5-8-2024

Impact of COVID-19 on Opioid Misuse, Mental Health, and Substance Abuse Treatment of Adults

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

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Walden University
2024

Abstract

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David S. Reed

MPH, Walden University, 2014

BS, Touro College, 2006

BFA, Boston University, 1999

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Public Health

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May 2024

Abstract

The purpose of this quantitative cross-year comparison of two cross-sectional studies was to examine whether there is an impact of the COVID-19 pandemic on opioid misusers seeking mental health and substance abuse treatment, taking into consideration the social, ecological, and economic factors of age, gender, poverty status, and county of residence metropolitan status. The theoretical foundations of this study are the social-ecological framework in terms of the geographic and economic impacts, and the structural and social determinants of health framework to examine the influences of economic and community on individual behaviors, to answer the research questions while controlling for the above factors in adults of was there a measurable impact of the COVID-19 pandemic on opioid misusers seeking mental health treatment, substance abuse treatment, or both mental health and substance abuse treatment in the year 2021 compared to 2019. Chi-squared tests and logistic regressions were conducted. Results indicated that in 2021 compared to 2019, younger adults, women, those living in smaller metropolitan areas, and those using illicit drugs, opioids, and more days of alcohol uses were more likely to predict mental health and substance abuse treatment, indicating a possible COVID-19 effect. The potential for social change includes mitigating opioid misuse modifying existing programs to allow a more focused approach to opioid use reduction programs based on age, gender, population density and poverty status that can help reduce the incidence of abuse in vulnerable populations.

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Dedication

This work is dedicated to my wife Cheryl, my daughter Julia, and my sons Matthew and Nicholas, for their unwavering and unconditional support and encouragement.

Acknowledgments

To my committee chair Dr. Twanda Wadlington and my committee member Dr.

Manoj Sharma, I will be forever grateful for your guidance and continued support.

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Section 1: Foundation of the Study and Literature Review

Introduction

In 2021, during the COVID-19 pandemic, the public found many unprecedented challenges, including access to mental health treatment and substance abuse treatment resources. Opioid misuse continues to be a challenge to public health and clinical health professionals, and this was compounded by the resource access challenges during the pandemic. Despite a well-developed public health system in New York State and New York City, Bennett et al. (2022) identified a deficit of needed access and care to the vulnerable population of opioid misusers. The situation or issue that prompted me to search the literature is the persistent incidence of opioid misuse in the United States and the potential impact of the COVID-19 pandemic on those suffering from an opioid misuse disorder. Despite efforts focused on interventions, awareness, and education, opioid misuse remains a significant problem in the United States (Bennett et al., 2022; National Institutes of Health: National Institute on Drug Abuse, 2021; Wilkes et al., 2021). The Centers for Disease Control and Prevention reported 49,860 deaths in 2019 and 80,411 deaths in 2021 in the United States involving opioids (National Institutes of Health – National Institute on Drug Abuse, 2023).

There are many factors that influence opioid misuse, and they have a complex interaction with both ecological, economic, and social factors (Jalali et al, 2020). Bennett et al. (2022) examined the impact of the COVID-19 pandemic in New York City on opioid misusers in broad terms of the opioid misuse, access to care and access to material goods, from April 2020 to March of 2021, but there are no published studies to date that

examine specifically the population of opioid misusers and the impact of mental health treatment and substance abuse treatment during the initial pandemic response that resulted in isolation, lockdowns, and other negative impacts on United States Residents (Bennett et al., 2022; Iacono, 2022).

The specific research problem that I addressed was if there was a measurable impact of the COVID-19 Pandemic on opioid misusers seeking mental health treatment, substance abuse treatment, and both mental health and substance abuse treatment in the year 2021 while considering age, gender, alcohol use, illicit drug use, poverty status, and metropolitan status of the county of residence.

