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**The Role of Mental Health Providers in
Dual Diagnosis Substance Abuse Treatment**

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Population Health and Public Health

Scholarship in Medicine

By checking this box, I indicate that my mentor has read and reviewed my draft proposal prior to submission (I am in the April super short course)

Abstract

Objective: This research study aims to determine the impact of mental health provider ratio on drug overdose mortality. It also investigates how mental health provider ratio and the frequency of mental distress correlate. Additionally, the study examines how mental health provider ratios have changed in Ohio over time and how the Ohio drug overdose mortality rates compare to the rates in Michigan, another Midwestern state. *Methods:* Pearson/Spearman correlation tests were done to show how mental health provider ratio influences drug overdose mortality rate and how mental health provider ratio influences the frequency of mental distress. A paired samples t-test was done to show changes in mental health provider ratio in Ohio over time, while an unpaired samples t-test was done to compare drug overdose mortality in Ohio to Michigan. *Results:* A discussion of the results of this study will be available by May 2020.

Key Words: mental health, drug overdose mortality, mental distress, Ohio, Michigan

Introduction/Literature Review

More than approximately 750,000 Americans have died due to drug overdoses from the years 1999 to 2018.¹ However, overall overdose death rates in the United States decreased by 4.1% from 2017 to 2018.¹ Despite progress in combating overdose deaths, death rates due to synthetic opioids, besides methadone, increased by 10% from 2017 to 2018.¹ Specifically in Ohio in 2018, a total of 3,764 Ohio residents died from unintentional drug overdoses.² Studies indicate that individuals with the most severe psychiatric disorders have the highest rates of co-occurring substance use disorders. The general population is averaging 17% with substance use disorder, while the numbers are 47% for those with schizophrenia, 56% for those with bipolar disorder, and 30% for people with another mood or anxiety disorder.³ The vast interconnections between mental illness and substance use disorders have been documented for over two decades.³⁻⁵

Despite awareness of dual diagnoses, treatment of clients with co-occurring disorders has proven to be a barrier, as services are rarely tailored to address the elements of co-occurrence. One study found that forty-seven percent of individuals with opioid use disorder and co-occurring mental illness did not receive behavioral health treatment.⁵ It was only in the early 2000s that the U.S. Department of Health and Human Services released clinical guidelines combining mental health and substance abuse interventions. Yet, these new guidelines failed to include specific instructions for clinical subgroups.³ While the natural course of mental illness and substance use disorders trends toward recovery with appropriate interventions, for individuals with co-occurring disorders, there has been sparse long-term evidence through three-year follow-ups indicating steady improvements.⁵

Much focus has been placed on identifying methods to improve treatment interventions for individuals with co-occurring mental health and substance abuse disorders.⁶ Research shows that

recovery follows many pathways, and treatment interventions need to offer education and intervention choices and have a basis in shared decision-making.⁵ Such individualization of treatment programs would allow each patient to pursue a path that he or she truly believes in and will be likely to maintain. Similarly, peer-oriented groups have been shown to be the core of dual diagnosis treatment plans, with steady attendance for several months being crucial.⁷ These peer-oriented sessions, when directed by a professional leader, have been shown to be effective in helping clients reduce substance abuse and improve overall outcomes of such treatment interventions.³

It has been well established that a lack of dual diagnosis treatment interventions has been a major cause of potential substance related deaths.³⁻⁵ However, the ratio of mental health providers in correlation to drug overdose mortality rate has rarely been the focus in understanding the overarching issue of treating individuals with both a mental health disorder and substance use disorder. Mental health services in the United States are severely insufficient, with 56% of Americans seeking help.⁸ About 38% of Americans have had to wait longer than one week to receive a mental health treatment appointment, and nearly 46% have had to travel over an hour round trip for treatment.⁸ The mere lack of mental health providers may influence the rate of drug-related deaths, as individuals are simply unable to access the appropriate care. The purpose of this study is to examine the role that mental health provider ratio has in determining the drug overdose rate and mental distress rate specifically in Ohio during the year 2020. This will be accomplished by using the population health data available on www.countyhealthrankings.org for each Ohio county. Comparisons will be made to the state of Michigan because of its proximal location and regional policy similarities,³ in order to determine whether potential correlations found in Ohio extend to other states in the Midwest.

Research Questions

RQ1: How does the mental health provider ratio correlate with the drug overdose mortality rate in Ohio in 2020?

