Depression and Phone Calls Among College Students

Aakash Agrawal
University of Washington
aakash23@uw.edu

Christina Mauri
University of Washington
cmauri@uw.edu

ABSTRACT
Rates of depression among college students are increasing rapidly. A prior study indicates that among young adults, general mobile phone use is correlated with depressed mood. However, another study on adolescents shows that while depressed mood does not spread, healthy mood in friends is associated with a reduced risk for becoming depressed, suggesting that phone calls between college students might encourage the spread of healthy mood and thereby reduce the risk of students developing depression. We conducted a survey with 48 college students to determine whether phone calls and depression are associated. The study shows there is no difference in depression scores of college students that engage in more phone calls and those that engage in fewer.

Key Words
Depression, college students, graduate students, phone communication, mobile phone calls

INTRODUCTION

Depression is a common and growing public health problem in the United States [1]. A treatable, but debilitating mood disorder, depression is correlated with increased morbidity and mortality. Disabilities of similar severity to those seen in people with chronic diseases such as diabetes and cancer have been found in people with depression [2].

Surveys suggest that rates of depression among college students doubled between 2003 and 2018 [3] and among them graduate students are particularly at risk. According to a recent study, the depression rate among graduate students is six times that of the general public [4]. Depression is also more common in women than in men, suggesting that female graduate students are especially vulnerable to the disorder [5].

Previous work has shown that a high frequency of calling and SMS messaging are together associated with symptoms of depression among both male and female adults of college age [6]. In contrast, another study indicates that phone communication might be used to combat depression; it shows that healthy mood in adolescent friends is associated with a reduced risk for becoming depressed, suggesting that phone calls between college students might foster the spread of healthy mood and thereby reduce the risk of the students developing depression [7].

Little research has been conducted on the relationship between phone calls alone and depression in college students. In this study we investigate the relationship between phone calling and depression in college students, proposing the following hypotheses:

> H0: There is no difference in depression scores of students that engage in more phone calls and those that engage in fewer phone calls.
> H1: There is a difference in depression scores of students that engage in more phone calls and those that engage in fewer phone calls.

In the hypotheses above, we define engagement in phone calls as the making and receiving of phone calls. Students were classified as engaging in more or fewer phone calls based on how many calls they engaged in relative to the mean number of calls reported by the 38 college student participants in this study.

METHOD

Participants

There were 48 participants, 38 of whom were in the target population of college students (male=18, female=19, non-binary=1). The college student participants consisted of 6 undergraduate students (15.8%), 31 Master's students (81.6%), and 1 doctoral student (2.6%).

Apparatus

The PHQ-9 questionnaire, a validated tool for the measurement of depression severity using a Likert scale, was used to measure the depression severity for each respondent. The PHQ-9, which has 9 questions, correlates highly with the Beck Depression Inventory (BDI), another questionnaire that is a validated measure for depression severity and that has 21 questions [8,9,10]. Of the two questionnaires, the PHQ-9 was chosen because it takes less time to complete and, unlike the BDI, it is free [11,12].

Procedure

Participants were asked to complete an anonymous online survey consisting of two sections. In the first section, they were asked to report the number of calls they received and made in the previous day. The second section consisted of a PHQ-9 questionnaire.

Participants also self-reported their sex and college affiliation (e.g. undergraduate student, Master's student, Doctoral student, faculty). Since we expected that participants might speak on the phone at a different frequency on weekends versus weekdays.

A link to the survey, which was administered online, was posted on the University of Washington, Western Washington University and University of Maryland student and alumni online forums. The survey was open from February 22nd to March 14th in 2019.

Design & Analysis

The study design had a single between-subjects factor with 2 levels. The independent variable was the number of calls made and received (CallerGroup) and had two levels, 'More' and 'Less'. The dependent variable was the depression score obtained after coding responses from PHQ-9 questionnaire.

Data Cleaning

Since we were interested in responses from college students, we removed any responses from people that were not college students from our analysis.

Data Coding

The responses to the depression questionnaire were coded to numeric responses as per the instructions of the PHQ-9 instrument [11]. Table 1 shows the score assigned to each category of response from the PHQ-9 questionnaire.

We divided participants into two groups based on the number of phone calls they reported making and receiving.

Response	Score
Not at all	0
Several days	1
More than half days	2
Nearly Every day	3

Table 1. Depression Score Mapping.

Those that reported a higher number of calls were labelled 'More' and those that reported fewer calls were labelled 'Less'. The threshold between the two groups was the mean number of phone calls made based on the data collected. From the data we got 2.73 as mean number of phone calls, so 3 calls was determine to be the threshold value; respondents that made 3 or more (>=3) phone calls were grouped under the 'More' level of CallerGroup and those that made less than 3 calls (<3) were assigned to the level 'Less.'

The pseudo logic for the CallerGroup assignment is as follows:

> If # of phone calls >= ciel(mean(total number of phone calls)) then 'More'

Else 'Less'

Once the caller groups were decided, we calculated the mapped depression score for each participant. Then, we classified participants as depressed or not depressed for analysis for the purpose of this study.

