this type of violence directly increased feelings of depression as well, along with low self-esteem and loneliness (Echevarria et al., 2022). A reported number of 277 undergraduates at a university in the United States completed a self-report survey, answering questions regarding dating app experience, perceived safety, sexual violence, and mental health indicators including depression and anxiety (Echevarria et al., 2022).

Moreover, based on results from analyzing users on Tinder, Lenton-Brym et al. (2021) found that the extent of dating application use, as well as motivation for usage, was associated with symptoms of social anxiety and depression. Participants underwent validation checks and along with a questionnaire that assessed anxiety levels, depression symptoms, stress levels, and motivation reasons, an online dating inventory (ODI) evaluated the participants’ usage of the dating site.

### **Positive Impacts**

Owing to the heightened restrictions on everyday activities in addition to the lockdowns and strict limits on social gatherings in most countries, “online dating became an even more viable instrument in finding and selecting romantic partners” (Candel & Jitaru, 2021). Castro and Barrada (2020), conducted a systematic review on the empirical research of the psychosocial content published in the last five years (2016–2020) about dating apps. Their findings state that

dating applications have created a new avenue for meeting and communicating with potential life partners.

With this new avenue of communication, the pandemic also instilled a greater appreciation for the value of face-to-face interaction (Chisom, 2021). The surge in isolation practices, both mandatory and voluntary, in an attempt to slow the spread of COVID-19 led to a heightened awareness of the importance of social interaction, especially concerning relationships. Even amidst the struggles of minimal human contact, the elevated use of technology during the pandemic “led to an increase in relationship quality” (Candel & Jitaru, 2021). This expansion of technology in the personal lives of individuals, as seen with dating apps, also contributed to an “ease of communication” (Chisom, 2021) among those in relationships. Also applicable to those interested in finding a partner, specifically through an online dating platform, the mobility of personal devices lends to the vast amount of users and potential connections - a benefit to those looking to meet new people.

Evident in the existing research on this topic, COVID-19 is a recent phenomenon that continues to cause implications within society. Existing research has found both negative and positive impacts, and further investigation will help determine the connection between the usage of dating applications during the pandemic, and the mental health of users. By conducting an investigation of this issue, this study aims to uncover potential outcomes specifically relating to the pandemic.

## **RESEARCH QUESTION**

Focusing on mental health, the main objective of this study is to investigate the possible positive benefits that ensued as many social interactions, including the dating scene, shifted online due to COVID-19 restrictions, and whether these results overshadow the overall negative connotation of dating apps. How has the usage of dating applications since the COVID-19 pandemic impacted the mental health of dating-application users?

## **THEORETICAL FRAMEWORK**

Following from the literature review, the theoretical framework for this study focuses on the stress and coping framework and social comparison theory. The stress and coping framework suggests that stressors, the COVID-19 pandemic in the case of this study, can trigger negative psychological and physiological reactions, which can lead to poor mental health fallouts (Folkman, 2013). The way individuals cope with these stressors affect their mental well-being, and in considering dating apps, these platforms may be a source of stress and negativity for some, while a way to deal with the uncertainty caused by the pandemic for others (Folkman, 2013).

The social comparison theory suggests that people engage in social comparisons to evaluate themselves in relation to others, and these comparisons can have both positive and negative effects on mental health (Festinger, 1954). In the context of dating apps, users may make comparisons with others based on factors such as appearance, personality, and romantic interest, which could have negative effects on their self-esteem and mental health (Drouin et al., 2015). Additionally, exposure to idealized representations of other individuals on dating apps can lead to negative body image and even lower levels of self-esteem (Tiggemann & Slater, 2013).

### **Key Independent Variable**

Based on previous research and the above theories, the key independent variable in this study is dating app use. It is the variable that will be quantified in order to determine its effect on mental health outcomes. The COVID-19 pandemic has caused significant stress and uncertainty for many individuals, and dating app usage may serve as both a coping mechanism or a stressor that influences mental health outcomes. Examining the relationship between dating app use and mental health will provide insight into the potential impact of this technology on psychological well-being during a time of heightened stress and anxiety. Isolating this factor will help determine its unique influence on mental health implications.