RQ2: How does the mental health provider ratio correlate with the percent with frequent mental distress in Ohio in 2020?

RQ3: What is the difference in the mental health provider ratio in Ohio in 2016 versus 2020?

RQ4: What is the difference in the drug overdose mortality rate in Ohio in 2020 versus in Michigan in 2020?

Methods

Context/Protocol

This study utilizes the variables of mental health provider ratio, percent with frequent mental distress, and drug overdose mortality rate. The variable of mental health providers is the ratio of population to mental health providers. The 2020 County Health Rankings used 2019 data for this measure. The NPI registry reveals a provider's National Plan and Provider Enumeration System (NPPES) information. The variable of drug overdose deaths is the number of drug poisoning deaths per 100,000 population. The 2020 County Health Rankings used 2016-2018 data for this measure. Data on deaths were provided by the National Center for Health Statistics and from the National Vital Statistics System (NVSS). The data was submitted to the NVSS by vital registration systems operating in jurisdictions responsible for registering vital events, such as births, deaths, marriages, divorces, and fetal deaths. The variable of frequent mental distress is the percentage of adults reporting fourteen or more days of poor mental health per month. The

2020 County Health Rankings used 2018 data for this measure. The Behavioral Risk Factor Surveillance System (BRFSS) is a statewide random digital dial (RDD) telephone survey conducted annually in all states. Data from the BRFSS represents each state's total non-institutionalized population over eighteen years of age. The data is weighted using proportional fitting methods to reflect appropriate population distributions.

Data Collection

Access to mental health providers is important in access to care for individuals. Thirty percent of the population lives in a county that is denoted as a Mental Health Professional Shortage Area. The mental health aspects of the Affordable Care Act created increased coverage for mental health services, which would also contribute to increased shortages in the mental health provider workforce.⁹ The mental health provider ratio represents the number of individuals served by one mental health provider in a county if the population were equally distributed across providers. Counties with a population greater than one thousand people and zero mental health providers have a missing value and were thus excluded from the study. I will use the mental health provider ratio data set to correlate it with both drug overdose mortality rate and percent with frequent mental distress in Ohio in 2020. I will also use the mental health provider ratio to observe any changes in ratios in Ohio from 2016 to 2020.

Drug overdose deaths are a largely preventable contributor to premature deaths. The United States is experiencing a drug overdose death epidemic, with the rate of deaths increasing by 137% across the nation since 2000. There has been a 200% increase in deaths involving opioids, which include opioid pain relievers and heroin.⁹ Drug overdose deaths are the number of deaths from drug poisoning per 100,000 population. The deaths are counted in the county of residence of the deceased individual, not in the county where the individual died. Counties with less than

ten drug-poisoning deaths have a missing value and were thus excluded from this study. I will use the drug overdose mortality rate data to correlate it with the mental health provider ratio in Ohio in 2020. I will also use drug overdose data to compare rates between Ohio and Michigan in 2020.

Frequent mental distress is a similar measure to poor mental health days. It provides a slightly unique picture that places emphasis on those individuals who are experiencing more chronic and severe mental health issues.⁹ Individuals responded to the following question, “Now, thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?” Frequent mental distress is age-adjusted in order to account for the fact that poor health outcomes are more likely as age increases. Counties with missing data were excluded from the study. I will use the frequent mental distress data to correlate it with mental health provider ratio in Ohio in 2020.

Data Analysis

RQ1: How does the mental health provider ratio correlate with the drug overdose mortality rate in Ohio in 2020?

To answer RQ1, I used a Pearson correlation test to compare the mental health provider ratio to the drug overdose mortality rate in Ohio during the year 2020. The data sets were derived from www.countyhealthrankings.org. The data includes values for both variables from each county in Ohio in 2020. I used SPSS to conduct the Pearson test for normally distributed data. The Pearson correlation will reveal a correlation coefficient. Generally, correlation strength is as follows: $\geq .7$ is a strong correlation, $\geq .5$ is moderate correlation, $\geq .3$ is a weak correlation, and

below .3 is essentially no correlation. The significance (2-tailed) value gives the significance of the correlation. If Sig. is < 0.05 , then the groups are statistically significantly different.

RQ2: How does the mental health provider ratio correlate with the percent with frequent mental distress in Ohio in 2020?

