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Wayne Davis

Lincoln Memorial University, wayne.davis@lmunet.edu

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# Is There a Difference Between Democrat and Republican States in the Number of Female Students Who Experienced Cyberbullying?

Wayne L. Davis, Ph.D.

Lincoln Memorial University (Harrogate, TN)

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## Abstract

In the United States, cyberbullying has become a major public health concern. Because there is a difference between the Democrat Party and the Republican Party on their philosophies involving laws and government interventions related to the control of electronic communications, it is important to know if there is a difference between political partisanship and cyberbullying. Data were collected in 2011, 2013, 2015, and 2017 using a three-stage cluster sample design, which produced a nationally representative sample of students in grades 9–12 who attended public and private schools. Initially, this study employed Poisson regression, which is a parametric statistic, in an attempt to answer the research question. However, the model did not adequately fit the data. As a result, another approach was employed using a nonparametric statistic. As an alternative to avoid the distributional assumptions associated with Poisson regression, generalized estimating equations (GEE) was used. The findings revealed that there was no significant difference between political parties and the percentage of female students who were electronically bullied in their respective jurisdictions.

**Keywords:** Cyberbullying, Democrats, Republicans, United States, Freedom of Speech, First Amendment

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## I. INTRODUCTION

Cyberbullying is the use of electronic or digital media to transmit hostile or aggressive messages with the intent to harm others (Tanrikulu, 2017). Cyberbullying is a major public health concern that may lead to school problems, social problems, and mental health disorders (Hase, Goldberg, Smith, Stuck, & Campaign, 2015; Rodríguez-Enríquez, Bennasar-Veny, Leiva, Garaigordobil, & Yañez, 2019). However, cyberspace and electronic information are essential parts of American culture. In the U.S., for example, 95% of teens have access to smartphones and 51% use Facebook (Anderson, 2018; Anderson & Jiang, 2018). About 45% of teens say they are online almost constantly, and 67% of these teens claim to have been cyberbullied.

Overall, 60% of girls have experienced at least one abusive online behavior. In short, cyberbullying is a serious problem worthy of study.

U.S. court rulings have made it clear that while hate speech is repulsive, it is protected under the First Amendment unless such speech meets the elements of harassment, it is used to incite a riot, or it contains a direct and credible threat against a person or organization (Banks, 2010; Weaver, 2000). Although there are no federal laws that specifically address cyberbullying, state and local lawmakers have taken action to protect children against cyberbullying (Washington, 2014). In some cases, when bullying overlaps with student harassment, schools are legally obligated to address it. However, schools do not have universal authority in all off-campus cases. In addition, the extent of punishment is controversial. On the one hand, students need to be disciplined for their participation in cyberbullying. On the other hand, students have a constitutional right to freedom of speech.

In the United States (U.S.), there are two main political parties: Democrats and Republicans. While the Democrats believe in social responsibility and rehabilitation, the Republicans believe in personal responsibility and punishment (“Democrat vs. Republican,” n.d.). While Democrats put greater value on communion, Republicans put greater value on agency (Eriksson, 2018). While the Democrats favor government regulations and a more active role of the government in society to protect consumers, the Republicans favor less involvement in terms of roles and responsibilities and oppose government regulations that hinder free market capitalism. These differences in attitudes may have an impact on cyberbullying. Therefore, it is important to know if there is a significant difference between Democrats and Republicans and the amount of cyberbullying in their respective jurisdictions.

The purpose of this study was to determine if there is a difference between political partisanship and the percentage of female students in grades 9-12 who were electronically bullied. The research question and the null hypothesis are listed below.

Research Question: Is there a difference between Democrat and Republican states in the percentage of female students who were electronically bullied?

Null Hypothesis: There is no difference between Democrat and Republican states in the percentage of female students who were electronically bullied.

## **II. LITERATURE REVIEW**

Sylwester and Purver (2015) conducted a qualitative research study to examine the use of language on Twitter accounts between liberals (i.e., Democrats) and conservatives (i.e., Republicans). The researchers used timeline content analysis to analyze the Twitter accounts of 5,373 Democrats and 5,386 Republicans. The findings indicated that Democrats were more likely to use swear words and words that were emotionally expressive. However, there were several limitations in the study. First, the Twitter messages contained noise (i.e., an overwhelming number of apparently unimportant tweets that constantly streamed through the timeline), and some of them may have been run by an institution instead of by an individual.

Second, Twitter users may not necessarily be representative of the general population. Finally, the data analysis relied on simple word count and did not consider the actual meanings of the text messages.

Kim, Colwell, Kata, Boyle, and Georgiades (2018) examined the association between cyberbullying and mental health problems. They sampled 31,148 Ontario students in grades 6-12 and used multilevel structural equation modeling to assess the relationships. The findings indicated that cyberbullying was a significant predictor of adolescents' emotional and behavioral problems. However, there were several limitations in this study. First, the students were Canadian and they may not necessarily be representative of American students. Second, the study had a correlational study and cannot determine causal relationships. Finally, because the study was quantitative in nature, it cannot reveal the meanings that participants have given to various phenomena.