The independent variable in this study, dating app use, will be measured with a combination of self-report indicators and behavioral data from the applications. Methods to measure dating app usage include:

1. Usage of dating platforms: Participants will be asked whether they have used dating applications or not.
2. Self-reported frequency of use: Participants will be asked to report how often they use dating apps, such as daily, weekly, or monthly.
3. Time spent on dating apps: Behavioral data from the apps will be used to measure the total time spent using the apps on a daily or weekly basis.

### **Dependent Variable**

For this study, our survey questions will draw off of two questionnaires (attached in Appendix A) in order to analyze mental health implications of dating apps during COVID-19 and up to current times. The assessment of the mental health indicators of those participating in

the survey will serve as the dependent variable in this study. Mental health will be measured through the use of the Generalized Anxiety Disorder 7 item test (GAD-7) and Patient Health Questionnaire-9 (PHQ-9). The GAD-7 test presents seven questions pertaining to whether the subject has an anxiety disorder ranging from minimal anxiety to severe anxiety. The subject must provide a numerical rating of his or her symptoms based on the seven questions over a time period of the past two weeks. According to Frost (n.d.), to ensure that a multiple-question survey is reliable, the use of Cronbach's alpha ( $\alpha = \frac{Nc_v + (N-1)c}{N}$ ) is required. Cronbach's alpha ( $\alpha$ ) measures the correlation of a set of items when they are categorized as a group, and establishes the reliability of the rating scale used. According to Dhira et al., (2021), the consistency of the GAD-7 is concluded to be reliable due to Cronbach's alpha ( $\alpha$ ) rating of 0.895 ( $p < 0.01$ ) for the overall GAD-7 test, which exceeds the recommendation value of 0.8. Using the same scaling system, the PHQ-9 test presents nine questions pertaining to whether the subject has a depression disorder ranging from mild depression to severe depression.

### **Control Variables**

The control variables for this study consist of demographics, social support, mental health history, COVID-19 stressors, and technology use. Demographic factors that will be measured when calculating the effects of dating apps include age, gender, ethnicity, and marital status. Likewise, social support, which stems from family and friends and can have a strong impact on mental health; mental health history, such as depression and anxiety; COVID-19 stressors, including social isolation that may impact individual well-being; and the use of other technology, such as social media, may all impact both dating app use and mental health outcomes. These variables will be taken into account when conducting the survey and performing analysis.

## **HYPOTHESIS**

The hypotheses that follow from the variables selected in the theoretical framework consist of the null hypothesis and alternative hypothesis. The null hypothesis (H0) claims that the usage of dating apps since the pandemic has had no significant impact on the mental health of individual users. The alternative hypothesis (H1) claims that the usage of dating apps since the pandemic has had a significant impact on the mental health of individual users. These hypotheses will be evaluated in this study by applying a two-tail test.

**H0 :** There will be no impact of dating applications on the mental health of users

**H1 :** There will be an impact of dating applications on the mental health of users

## CHAPTER 2

### RESEARCH METHODOLOGY AND ANALYSIS REPORT

#### STUDY DESIGN

Dating applications have become a popular topic of study in the field of social science, especially considering the heightened usage of online dating platforms brought about by COVID-19. The societal shifts caused by the recent pandemic have not only affected the mental well-being of individuals, but also in regards to online interactions, these changes have directly impacted dating as a whole. This study will examine the well-being of individual users following from the impact of dating application usage since the COVID-19 pandemic. We will investigate the possible implications that resulted from an increased rate of online dating due to COVID-19 restrictions.

#### **Research Question:**

How has the usage of dating applications since the COVID-19 pandemic impacted the mental health of dating-application users?