The purpose of this quantitative study was to examine whether there is a measurable impact of the COVID-19 pandemic and associated changes in access to myriad healthcare services on those who identify as opioid misusers seeking and seeking mental health treatment, substance abuse treatment and both during the COVID-19 pandemic in 2021, taking into consideration the social, ecological, and economic factors of age, gender, poverty status and county of residence metropolitan status. This was a correlation between the dependent variable of opioid misuse and the independent variables of mental health treatment, substance abuse treatment, and both treatments while controlling for the covariates of age, gender, alcohol use, illicit drug use, poverty status and metropolitan status.

While various factors including poverty level and population-density regions have been analyzed individually in past studies globally, there have been no studies to date that examine both factors in the data captured for the year 2021. The year 2021 is the most

recent collected data available for evaluation in the format provided by the National Survey on Drug Use and Health. The year 2021 had the added aspect of being impacted by a global pandemic, the impact of which has yet to be fully comprehended, but worth analyzing.

There was a potential to generate data that contribute to the body of knowledge used to create and revise public health initiatives focused on the misuse of opioids and seeking mental and substance abuse treatments. There is currently no state-level data available, and the data from the National Survey on Drug Use and Health for 2021 were just made available in January of 2023 and has yet to be researched and discussed in relation to surveys published previously.

In this study, I evaluated the potential impact of the COVID-19 pandemic by comparing the incidences of reported opioid misuse of adults and sought mental health treatment, substance abuse treatment, or both in 2021 in the National Survey on Drug Use and Health, with covariates including poverty level as calculated based on the federal poverty threshold of income of those reporting, county metro status of those respondents as classified by the 2013 Rural/Urban Continuum Codes, age, gender, alcohol use and illicit drug use.

To address the research questions in this quantitative study, I used bi-variate testing and regression. These same data points were calculated and compared to the data available from the National Survey on Drug Use and Health for the year 2019, and the delta or change in the results was evaluated for statistical significance.

Social Determinants of Health

The theories, concepts, and/or behavioral models that ground this study include the social-ecological framework and structural and social determinants of health framework. The logical connections between the framework presented and the nature of my study include the social-ecological framework regarding geographic variation in terms of the metro area variables & economic status. The structural and social determinants of health framework also applies, as this framework is used to examine the influences of economic and community on individual behaviors, including those of drug use.

Social-Ecological Framework

The social-ecological framework states that there are geographical as well as economic impacts on opioid use (Jalali et al., 2020). The community level of the social-ecological framework includes geographic variations (Jalali et al., 2020) and the physical environment (Golden & Earp, 2012) both of which the density of the population of the target population can be considered a component of. Economic conditions, which I assessed via the poverty level of respondents reporting opioid abuse, is a component of the society or societal level of the social-ecological framework. By examining the impact of the population density and the poverty level as it applies to respondents in the data set reporting opioid misuse, the determination of the impact of both the society and community levels of the social-ecological framework as illustrated in Figure 1. (Jalali et al., 2020).