Finally, Peng and Davis (2017) conducted a study on political partisanship and cyberbullying in the United States. Data were collected in 2011, 2013, and 2015 using a three-stage cluster sample design, which produced a nationally representative sample of students in grades 9-12 who attended public and private schools. This study employed the independent-samples t-test and the findings indicated that there was a significant difference in political partisanship and the percentage of female students who were electronically bullied. However, there were several limitations in this study. First, the t-test did not account for the different sample sizes for each state. Second, the study was not an experimental study and cannot determine causal relationships. Finally, because the sample was limited to school students in grades 9-12, the findings cannot be generalized to other populations.

### **III. METHODOLOGY**

#### **Sample**

This study examined electronic government-based second-hand data gathered from the Youth Risk Behavior Surveillance System (YRBSS) in 2011, 2013, 2015, and 2017 (Eaton et al., 2012; Kann et al., 2014; Kann et al., 2016; Kann et al., 2018). The data were collected by the Centers for Disease Control and Prevention, which is devoted to the public's safety and health. A three-stage cluster sample design produced a nationally representative sample of students in grades 9-12 who attended public and private schools. The standard questionnaire in 2011 and 2013 included 86 questions; the standard questionnaire in 2015 and 2017 included 89 questions. Because the sampling frames for the four surveys were not the same, and it is likely that the students were randomly sampled at the third stage of each study, the data retrieved in 2011, 2013, 2015, and 2017 were initially considered independent.

#### **Z-scores & Poisson Regression**

Because the data were presented as percentage values, and each state has a different sample size, a way was needed to take in to account the different sample sizes (Su, 2020). Using a z-score to normalize the data was considered because a z-score is a measure of position that

indicates the number of standards deviations a data value lies from the mean. A z-score is a convenient tool when someone wants to compare two variables that are measured in different units. However, contrary to what many people believe, z-scores are not necessarily normally distributed. Although z-scores are linearly transformed scores and have a mean of zero and a standard deviation of one, z-scores follow the exact same distribution as original scores and they do not make the distribution of the data more normal. Thus, it was decided to use Poisson regression because it can use an offset variable to modify each observation so that samples of different sizes can be effectively compared.

#### Political Partisanship Definition

A state was considered either Democrat or Republican based on the color assigned to that state during U.S. Presidential elections (2008, 2012, and 2016). If a state's electoral college voted for the Democrat U.S. Presidential candidate, then that state was considered a blue state. If a state's electoral college voted for the Republican U.S. Presidential candidate, then that state was considered a red state. To be considered in this study, a state had to be consistently red or blue during the years of data collection, which were 2011, 2013, 2015, and 2017.

## IV. RESULTS

Although there was a possibility of 200 data values (50 states times four surveys), several states were not considered because they were not consistently red or blue during the data collection period. In addition, several states, which were considered, did not provide cyberbullying data for each of the four surveys. Only the data provided were considered. In short, only 128 data values were considered in this study. See Table 1.

Table 1. Number of Data Values: 73 Republican Data Values and 55 Democrat Data Values.

<b>Categorical Variable Information</b>			
		<b>N</b>	<b>Percent</b>
IV = Party	Republican	73	57.0%
	Democrat	55	43.0%
	Total	128	100.0%

The independent-samples t-test was not considered to be the best statistical test to answer the research question because the sample size for each state was different (Su, 2020). The t-test does not take into account the population size of each state, which may produce biased results. However, the Poisson regression will adjust for the population difference for each state by using an offset variable, which will modify each observation so that the count outcome is weighted

based on population size. Therefore, to answer the research question, Poisson regression was used with the political party as the predictor variable, the number of bullied females as the outcome variable, and the total number of females for each state as the offset variable.

Table 2. Descriptive Statistics for the Number of Females Who Were Cyberbullied in the Various States.

<b>Continuous Variable Information</b>					
	N	Minimum	Maximum	Mean	Std. Deviation
DV = Electronic Bullied: Female	128	68	15867	437.09	1483.641
Offset Variable	128	2.54	4.85	2.9831	.38176

A Poisson distribution assumes that the mean and variances are equal (i.e., a ratio of one) (Su, 2020). In this case, the mean is 437.09 and the variance, which is the square of the standard deviation, is 2,201,191. This produces a ratio of 5,036.01, which is much larger than one. Thus, there is a large amount of overdispersion, which is problematic.

Deviance goodness-of-fit and Pearson Chi-Square statistics were then used to assess how well the Poisson model fit the data, and the values were 421.932 and 703.870, respectively. A value of one indicates equidispersion (Su, 2020); a value greater than one indicates overdispersion; and a value less than one indicates underdispersion. Thus, the results confirm that there is a large overdispersion problem.

Next, the assumptions of Poisson regression were checked. A Poisson regression model is a generalized linear model and relies on several assumptions (McCullagh & Nelder, 1989).

For a generalized linear model, the following conditions should be satisfied:

1. Independence of each data points
2. Correct distribution of the residuals
3. Correct specification of the variance structure
4. Linear relationship between the response and the linear predictor.