#### **Hypotheses:**

**H0:** There will be no impact of dating applications on the mental health of the users.

**H1:** There will be an impact of dating applications on the mental health of the users.

The following methodology report defines the sampling method, selected variables, data collection methods, and data analysis techniques necessary to investigate the research question above. We will conduct an online survey to obtain quantitative data from our targeted sample of university students in Singapore. This sample will be collected using a purposive sampling

method further discussed below. With our survey responses, we will then perform multiple t-tests and regression analysis tests to analyze patterns in dating app usage during COVID-19 in connection with user mental health.

## **POPULATION AND SAMPLE**

The population for this study will consist of all adults. In regards to feasibility, it is not possible to collect a response from every adult on their usage of dating platforms, so purposive sampling methods will be used to select a sample and provide a representation of the population. Based on a U.S. survey of over 6,000 adults in 2022, 53% of individuals ages 18 to 29 have used a dating app, and 37% of individuals with some college experience have used online dating platforms (Vogels & McClain, 2023). Hence, our sample will focus on university students and considering that dating app usage rates are similar around the world, will be conducted in Singapore due to location practicality. This method of sampling will be used to narrow down the population to determine a suitable sample that will receive our survey. Since the targeted population consists of millions of individuals and is highly dispersed, this sampling technique will ensure the validity of the representation with limited bias.

In 2021, Singapore had a recorded number of university students of about 79,000 (Singapore: full-time enrollment in universities, 2021). To assure the greatest efficiency, a necessary sample size for populations exceeding 20,000 (Sample Size Calculator by Raosoft, Inc., n.d.) remains between 300 to 400 subjects. With a 5% margin of error, 95% confidence interval, response distribution of 50%, and critical value of 1.96, the sample size would be calculated at 385 subjects. For this study, the number of Singaporean university students is estimated to range from about 82,000 to 85,000 students, following the pattern of an increase in

students by about 3,000 a year (Singapore: full-time enrollment in universities, 2021). Therefore, we have chosen to select a sample size of 383 students (Sample Size Calculator by Raosoft, Inc., n.d.).

Purposive sampling involves the selection of participants based on the usefulness to the study, and the subsequent collection of necessary data from this selected group. Being that universities have a large community of young adults, this investigation will focus on Singaporean university students, sampled based on school. According to the Ministry of Education the six public universities in Singapore include NUS with 32,335 students; NTU with 24,630 students; SMU with 9,883 undergraduates; SUSS with 21,000 students; SUTD with 1,500 students; and SIT with around 8,500 students. We will focus on the public universities for feasibility purposes and in order to reach our desired sample size, select the three schools with the highest student population from the six public universities that exist in Singapore. In this case, the selected schools will be NUS, NTU, and SUSS. Data can then be collected from participants in the selected schools and is discussed in greater detail below.

## **VARIABLES AND MEASURES**

### **Key Independent Variables**

As mentioned in the overview of previous research regarding this area, dating applications have been found to have both negative and positive effects on the mental well-being of individuals. The aim of this study is to investigate the impacts of digital dating platforms on the mental health of app users in connection with COVID-19. The global pandemic disrupted previous social elements within society, and the intent of this study is to evaluate the outcome

that increased dating app usage (heightened by Covid-19) had on the mental health of users. Following from this, our key independent variable is the usage of dating applications. Our key independent variable can be measured through whether the respondent has ever used a dating application, along with the frequency of usage. Essentially, this measures how often users engage with the app. For example, if a user uses the app every day or multiple times a day, they are considered to have high frequency of usage. In using questions from the supplementary survey included in the appendix as an example, one of the questions specifically asks the participants how often they use dating apps. For instance, “How often do you use a dating application?” and “Roughly how long do you spend using a dating application?”. These questions allow for a more accurate measurement of the frequency of app usage, which can affect the degree of retention.

### **Control Variables**

In addition to the use of online dating, various other variables may influence the mental health of an individual. First, consider demographics – these variables report everyday background information on the lives of individuals. For this study, age, gender, ethnicity, and marital status will be examined. People of all ages are at risk for mental health concerns and for example, women have a higher average rate of depression while men have a higher average rate of substance abuse (The Gender Gap in Mental Health, 2022). Cultural norms also affect the way mental health is viewed and therefore treated. Marital status, whether someone is married or single, is known to positively impact well-being and lower negative mental health concern (Shmerling, 2016).

