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ToniNigro, ShelbyRauh, Matt Vassar

Oklahoma School of Science and Mathematics

#### Evaluation of Systematic Review Utilization in the Development of OB-GYN Randomized Controlled Trials

The issue of research waste has been raised due to the fact that 85% of funding for biomedical research has been improperly utilized. A prominent issue is the frequency of randomized controlled trials (RCTs) being conducted without prior consultation of existing support, such as systematic reviews (SRs). Meticulous monitoring is necessary to ensure that clinical recommendations are being made with confidence in high-quality biomedical practices. The aim of this study was to survey OB-GYN journals to analyze their published articles for citation of SR for justification of conducting the RCT. We conducted a search of PubMed for RCTs published between 2014 and 2017 in the top 10 OB-GYN journals. Studies were evaluated to determine the number of SRs cited in the introduction, methods, and discussion. We further analyzed whether the SR was cited verbatim or indirectly, number of participants, type of intervention being studied, funding source, type of trial, and how the outcome was perceived. Of the 720 articles from our initial search, 458 (63.61%) met inclusion criteria. Of the 458 included studies, 279 (60.92%) cited an SR in the introduction, 34 (7.42%) in the methods, and 207 (45.2%) in the discussion as justification for conducting the study. A large portion of the RCTs being published in clinical OB-GYN journals are not citing SRs as justification for conducting their studies, which may be leading to an increase in research waste.

Mathematics and Science.Statistics.02

Khue TuDoan

University of Central Oklahoma

### Exploration of Factors Influencing Low Birth Weight Infants in Oklahoma

This project analyzed the relationships between low birth weight infants (weighing less than 2500 grams) and characteristics of the mother and the birth. Oklahoma data for all live births in 2016 (n=52,592) was obtained from the CDC. Literature suggests several risk factors for low birth weight associated with the birth: less prenatal care, plurality (twin/triplet), males, early live birth order, and gestational age. Maternal risk factors include: young age, less education, race other than white, unmarried, smoking, pregnancy-associated or chronic hypertension, eclampsia, and diabetes. In addition, the study focused on comparing national natality statistics to those in the state of Oklahoma. Tables were used to summarize low birth weight for each of the dichotomous risk factors. Data was graphically summarized with regard to birth weight for age vs marital status, age vs race, race vs gender, and race vs education. Statistical tests included chi-square tests for significant differences in proportions and logistic regression modeling for predicting low birth weight.

Mathematics and Science.Statistics.03

AlkinHuggins

University of Central Oklahoma

Metacognitive Studying Strategies and Student Success in General Chemistry

The aim of this project is to determine whether a presentation on metacognitive strategies for studying has led to an improvement in the performance of students taking General Chemistry I. Over the last several years, several professors in the Department of Chemistry at the University of Central Oklahoma have given such a presentation to their students after having completed the first exam of the semester. At the end of the semester, the students take a standardized final exam written by the American Chemical Society (ACS), which we use to gauge student success. Records were kept of whether students received the presentation, their respective ACS final exam scores, as well as other relevant demographic information, and this information was used to create the dataset for this project. In order to determine if the presentation was impactful and has indeed improved student performance, we created several regression models to determine which variables are significant in predicting each student's ACS percentile rank. We expect to find that while there may be some correlation between a student's performance and his or her exposure to the presentation, there are several factors that are affecting each student's performance in the course. Our statistical models and results will assist the faculty of the Department of Chemistry at the University of Central Oklahoma in determining the next step in improving students' performance in General Chemistry I.

Mathematics and Science.Statistics.04

EthanBruegel, TracyMorris

University of Central Oklahoma

Division II Football Analytics

For our university's football team, one of their biggest competitors is Emporia State. We decided to comb through their play by play data to figure out if there are any consistencies in which plays occur at specific moments to aid our team. The play by play code was extracted from Emporia State's website and imported into R Studio where we used functions to create different variables such as side, offense, yards, to go, and receiver. Once we were able to get the variables we needed from one game, we went through all of the games and compiled the variables into a table. From there, we were able to get a better look at the data and find notable consistencies. We performed statistical tests to figure out if these consistencies were statistically significant. Hopefully the data and results will be of use to our football team in order to better prepare for one of their biggest rivals.

SihanDeng

University of Central Oklahoma

#### EVALUATING WHETHER EXPERT RANKINGS ON FANTASY BASKETBALL PLAYERS ARE ACCURATE

The major goal of this project was to compare expert rankings on fantasy basketball players with actual fantasy results at the end of the season. This might be an interesting problem because millions of people play fantasy sports and spend billions of dollars a year. First of all, we might expect that expert rankings on basketball players can correctly predict the final actual results. To answer this question, we collected data from online fantasy sports websites and compared expert rankings with actual results. We performed a correlation test to measure the relationship between expert rankings and final results. This project could be useful for people to help draft the best fantasy basketball team.

Mathematics and Science.Statistics.06

RebeccaHicks, OliviaCampos, TracyMorris

University of Central Oklahoma

#### The Interaction of Language Transfer and Language Processing in Second Language Acquisition

Project SCHOLAR (Statistical Consulting Help for Organizational Leaders and Academic Researchers) is a student statistical consulting service at the University of Central Oklahoma (UCO). SCHOLAR students work under the supervision of faculty from the Department of Mathematics and Statistics on various projects submitted from other researchers from both on and off campus. A faculty member from The English Department at UCO partnered with the students in Project SCHOLAR to study the influence of first language in learning a second language. Participants consisted of native speakers of English as the control group and native speakers of Arabic and Korean as the experimental groups. The participants were divided into three subgroups: elementary, intermediate, and advanced, based on level of English proficiency. The participants were then asked to rate a series of sentences on a 4-point scale from based on the correctness of the sentence. The reading times of the individual words will be used to develop a linear regression model predicting reading time from word length. An analysis of variance (ANOVA) will then be performed to test for differences in first language and English proficiency with respect to mean residuals from the regression model. Logistic and/or ordinal regression will also be performed to test for differences with respect to the sentence ratings.