To answer RQ2, I used a Pearson correlation test to compare the mental health provider ratio to the percent with frequent mental distress in Ohio in 2020. The data sets were derived from www.countyhealthrankings.org. The data includes values for both variables from each county in Ohio in 2020. I used SPSS to conduct the Pearson test for normally distributed data. The Pearson correlation will reveal a correlation coefficient. Generally, correlation strength is as follows: $\geq .7$ is a strong correlation, $\geq .5$ is moderate correlation, $\geq .3$ is a weak correlation, and below .3 is essentially no correlation. The significance (2-tailed) value gives the significance of the correlation. If Sig. is < 0.05 , then the groups are statistically significantly different.

RQ3: What is the difference in the mental health provider ratio in Ohio in 2016 versus 2020?

To answer RQ3, I used a paired samples t-test to compare the mental health provider ratio in Ohio in 2016 with the mental health provider ratio in Ohio in 2020. The data sets were derived from www.countyhealthrankings.org. The data includes values for the mental health provider ratio for each county in both 2016 and 2020. I used SPSS to conduct a paired samples t-test in order to compare the means of this data set in 2016 and 2020. If Sig is < 0.05 , then the variables are statistically significantly different.

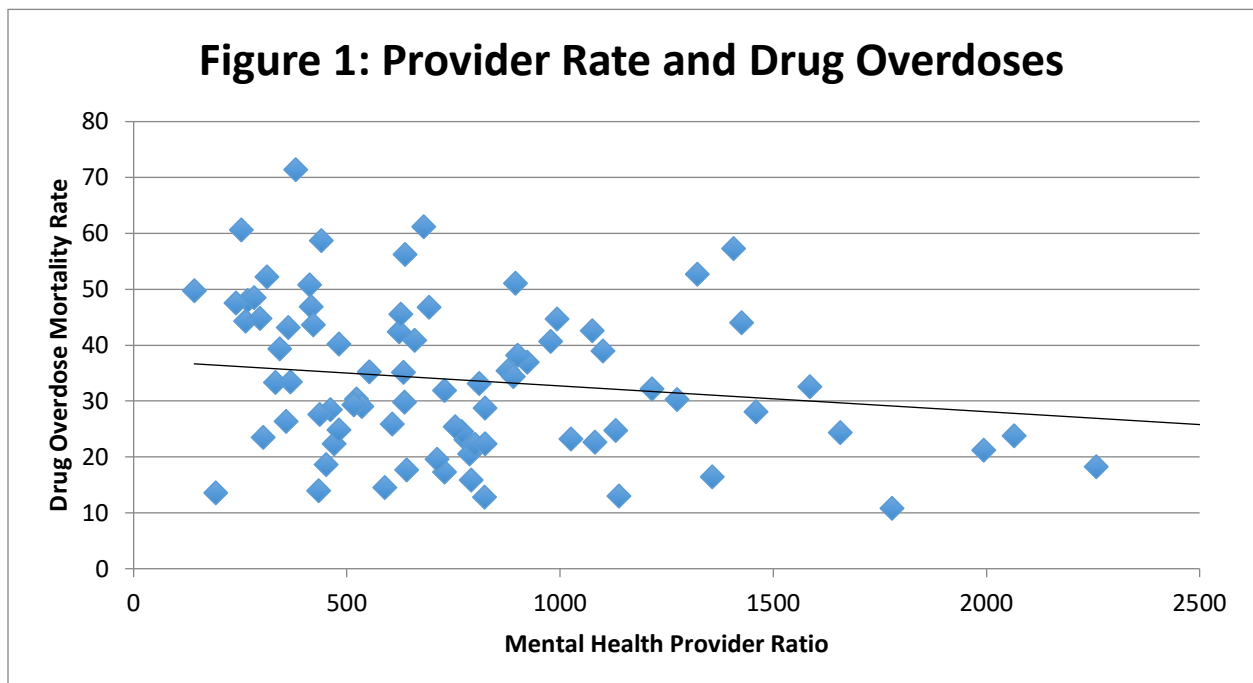
RQ4: What is the difference in the drug overdose mortality rate in Ohio in 2020 versus in Michigan in 2020?

To answer RQ4, I used an unpaired samples t-test to compare the drug overdose mortality rate in Ohio in 2020 versus the drug overdose mortality rate in Michigan in 2020. The data sets were derived from www.countyhealthrankings.org. The data includes values for the drug overdose mortality rate for each county in both states in 2020. I used SPSS to conduct an unpaired samples t-test in order to compare the means of this data set in Ohio and Michigan in 2020. If Sig is < 0.05 , then the variables are statistically significantly different.