In addition to demographics, other predictor variables regarded in this study include social support, mental health history, COVID-19 stressors, and technology use. Directly tied to

psychological well-being and relationship building, social support consists of the societal interactions and sense of belonging that an individual experiences (Scheid & Brown, 2010). Previously diagnosed mental health illnesses, as well as poor overall mental health, have been found to increase future mental health issues. Moreover, stressors that intensified during the pandemic, such as anxiety, depression, loneliness, and isolation (COVID-19: How to manage your mental health during the pandemic, n.d.), contributed to decreased psychological health across the population. A final control variable is technology use. For example, increased social media use during the pandemic (Valdez et al., 2020) as well as excessive screen time (Driscoll et al., 2022) have been associated with poor mental health outcomes. To measure technology use, we will include a question in the survey that specifically asks about the frequency of social media use during the pandemic. This will allow us to assess whether increased social media use has any impact on the mental health of dating app users during COVID-19. "On average, how many hours per day do you spend using social media (such as Facebook, Instagram, Twitter, TikTok, etc.) on your phone or computer?" This question will be included in the supplementary survey alongside questions related to the other predictor variables, such as demographics, social support, mental health history, and COVID-19 stressors attached in the appendix. We will ensure that the survey questions are specifically formulated to measure the different predictor variables in a reliable and valid manner. By accounting for these variables, we hope to gain a comprehensive understanding of the relationship between dating app usage and mental health during the pandemic, while also controlling for potential confounding factors.

### **Dependent Variables**

The dependent variable in this study is individual mental health. With the goal of

measuring the outcome of dating app usage during COVID-19 on mental illness levels, this variable will be assessed using the Generalized Anxiety Disorder 7-item (GAD-7) and Patient Health Questionnaire-9 (PHQ-9) forms in addition to the survey questions included in the appendix. The GAD-7 measures the impact of anxiety and stress levels on the mental health of pertinent individuals by presenting seven questions. Providing an answer scale from 0 to 3, these questions inquire about the emotional feelings of nervousness, uncontrollable worrying, relaxation levels, restlessness, anger, and fear an individual has experienced over the last two weeks. To evaluate, the answer scores are summed and resulting levels indicate anxiety and stress issues, with a score greater than 15 signifying a severe condition.

The PHQ-9 measures depression levels with a series of nine questions and has the same answer scale as the GAD-7 system. The questions inquire about interest levels, negative emotions, sleep habits, energy levels, appetite, self-esteem, concentration aptitude, sluggish or fidgety feelings, and suicidal thoughts. A score of 5 signifies mild depression, whereas a score of 20 signifies severe depression. Along with chosen survey questions, we can locate the study participants who scored a high answer on these questionnaires and prepare further analysis, which will be discussed in a later section, to find COVID-19 and dating app usage correlations.

## **DATA COLLECTION**

For this investigation, we have decided to use a survey as our primary data collection method. Surveys are an efficient and standardized way of collecting data, as each individual is asked the same set of questions. This allows us to compare and analyze data across various individuals, and the use of surveys enables us to achieve quantitative analysis, which can be analyzed using various statistical methods such as T-tests, ANOVA, and Chi-Squared tests.

To ensure the quality and reliability of our data, we have conducted a pilot survey using the survey questions in combination with the GAD-7 and PHQ-9 questionnaires. The results of the pilot survey will help us refine our survey questions and assess the suitability of the GAD-7 and PHQ-9 questionnaires for our investigation.