Figure 1

Social-ecological Framework of the Opioid Crisis
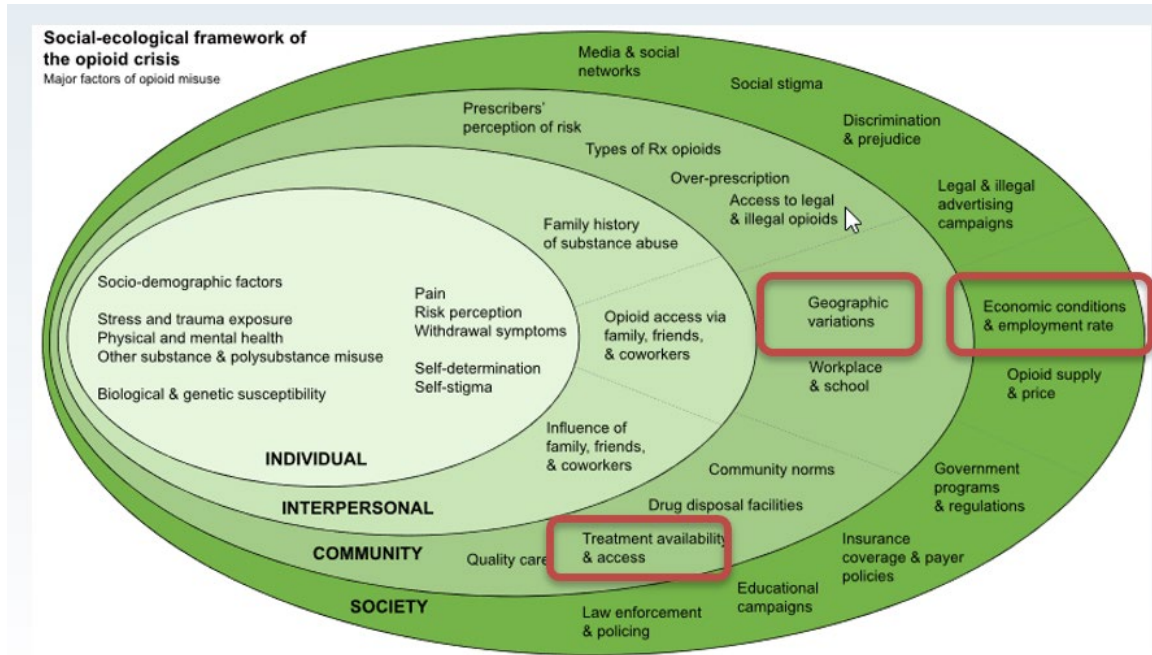
Note. This figure illustrates the components of the Social-ecological Framework in relation to the ongoing opioid crisis. 3 colored boxes were added to the original figure. From "The Opioid Crisis: A Contextual, Social-Ecological Framework" by Jalali, M.S., Botticelli, M., Hwang, R.C., Koh, H.K., & McHugh, R.K. (2020). The opioid crisis: A contextual, social-ecological framework. *Health Research Policy and Systems (18) 87*. https://doi.org/10.1186/s12961-020-00596-8. This article is licensed under the Creative Commons Attribution 4.0 International License, which explicitly states that permits the unrestricted use, distribution, and reproduction in any medium without requiring permission to reuse.

Structural and Social Determinants of Health

In applying the social determinants of health to the problem of opioid misuse in the United States, the Committee on Educating Health Professionals to Address the Social Determinants of Health, Board on Global Health, Institute of Medicine, and National Academies of Sciences, Engineering, and Medicine, (CEHPASDH, 2016) text identifies that population, as well as economics, has a direct on impact health. Golden and Earp (2012) discussed the application of ecological determinant of health, supported by the discussion in Jalali et al. (2020) regarding the opioid crisis in the United States is impacted by economic and environmental factors, including population density. In applying the social-ecological model to my study in terms of the county metropolitan status and poverty level as it related to opioid misuse, I focused on higher levels of the social-ecological model, namely those of the community and society, rather than the lower levels of individual and interpersonal.

Research Regarding Opioid Misuse, Mental Health, and Substance Abuse Treatment

Opioid misuse can have a significant impact on the health of the public, with a significant correlation reported of opioid misuse and accidental injuries and death (Hudgins et al., 2019). Mental health treatment and substance abuse treatment are resources that are both essential and underutilized in the opioid abuse population, and with reduced access during the COVID-19 pandemic in New York City (Bennett et al., 2022), this at-risk population potentially suffered a significant impact that can be quantified by this study.