Results

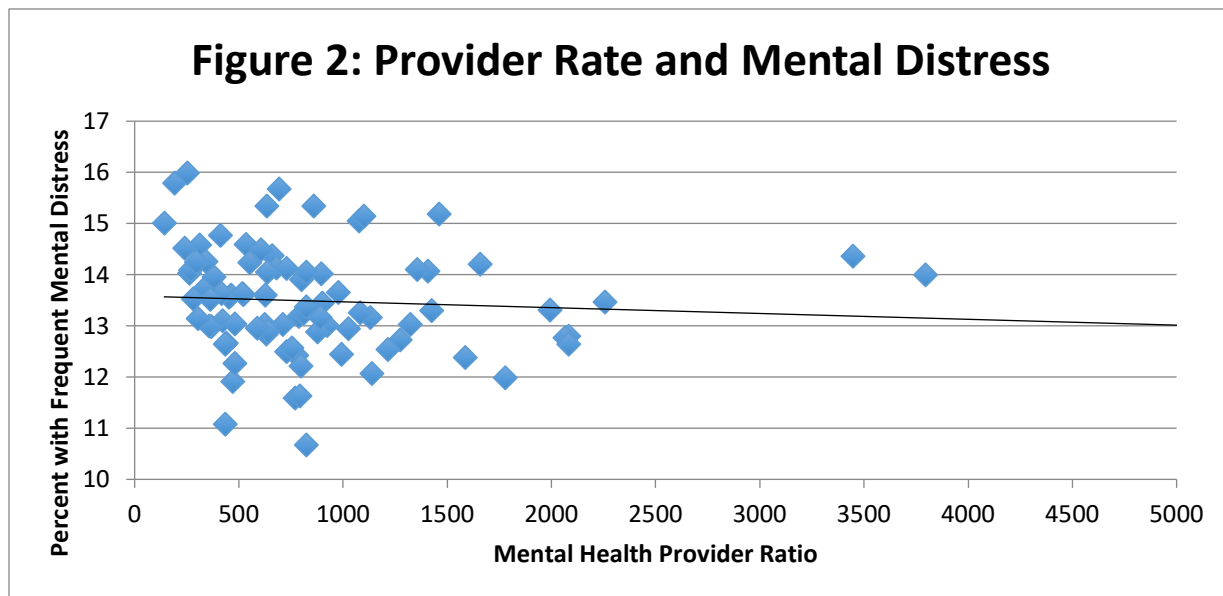
RQ1: How does the mental health provider ratio correlate with the drug overdose mortality rate in Ohio in 2020?

In Ohio in 2020, we found a negative correlation ($r = -0.305$) between mental health provider ratio and drug overdose mortality rate (Figure 1). This negative correlation was statistically significant ($p < 0.01$). This reveals a moderate negative correlation between the two variables, suggesting that an increase in mental health provider ratio decreases the drug overdose mortality rate in Ohio during 2020.



RQ2: How does the mental health provider ratio correlate with the percent with frequent mental distress in Ohio in 2020?

In Ohio in 2020, we found a negative correlation ($r = -0.104$) between mental health provider ratio and percent with frequent mental distress (Figure 2). However, the negative correlation was not statistically significant ($p = 0.337$). Despite the trend for an increase in mental health provider ratio to result in a decrease in the percent with frequent mental distress in Ohio during 2020, such a conclusion is not significantly supported by this data.



RQ3: What is the difference in the mental health provider ratio in Ohio in 2016 versus 2020?

Comparing 2016 to 2020, we found that there was a significant difference in mental health provider ratio, with 2020 being lower than 2016 ($t = 6.677$, $p < 0.001$). The mean mental health provider ratio decreased from 1726.22 providers in 2016 to 944.00 providers in 2020 (Table 1). These results suggest a decrease in the amount of mental health providers in Ohio over this four-year period.

Table 1 Descriptive Values for Ohio Mental Health Provider Ratio

Ohio Mental Health Provider Ratio	Mean	N	Std. Deviation
2016	1726.22	88	1794.727
2020	944.00*	88	936.668

* statistically significantly different from 2016 ($p < 0.001$)

RQ4: What is the difference in the drug overdose mortality rate in Ohio in 2020 versus in Michigan in 2020?