To make our survey more accessible and flexible, we will build it online using a customized survey website called Qualtrics. The use of a digital survey allows us to reach a wider range of students throughout the sample universities who can complete the survey at their own pace. Qualtrics offers five circulation methods: email, web, social media, mobile, or online panel. This study will be using a mobile circulation method. Mobile circulation relies on personal devices and in this case, our method of collecting responses will be the use of QR codes. We will reach out to the human resources (HR) department and student government associations (SGA) of the selected universities discussed above and coordinate the placement of the QR codes around campus. The QR codes will be displayed on bulletins, flyers, and posters and have a customized shape and color. Each sampled university will have a different QR code that links to the same survey. To ensure that the respondent is a student, question one in the attached supplementary survey asks, “Are you currently enrolled at this university?”, and the “No” answers will be filtered out of our data before data analysis. Additionally, in order to reach our desired sample size of 383 students, we will incentivize the use of the QR codes with free waterproof laptop stickers and one prize. We will work with the SGA of the respective universities to present one laptop sticker to each respondent by setting up a small basket of stickers in the SGA office. After an individual completes the last survey question, the screen will show a final phrase that thanks them for answering the questions. The respondents who wish to claim their sticker must present a screenshot of this. Once the time period for the survey is reached and the QR

codes are no longer valid, one of the students who participated will be randomly selected to win the prize of a twenty-five dollar gift card.

### **Survey Questions**

The pilot survey consists of fifteen questions, with questions one through four addressing demographics, questions five through ten addressing psychological well-being, questions eleven and twelve addressing dating app usage, question thirteen addressing dating app effects on relationships, and questions fourteen and fifteen addressing COVID-19 aspects. The recorded answers will aid in the examination of significant impacts on the dependent variable of mental health. Moreover, the supplementary survey consists of eleven questions that will measure the control variables and provide more precise data. Both surveys can be found Appendix A.

## **DATA ANALYSIS**

Once the duration of the survey is complete, the survey results will be exported from Qualtrics into a XLSX file and uploaded into a spreadsheet file into Excel. Before any analytical tests can be run using the data, the information must be cleaned, formatted, and sorted, with text inputs converted to dummy variables for example. First off, simple analysis can be accomplished through the use of descriptive statistics. This presents a summarization of quantitative data collected from a specific source, with the most meaningful outputs consisting of mean, standard deviation, range, and count. If the minimum and maximum limits are reasonable, further analysis can follow. Within this study, descriptive statistics will be used to find means when needed, and determine if general summary statistics are reasonable in order to further proceed with in-depth data analysis.

## **T-test**

An analytical technique used to compare two groups is considered a t-test. The null hypothesis claims there is no difference between the groups and the alternative hypothesis claims that a difference exists between the two groups. If the resulting p-value is larger than the significance level used (either 0.01, 0.05, or 0.10), we cannot reject the null hypothesis. However, if the resulting p-value is larger than the determined significance level, we can reject the null hypothesis. This means that a significant difference exists between the two groups. For this study, t-tests will be extremely useful in comparing the response data for different factors. With our dependent variable of mental health and key independent variable of dating app usage, analyzing responses to question fourteen and question five from the pilot survey will provide essential results for evaluating our research question. Question fourteen asks, “Has being locked down during the COVID-19 pandemic made you use dating applications?” and question five asks, “Overall, how would you rate your mental health and state of mind?”. Question six, which asks, “Have you been diagnosed with a mental disorder before by a certified psychologist?”; question seven, which asks, “Have you had any problems with your work or daily life due to any emotional problems, such as feeling depressed, sad or anxious?”; question eight, which asks, “How often has your mental health affected your ability to meet someone new online or in real life?”; and question nine, which asks, “When was the last time you felt good about yourself?”, are additional questions that can be analyzed in the evaluation of the dependent variable of mental health.

## **Preliminary T-test Performed Using Survey Results**

In this analysis, we are exploring whether there is a relationship between people using

data applications and their level of contentment with their relationships and family. To do this, we selected two questions from the pilot survey where we asked participants about their use of data applications and their level of contentment with their relationships and family. Question eleven asks, “Have you used any dating applications before?” and question ten asks, “Do you feel content with your relationships and family?”. We then performed a t-test to determine if there was a statistically significant difference in contentment levels between those who use data applications and those who do not. We assigned people that used dating apps a numerical value of 1 and people that did not use dating apps a numerical value of 0.