Mathematics and Science.Statistics.07

JessicaSanders

University of Central Oklahoma

March Madness: A Statistical Analysis of Various Aspects of the Men's NCAA Basketball Tournament

This project examines various aspects of the NCAA March Madness men's basketball tournament. Each year 64 of the best division I men's basketball teams are selected to play in the tournament. The teams are divided into four regions and seeded from 1 to 16 with the 1 seed considered the best team in the region. The 16 teams in each region play a single elimination tournament resulting in the final four teams, who then play a single elimination tournament resulting in the national champion. Data were collected from Sport Reference (<https://www.sports-reference.com/cbb/postseason/index.html>). Variables include year, round, region, team names, scores, and seeds for each game in each tournament from 1985 to 2018. Aspects of the tournament that were analyzed include team dominance, wins vs. seeds, and upsets.

Mathematics and Science.Statistics.08

PatriciaSalas

University of Central Oklahoma

### Exploration of Factors Influencing Low Birth Weight Infants in Oklahoma

This project analyzed the relationships between low birth weight infants (weighing less than 2500 grams) and characteristics of the mother and the birth. Oklahoma data for all live births in 2016 (n=52,592) was obtained from the CDC. Literature suggests several risk factors for low birth weight associated with the birth: less prenatal care, plurality (twin/triplet), males, early live birth order, and gestational age. Maternal risk factors include: young age, less education, race other than white, unmarried, smoking, pregnancy-associated or chronic hypertension, eclampsia, and diabetes. In addition, the study focused on comparing national natality statistics to those in the state of Oklahoma. Tables were used to summarize low birth weight for each of the dichotomous risk factors. Data was graphically summarized with regard to birth weight for age vs marital status, age vs race, race vs gender, and race vs education. Statistical tests included chi-square tests for significant differences in proportions and logistic regression modeling for predicting low birth weight.

ElenaOjeda

University of Central Oklahoma

### A Tale of Two Models: A Non-Spatial and Spatial Regression Analysis of Poverty in Oklahoma

When data is associated with a spatial attribute, observed values of a variable at one location may influence values of that variable at neighboring locations. Failure to properly account for spatial dependence between observations in statistical models can produce biased coefficient estimates and compromise the quality of prediction. Spatial regression models incorporate this spatial dependence to produce more appropriate results. This project seeks to identify key determinants of poverty at a county and census tract level in Oklahoma using data from the U.S. Census Bureau's American Community Survey. I fit both a non-spatial and spatial autologistic models and test for the presence of spatial dependence in the residuals to determine which coefficient estimates are more appropriate. Spatial autocorrelation is tested for in the dependent variable using join-count statistics, which test the extent to which the spatial pattern in binary data are clustered, dispersed or random. I find that poverty rates in Oklahoma are spatially autocorrelated, and while the coefficient estimates for both models are not drastically different, the spatial autologistic model eliminates spatial autocorrelation in the county level model. These findings illustrate the value in examining and incorporating spatial attributes into regression analyses. Specifically, the Oklahoma spatial models will allow policy-makers interested in lowering poverty rates to understand how geography relates to poverty.

Gabriella Oliver, Tracy Morris

University of Central Oklahoma

#### A Statistical Analysis of a Screening Tool for Infant Safe Sleep Practices

Sleep-related infant deaths occur at a rate of approximately 3,500/year in the US. Many of these deaths could have been avoided had a safe sleeping environment been provided. Unsafe practices include bed sharing, using loose bedding, and exposure to smoking, among others. The focus of this project was to improve screening for unsafe sleep practices. In 2018, patients at a pediatric practice were assessed with the CDC's pregnancy risk assessment monitoring system (PRAMS) questions focused on infant sleep. At well-child checks (WCC) between birth and 6 months, caregivers were assessed with the PRAMS questions and were then given education specific to needs identified by the screening. One week after the WCC, participants received a phone call (CB) to identify whether changes were successful. During the CB, caregivers were rescreened with the PRAMS questions. Data were also mined from the same pediatric practice concerning caregivers who were not screened with the PRAMS questions (control group). We hypothesize that the use of the PRAMS questions will identify significantly more unsafe sleep practices, and that the education on safe sleep will significantly reduce the number of unsafe sleep practices. To address these hypotheses, chi-square tests and generalized estimating equations were used to determine if there are any relationships between unsafe sleep practices and variables including but not limited to socioeconomics, parental age, and infant age. Addition

## DETERMINING WHAT INDIVIDUAL AND HOUSEHOLD FACTORS INFLUENCE FOOD CHOICE

People have different lifestyles and eat different things. It is interesting to talk about food choice because good nutrition is an important part of leading a healthy lifestyle. Moreover, the relationship between good nutrition and overall health is too important to be ignored. With that as motivation, we performed a study whose main purpose is to determine what individual and household factors influence people's food choice. To do so, we analyzed data from the National Household Food Acquisition and Purchase Survey which was conducted by the United States Department of Agriculture. Those data were based on different surveys done on multiple people living in the United States about their habits such as how many children they have, their financial situation, where they work and what they eat. We then analyzed the data for people living in the southern part of the United States, including Oklahoma, using many statistical tests such as chi-square test and then developed a multiple regression model in order to understand how their lifestyle and the food availability are related to their food choice. Our model produced results identifying details of which factors were the most significant in affecting food choice. These results are important because they might influence people's food choice, lifestyle, and even food companies to open in more locations.