The pseudo logic for the classification of each participant as depressed or not is as follows:

> If Total Score >=14 then Depressed

Else Not depressed

Data Analysis

Data analysis was performed using the R programming language. Since the study was one with a single factor and two levels, we initially considered conducting an independent samples t-test to examine differences in the two levels of the independent variable, CallerGroup. We also considered conducting a one-way ANOVA to examine whether the dependent variable per level of the independent variable conformed to the assumptions of ANOVA, including normality and homoscedasticity.

After cleaning and coding the data, we summarized it. Table 2 shows descriptive statistics of the data, Figure 1 shows the distribution of the data, and Figure 2 shows a box plot of the data.

Caller Group	Number of Participants	Depression Score		
		Mean	Median	Mode
More	17	6.70	5	5.26
Less	21	6.57	6	4.87

Table 2. Descriptive Statistics.

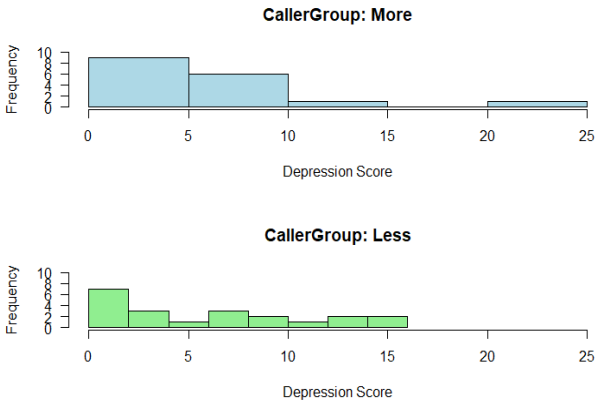

Figure 1. Frequency distribution of the depression scores by CallerGroup

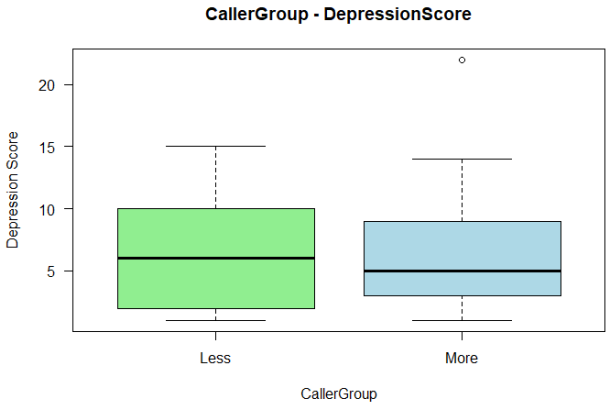

Figure 2. Box Plot for DepressionScore by CallerGroup.

RESULTS AND DISCUSSION

Through initial data exploration and visualizations, the distribution of scores for each of the caller groups appeared to be lognormal, indicating violations of normality, and suggesting either a log-transform of the response (DepressionScore) or the use of a non-parametric statistical test.

A Shapiro-Wilk test of normality on the response (DepressionScore) for each level of factor (CallerGroup) showed a statistically significant deviation from normality for both the CallerGroups 'More' (W=.845, p<.01) and 'Less' (W=.881, p<.05). A Brown-Forsythe homoscedasticity test on DepressionScore by CallerGroup showed no violation of homoscedasticity (F(1, 36) = .317, n.s.). Since the normality assumption was violated, lognormal distributions were fit to the response of each level of CallerGroup. Kolmogorov-Smirnov goodness-of-fit tests were then conducted, showing no departure from log-normality for 'More' (D=.134, p=.850) or 'Less' (D=.167, p=.546). A log-transform was applied to the response data, and the normality of the transformed response was checked with Shapiro-Wilk tests, showing no departure from normality for 'More' (W=.972, p=.853), and a statistically significant departure for 'Less' (W=.906, p=.046).

Since neither the data collected nor the log-transformed data conformed to the normality assumption for ANOVA, a non-parametric equivalent Mann-Whitney U test was conducted. A Mann-Whitney test indicated no statistical significant difference between the levels of CallerGroup 'More' (Mdn =5), 'Less' (Mdn =6) and DepressionScore, Z = -0.103, p = .924, r = .02.

CONCLUSION

Since the observed p-value from the non-parametric Man-Whitney U test was greater than .05 (p>.05), we fail to reject the null hypothesis and conclude that there is no difference in depression scores of college students that engage in more phone calls and those that engage in fewer phone calls.

There were several limitations to our study. First, due to time constraints, we were not able to generate a significant amount of data to generalize about the broader population of college students. Second, given more time we would have liked to evaluate the relationship between participant gender and status as a undergraduate student, graduate student, or neither and depression level to see whether our findings were consistent with prior research showing that women and graduate students are most at risk. Third, a generalized linear model could have also been fit to the data, with 'family=binomial" by converting the dependent variable to a categorical response with two levels (Depressed and Not Depressed).

In the future, longitudinal research should be conducted on the impact of phone calls, text messages, and audio messages, independently, on depression levels among undergraduate students, graduate students, and college faculty.

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