Strategy for Literature Search

To effectively conduct the literature review, I used multiple sources including books, electronically published resources, peer-reviewed journal articles, and various internet resources. I focused on publications from 2017 to 2023, and also accessed resources and references cited in the works found. The databases that I researched included the Walden Library, PubMed, SAGE, CINAHL, Google Scholar, The NIH, and EBSCO. The key search terms that I used included *opioid misuse, COVID-19, pandemic impact on mental health and substance abuse treatment, socioeconomic impacts on opioid abuse, scholarly articles, comparison of pandemic* and *pre-pandemic, opioid misuse,* and *pandemic.*

Opioid Misuse

The Center for Disease Control and Prevention's (CDC) report titled "Synthetic Opioid Overdose Data" (CDC, 2021) as well as the National Institute of Drug Use's (NIDA) report on the opioid overdose crisis (NIDA, 2020) highlighted a significant increase in synthetic opioid overdoses from 2015 to 2019 in the United States. It does not report by state, but by urbanization level, and does not report by state individually, however, it provides foundational information that nationally the rising incidence of synthetic opioids is a recognized problem, without a detailed analysis of the incidence in the year 2020 and in relation to population and economic status.

There is a need for more examination of opioid misuse and public health interventions. Chen et al. (2019) studied the data regarding opioid deaths in the United States from 2002 to 2015 and interventions designed to prevent opioid misuse and death.

It was predicted that programs focused on prescription opioid misuse if they remain consistent with existing programs, will have a "modest effect, at best" (Chen et al., 2019, p. 1) on opioid-related deaths. This is research that supports the need for more granular data regarding opioid misuse in the United States, to develop and refine the efforts to reduce the misuse of opioids, therefore justifying my proposed study.

Jalali et al. (2020) studied the contributions and interactions of multiple factors of opioid use on the individual, interpersonal, community and society levels. They concluded that public health interventions require opioid use-focused interventions that analyze a broad and complex inter-related group of factors and supports the selection of the variables for my study of economic and community on individual behaviors.

Wilkes et al. (2021) studied the population demographics of opioid users from 2010 to 2018 from the U.S. Census data and found that opioid use is significant in a diverse distribution of populations in the United States. They concluded that there are "unique dynamics associated with opioid usage" (Wilkes et al., 2021, p. 1) and that more analysis of opioid use is needed to craft future public health interventions.

Mental Health Treatment

Less than half of adults in the United States that have mental illness are estimated to receive mental health treatment in the United States (Alegria et al., 2021). During the initial initiatives to contain the COVID-19 pandemic outbreak in 2020 in the United States, quarantines, reductions in healthcare service access and fears of infection had a significant impact of the seeking of mental health treatments in the United States. The American Hospital Association reports that there was an estimated 75% reduction in

outpatient, in-person mental or behavioral health visits in 2020 prior to August 2020 (American Hospital Association, 2022), and Zhu et al. (2022) reported in May of 2020 alone there was an estimated almost 60% reduction in in-person outpatient mental health visits. In contrast to the reduction in mental health care provided, there was a significant increase in anxiety, fear-related disorders and depression being treated contributed to the pandemic (Substance Abuse and Mental Health Services Administration, 2021; Zhu et al., 2022).

Substance Abuse Treatment

It is estimated that only 1 in 10 individuals over the age of 12 in the United States that have a substance abuse disorder receive substance abuse treatment (Alegria et al., 2021) despite an estimated 20 million people in the United States over the age of 12 reporting a substance abuse disorder (American Hospital Association, 2022). During the COVID-19 pandemic in 2020, the strict guidelines for both providers and practice to treat substance abuse disorders were significantly modified to allow for telehealth access to care and eased requirements for the prescribing of medications for substance abuse, termed medication-assisted treatment (MAT), following an increase in the number of overdoses and deaths during the pandemic contributed to quarantine-driven social isolation, premature cessation of treatments and limited access to resources and care (American Hospital Association, 2022; Iacono, 2022). There was also a pandemic-associated decrease of approximately 13% in substance abuse disorder treatment programs reported for patients enrolled in Medicaid as per the Centers for Medicare and Medicaid Services starting in April 2020 (American Hospital Association, 2022).