Our null hypothesis is that there is no significant difference in contentment levels between those who use data applications and those who do not, while our alternative hypothesis is that there is a significant difference in contentment levels. We collected data from 40 participants, and the results of the t-test showed a p-value of 0.122 (3 s.f.). This p-value is greater than the typical significance level of 0.05 (5% significance level), which means that we cannot reject the null hypothesis. Therefore, we conclude that there is no significant difference in contentment levels between those who use data applications and those who do not.

It is important to note that this analysis only shows a correlation between the use of data applications and contentment levels. There could be other factors that are impacting participants' levels of contentment with their relationships and family that are not captured in this analysis. In conclusion, this analysis suggests that using data applications does not have a significant impact on people's contentment with their relationships and family. However, further research may be needed to explore this relationship in more depth and to identify other potential factors that may be impacting contentment levels.

## **Regression Analysis**

Regression tests determine whether the independent variables have an impact on the dependent variable. In this case, whether dating app usage along with selected control variables, affect the mental health of the participants. Regression analysis uses the following equation:  $y = B_0 + B_1X_1 + B_2X_2 + \epsilon$ . The dependent variable is represented with  $y$ ,  $B_0$  represents the  $y$  intercept,  $B_1$  represents the slope,  $X$  represents the independent variables, and  $E$  represents the residuals. It is important to note that  $X_2$  stands for all of the independent variables to be selected. In this study, these variables consist of demographics, social support, mental health history, COVID-19 stressors, and technology use.

An advantage of regression analysis is that it pinpoints the exact size of the impact, whereas t-tests can only find if a difference exists. In regression analysis, even though many factors affect the dependent variable, this technique can determine which variables cause the significant difference. Moreover, various regression tests can be run with different variables and the outputs can be compared. Within this study, regression analysis will be used to measure different variables against each other to find whether dating app usage is significantly impacted as seen in the following example.

## **Preliminary Regression Analysis Performed Using Survey Results**

The purpose of this statistical analysis is to examine the relationship between people who use dating apps ( $X_1$ ) and their respective family relationships ( $X_2$ ). The analysis will be based on a regression model that includes data on the frequency of dating app use and a self-reported measure of family relationship quality with the following equation: The p-value for the regression model is 0.0000131 (2 s.f.) with a 5% significance level. Since the p-value is less than

0.05 (5% significance level), this indicates that there is a statistically significant relationship between using dating apps and having satisfactory family relationships. Considering that the coefficient value of 0.195 (3 s.f.) is far from the value of 1, it suggests that there is a weak correlation between dating app usage and relationship satisfaction in this regression analysis. The direction of this regression is positive as the coefficient is positive with a numerical value of 1.07 (3 s.f.). It is important to note that the R square value is 0.0757 (3 s.f.) and the adjusted R square is 0.0492 (3 s.f.), which indicates that the goodness of fit is not ideal.

## **CONCLUSION**

### **Limitations**

There are some limitations to our survey and sampling methods. One limitation is possible cultural bias, since the target subjects are selected from the country of Singapore for attainable sampling purposes, and cultural norms may influence aspects of this region's approach to dating. However, due to the multicultural environment of and presence of many international university students in Singapore, we believe that our sample will account for these cultural differences. Another limitation is the difficulty in assessing the exact impact of COVID-19 due to subjective views and constraints of survey questions. Nevertheless, we believe that our survey questions have been carefully crafted to address COVID-19 relevance, and we have taken critical deliberation to ensure that our survey design is suitable for our investigation.

Moreover, it is helpful to note that our sampling technique is not free from possible bias that may affect the validity of results. First, subgrouping techniques are subjective, meaning that the process of stratified sampling is directed by those running the study. The final sample may

not reflect an exact representation of the intended population due to this subjective nature of subgrouping. Second, dividing and clustering information from a large population may introduce bias for similar reasons. There is no way to perfectly represent an entire population, especially when highly dispersed, but this study aims to reduce bias possibilities as much as possible by staying aware of these limitations and taking them into account when evaluating results.