Comparing Ohio to Michigan in 2020, we found that there was a significant difference in drug overdose mortality rate between the two Midwestern states ($p < 0.001$). Ohio's 2020 drug overdose mortality rate mean of 32.219 deaths surpasses Michigan's 2020 drug overdose mortality mean of 20.817 deaths (Table 2). These results suggest that the drug overdose mortality rate is different in these two states, despite their proximity.

Table 2 Descriptive Values for Drug Overdose Mortality Rates

Drug Overdose Mortality Rate	Mean	N	Std. Deviation
Ohio	33.219	84	13.585
Michigan	20.817*	63	8.804

* statistically significantly different than Ohio ($p < 0.001$)

Discussion

Our results further verify the well-established importance of mental health providers in maintaining the well-being of individuals in numerous aspects. We chose to focus on the counties in Ohio during 2020, as we predicted the counties with fewer mental health providers would have a higher drug overdose mortality rate. The moderate negative correlation suggests counties with less mental health providers did in fact have a greater number of drug overdose

deaths. As previously mentioned, several studies indicate that individuals with the most severe psychiatric disorders also possess the highest rates of co-occurring substance use disorders.³⁻⁵ So it would follow that a deficit in the amount of available mental health providers would lead to a lack of mental health care, especially for those individuals with a dual diagnosis of substance use disorder.⁶ Ultimately, the inefficient treatment options would lead to a higher incidence of drug-related deaths. The detrimental impact of minimal mental health care on drug overdose deaths is apparent, as Ohio previously reported a total of 3,764 residents dying from unintentional drug overdoses just in 2018.² Additionally, this potential correlation led us to believe that we would see a similar effect of mental health providers on the percent of individuals with frequent mental distress. Although there was a weak negative correlation, it was statistically insignificant, suggesting that the category of mental distress is influenced by more factors than merely the availability of mental health providers.

Due to the documented difficulty patients consistently endure to receive treatment by a mental health provider,⁸ we also predicted that Ohio's mental health provider ratio decreased from 2016 to 2020. Our study revealed a statistically significant decrease in Ohio mental health providers over the span of these four years, aligning with prior studies discussing the great difficulties patients face in accessing mental health care. As individuals face longer wait times to be seen by a mental health professional and further travel distances even when they are able to access a provider,⁸ our study's results support the concurrent decrease in mental health providers leading to such accessibility challenges. In addition to our questions regarding Ohio's overall mental health accessibility, we chose to investigate Michigan, a surrounding Midwestern state, to observe any similarities between the two states in terms of drug overdose mortality rate. We found a statistically significant difference in the drug overdose mortality rate between Ohio and

Michigan, with Ohio possessing the higher number of drug-related deaths. We incorrectly predicted the two states would have a similar drug overdose mortality rate due to their regional similarities and potentially similar mental health resources. Perhaps the higher drug overdose mortality rate in Ohio is more representative of the fact that Ohio has faced a dire opioid crisis in preceding years far surpassing the drug use in Michigan.² While our study establishes discrete relationships between mental health provider availability and drug overdose deaths, it would be beneficial to look deeper into the reasons for mental health provider shortages.

Conclusion

This study has further established the undoubted need for more mental health providers in Ohio to help combat the rise in drug overdose deaths due to co-occurring mental health disorders and substance use disorders. While our results support our predictions, we are aware of the limitations that arise from utilizing population health data from one publically available database County Health Rankings. In order to verify our results, future research would measure our findings in another population database assessing these same variables to ensure the validity of the reporting protocol. We realize that census data may not always be accurate, as many individuals may not respond to census reports while others may have multiple residences and report multiple times. Thus, the baseline sample size of each county may not be fully accurate, ultimately affecting the outcomes we discovered. If future research establishes differences in results with another population database, then it would be worthwhile to reassess the relationship between Ohio and Michigan's drug overdose mortality rate as well, looking deeper into the reasons behind the difference in death rates.

Moreover, there is a potential limitation in the reporting of percent with frequent mental distress, as individuals self-report their mental health. A standard measurement of mental health

was not used for these individuals, which may have contributed to our lack of significant results with this variable. In future studies, we hope to include a standard depression scale to record the number of poor mental health days reported by individuals. In this manner, we can ensure that each person has a similar baseline understanding of what features constitute a poor mental health day in medical terms. Despite these shortcomings, we are hopeful that these preliminary results will contribute to the wealth of existing knowledge regarding the importance of mental health in everyday life and help push for more comprehensive treatment of individuals with co-occurring mental health disorders and substance use disorders.

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