Upon investigation, the independence of observations does not appear to be satisfied. For each state, data were collected over 4 years (2011, 2013, 2015, and 2017). Because data were collected from the same states over multiple years, the observations may not have been

independent. The Poisson model did not consider the possible correlation between observations within the same state (Su, 2020).

To check systematic departure from the model, a residual plot that plots residuals against the predicted value of the linear predictor was examined. The null pattern of this plot is a distribution of residuals with mean zero and constant variance (McCullagh & Nelder, 1989; Su, 2020). Typical systematic deviations are the appearance of curvature. Therefore, if the data points are randomly distributed along the 0-horizontal line, it is an indication that the model fitted is adequate for the data. However, the plot displayed an appearance of curvature, which indicates that there is systematic departure from the model and the distribution of the residuals may be incorrect.

To check the variance function, a plot of the absolute residuals against fitted values was examined. The null pattern will show no trend, but an ill-chosen variance function will result in a trend in the mean (Su, 2020). Because the scatter plot indicated curvature, it is concluded that the variance function may be inadequate.

Finally, to check if the link function was appropriate, a plot of the predicted values against the actual outcomes was examined. If the link function is appropriate, then the null pattern will be a straight line (Su, 2020). In other words, if the link function is appropriate, the differences between the predicted values and the averaged actual values will be small, and the points will form approximately a straight line. Because the scatter plot of the predicted values and the actual outcomes did not seem to form a straight line, it is concluded that the link function is not appropriate.

In short, the Poisson model did not accurately fit the data. Analyzing non-independent data with techniques that assume independence (ex: generalized linear models) is a widespread practice but one that often produces erroneous results (Aarts, Verhage, Veenvliet, Dolan, & van der Sluis, 2014; Bakdash & Marusich, 2017; Bland & Altman, 1995; Su, 2020). Therefore, to answer the research question, a nonparametric statistic was used.

Because the data were not normally distributed, an alternative to avoid distributional assumptions of the response variable (i.e., number of bullied females) leads to a method of estimation known as generalized estimating equations (GEE) (Fitzmaurice, Laird, & Ware, 2004; Su, 2020). The GEE will describe the model solely in terms of the mean response, the variances, and the pairwise within-subject association. Although GEE is a flexible approach for modeling the mean and the pairwise within-subject association structure, it should be noted that avoidance of distributional assumptions would usually result in some loss of efficiency for the estimation of the coefficients relative to the optimal likelihood-based estimates when distributional assumptions are met (Fitzmaurice, Laird, & Ware, 2004).

Below are the results of parameter estimates for GEE. Even though the data indicate that the rate of being a female victim of cyberbullying is 1.036 times greater for Republican states than for Democrat states, the results are not significant. In sum, there is no difference between political party and the percentage of female students who were cyberbullied.

Table 3. The Results of Parameter Estimates Under GEE.

<b>Parameter Estimates</b>										
Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
(Intercept)	2.982	.2344	2.522	3.441	161.806	1	.000	19.726	12.459	31.230
[Party=1]	.036	.5305	-1.004	1.075	.005	1	.947	1.036	.366	2.931
[Party=2]	0	.	.	.	.	.	.	1	.	.
(Scale)	1									

Dependent Variable: Electronic Bullied Female

Model: (Intercept), Party, offset = offset

## V. DISCUSSION

Is there a difference between Democrat and Republican states in the percentage of female students who were electronically bullied? Although Poisson regression, which is a parametric statistic, was initially thought to be the best statistic for answering the research question, it was determined to be less than optimal when its assumptions were checked, which occurred after the data were collected. As a result, a nonparametric statistic, GEE, was used to answer the research question. Although GEE is more flexible than Poisson regression because it does not rely on the Poisson regression's assumptions, there is a loss of efficiency for the estimation of the coefficients (Su, 2020). In other words, nonparametric statistics are not as strong as parametric statistics (Field, 2005).

The results of the GEE test indicate that there is no statistically significant difference between Democrat and Republican states in the percentage of female students who were electronically bullied. The results are important because an earlier research study based on independent-sample t-tests indicated that female students in Democrat states were less likely to be cyberbullied than female students in Republican states (Peng & Davis, 2017). Although the Democrat Party and the Republican Party have different philosophies on government regulations and responsibilities, neither philosophy seems to be better than the other involving the number of female students who have been cyberbullied. This study may spark interest into developing better strategies for reducing cyberbullying. It indicates the need for additional research.

There are several limitations in this study. First, because the sample is limited to female students in grades 9-12, the findings cannot be generalized to other populations (Champion, 2006). Second, it is not possible to know the actual number of victims because many violations

go unreported (Berry & Smith, 2000; U.S. Department of Justice, 2010). Third, because cyberbullying is a recent issue, there are only four youth risk behavior surveillance surveys of available data. Thus, the amount of data available is less than optimal. Fourth, because the data used in the study were second-hand and collected for a different reason, the data values cannot be more clearly defined. Finally, because the study is quantitative in nature, it does not provide an in-depth understanding of the meanings that the participants have associated with their lived experiences (Berg, 2007).

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