A final limitation noted for this study is the accessibility of QR codes. The completion of the survey from a mobile device after activating the QR code, requires an internet connection. However, this should not be a problem considering that college campuses provide adequate Wi-Fi for students.

### **Contribution**

By conducting an online survey using QR codes displayed throughout the selected university campuses, this study will compile a data set that measures the implications of dating app usage since COVID-19 on the mental health of users. Although previous research has found many negative outcomes linked to the use of dating applications, the preliminary results reinforce the existence of positive impacts following from dating app usage as well, specifically since the pandemic. The findings of the study are important to inform users about the possible ramifications of using online dating platforms, provide further information for app developers on how users interact with the applications, and expand on the wider research area of how mental health relates to technology use.

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## APPENDIX A.

### Pilot Survey Questionnaire

The following survey questions were designed to gather information on the usage of dating applications and their potential effects on mental health. Participants were asked to provide demographic information and answer questions related to their frequency of use, perceived benefits and drawbacks of dating applications, and any negative experiences they may have had while using them. Participants were also asked about their levels of anxiety, depression, and self-esteem to assess any potential correlations between dating app use and mental health outcomes. The survey aimed to provide insights into the impact of dating app use on mental health and inform potential interventions to improve the well-being of individuals who use these apps. The survey was administered anonymously and in accordance with ethical research standards.

1. What is your gender?

- Female
- Male
- Other

2. How old are you?

- Under 18
- 18-24 years old
- 25-34 years old
- 35-44 years old

- 45-54 years old
- 55-64 years old
- 65+ years old

3. What is your nationality?

4. What is your relationship status?

- Single
- Married
- Divorced
- In a relationship
- It's complicated
- Widowed

5. Overall, how would you rate your mental health and state of mind?

- Excellent
- Somewhat Good
- Average
- Somewhat Poor
- Poor
- Not Sure

6. Have you been diagnosed with a mental disorder before by a certified psychologist?
  - Yes
  - No
  
7. Have you had any problems with your work or daily life due to any emotional problems, such as feeling depressed, sad or anxious?
  - Yes
  - No
  - Not Sure
  
8. How often has your mental health affected your ability to meet someone new online or in real life?
  - Very often
  - Somewhat often
  - Not so often
  - Not at all
  
9. When was the last time you felt good about yourself?
  - Now
  - A few days ago
  - Few weeks ago
  - Few months ago

- Few years ago
- I don't remember

10. Do you feel content with your relationships and family?

- Yes
- Sometimes
- No

11. Have you used any dating applications before?

- I have used
- I have never used

12. If you answered yes to the question above, which of the dating applications have you used?

- Tinder
- Bumble
- OKCupid
- Hinge
- Others (Please Specify)
- None

13. Overall, what type of effect would you say online dating sites and dating apps have had on your dates and relationships?

- Mostly positive effects
- Mostly negative effects
- Neither positive nor negative
- Mixed
- No answer

14. Has being locked down during the COVID-19 pandemic made you use dating applications?

- Yes
- No

15. How has COVID-19 affected your mental health?

- The same
- Made it worse
- Neutral
- Made it better

## Supplementary Survey Questionnaire

The following survey questions were designed to gather additional information on the usage of dating applications and their potential effects on mental health. These questions have been formulated to measure the variables discussed in this study with increased precision and can be used in combination with the questions from the pilot survey.

**1.** Are you currently enrolled at this university?

- Yes
- No

**2.** How often do you use a dating application?

- Multiple times a day
- Once a day
- Several times a week
- Once a week
- Several times a month
- Never

**3.** Roughly how long do you spend using a dating application?

- Less than 10 minutes
- 10-30 minutes
- 30-60 minutes
- More than 60 minutes
- More than several hour

4. How often do you interact online with others using the dating application?

- Not often
- Sometimes
- Very often
- All the time

5. Do you interact with the same friends on a daily basis?

- Yes
- No

6. How often do you interact with your family?

- Everyday
- Weekly
- Monthly
- Yearly
- Never

7. Did social isolation during COVID-19 affect your mood?

- No
- A little
- Yes
- A lot

**8.** Do you think school requirements negatively affect your mental health?

- Yes
- No

**9.** Were you attending college during COVID-19?

- Yes
- No

**10.** If you answered yes to the question above, did COVID-19 negatively affect your education experience?

- Yes
- Does not apply

**11.** On average, how many hours per day do you spend using social media (such as Facebook, Instagram, Twitter, TikTok, etc.) on your phone or computer?

## Figure 1 - GAD- 7

Source: <https://www.hiv.uw.edu/page/mental-health-screening/gad-7>

### Generalized Anxiety Disorder 7-item (GAD-7) Share

The Generalized Anxiety Disorder 7-item (GAD-7) is a easy to perform initial screening tool for generalized anxiety disorder<sup>1</sup>.

Over the <b>last 2 weeks</b> , how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	<input type="radio"/> 0	<input type="radio"/> +1	<input type="radio"/> +2	<input type="radio"/> +3
2. Not being able to stop or control worrying	<input type="radio"/> 0	<input type="radio"/> +1	<input type="radio"/> +2	<input type="radio"/> +3
3. Worrying too much about different things	<input type="radio"/> 0	<input type="radio"/> +1	<input type="radio"/> +2	<input type="radio"/> +3
4. Trouble relaxing	<input type="radio"/> 0	<input type="radio"/> +1	<input type="radio"/> +2	<input type="radio"/> +3
5. Being so restless that it is hard to sit still	<input type="radio"/> 0	<input type="radio"/> +1	<input type="radio"/> +2	<input type="radio"/> +3
6. Becoming easily annoyed or irritable	<input type="radio"/> 0	<input type="radio"/> +1	<input type="radio"/> +2	<input type="radio"/> +3
7. Feeling afraid as if something awful might happen	<input type="radio"/> 0	<input type="radio"/> +1	<input type="radio"/> +2	<input type="radio"/> +3

GAD-7 score obtained by adding score for each question (total points)

Figure 2 - PHQ-9

Source: <https://www.hiv.uw.edu/page/mental-health-screening/phq-9>

## Patient Health Questionnaire-9 (PHQ-9)

Share

The PHQ-9 is a multipurpose instrument for screening, diagnosing, monitoring and measuring the severity of depression.

Over the <b>last 2 weeks</b> , how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	<input type="radio"/> 0	<input type="radio"/> +1	<input type="radio"/> +2	<input type="radio"/> +3
2. Feeling down, depressed or hopeless	<input type="radio"/> 0	<input type="radio"/> +1	<input type="radio"/> +2	<input type="radio"/> +3
3. Trouble falling asleep, staying asleep, or sleeping too much	<input type="radio"/> 0	<input type="radio"/> +1	<input type="radio"/> +2	<input type="radio"/> +3
4. Feeling tired or having little energy	<input type="radio"/> 0	<input type="radio"/> +1	<input type="radio"/> +2	<input type="radio"/> +3
5. Poor appetite or overeating	<input type="radio"/> 0	<input type="radio"/> +1	<input type="radio"/> +2	<input type="radio"/> +3
6. Feeling bad about yourself - or that you're a failure or have let yourself or your family down	<input type="radio"/> 0	<input type="radio"/> +1	<input type="radio"/> +2	<input type="radio"/> +3
7. Trouble concentrating on things, such as reading the newspaper or watching television	<input type="radio"/> 0	<input type="radio"/> +1	<input type="radio"/> +2	<input type="radio"/> +3
8. Moving or speaking so slowly that other people could have noticed. Or, the opposite - being so fidgety or restless that you have been moving around a lot more than usual	<input type="radio"/> 0	<input type="radio"/> +1	<input type="radio"/> +2	<input type="radio"/> +3
9. Thoughts that you would be better off dead or of hurting yourself in some way	<input type="radio"/> 0	<input type="radio"/> +1	<input type="radio"/> +2	<input type="radio"/> +3

PHQ-9 score obtained by adding score for each question (total points)