The Impact of COVID-19 on Opioid Misuse, Mental Health, and Substance Abuse Treatment

Bennett et al. (2022) studied the impact of COVID-19 on New York City residents from April 2020 through March 2021 that self-reported illicit opioid use during that period. The study focused on the impacts of the pandemic specifically on mental health, material challenges or hardships, access to healthcare, and the pandemic impact on the drug use itself. This study is important to my study because it discusses the impact of COVID-19 on mental health in New York City, but also highlights the gap in the literature regarding COVID-19 in New York State for its impact on the often-marginalized population of opioid use disorder patients and the specifics of mental health and substance abuse treatment access during the pandemic.

Iacono (2022) discussed the impact of COVID-19 on the efforts to treat those with opioid use disorder and found that it increased the already significant risks and impacts of mental and social stressors on those with opioid use disorder, but also resulted in changes to the policies as well as the standards of practice for clinicians treating those with opioid use disorder.

The prediction by Wakeman et al. (2020) as cited by Bennett et al. (2022) that overdose deaths would rise was proven correct as per data from Macmadu et al. (2021) that reported a 28% increase in overdose deaths in Rhode Island from 2019 to 2020, during the COVID-19 pandemic. This further indicates the need for more analysis of the impact of the pandemic to inform plans to mitigate the impact of future public health crises on the existing challenges related to substance abuse.

Metropolitan Status and Poverty Level

Moore et al. (2021) studied the incidence and frequency of cannabis use in large, small, and non-metropolitan areas, and the relationship of cannabis use and health insurance as well as medical cannabis regulations. Moore et al. (2021) found that both the other two factors impacted cannabis use in non-metropolitan and small metropolitan areas. This is relevant to my study because the study was about the incidence of substance use and population density of the study participants' area of residence, which is a factor that I assessed in this study in relation to opioid use.

<div align="center">

Gap in the Knowledge and Why Study is Needed

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This study is significant in that to the best of my knowledge, despite there being a significant amount of ongoing research regarding opioid misuse and the public health interventions focused on mitigating it, there has been limited examination of the impact of mental health treatment, substance abuse treatment, and opioid misuse in the setting of the added impact of COVID-19 on the myriad factors of access to care, mental health, social and economic factors. This study is significant in that the epidemic of opioid misuse, despite being identified as an ongoing public health threat that is being addressed, continues to adversely impact not only the physical health but the mental health of those suffering from the disease of opioid addiction. If quantified, the impact of changes to access to treatments and resource availability may contribute to the body of knowledge. This potentially can be used to modify existing available services for mental health and substance abuse treatments. This can be accomplished through data that support reduced opioid misuse and access to care, which has the potential to result in a

more targeted approach to programs based on age, gender, population density and poverty status. Understanding these contributory factors of opioid misuse can support increased efforts to educate the public and regional public health professionals regarding the determinants of health related to opioid use, potentially generating and improving efforts to mitigate opioid misuse. Social change implications of this study include justifying the redistribution and modification of existing programs and resources in the public health services directed at opioid misuse. This intervention could provide additional justification for increasing or redirecting mental health and substance abuse resources to those that would benefit the most from it, and hopefully reduce the incident and impact of opioid misuse on more people and vulnerable populations.

Problem Statement

Research Problem

Is there a measurable impact of the COVID-19 pandemic on those adults in the United States that identify as opioid misusers seeking or seeking mental health treatment, substance abuse treatment, or both, when comparing 2019, pre-pandemic, to 2021 data, while considering age, gender, poverty status and metropolitan status?

Meaningful Gap in Current Research

While various factors including poverty level and population-density regions have been analyzed individually in past studies globally, there have been no studies to date that examine both factors in the data captured for the year 2021. The year 2021 was the most recent collected data available for evaluation in the format provided by the National Survey on Drug Use and Health. The year 2021 includes the added aspect of being

impacted by a global pandemic, the impact of which has yet to be fully comprehended, but worth analyzing.

There is a potential to generate data that contributes to the body of knowledge used to create and revise public health initiatives focused on the misuse of opioids and provide actionable information. There are currently no state-level data available, and the data from the National Survey on Drug Use and Health for 2021 were just made available in January of 2023, and has yet to be researched and discussed in relation to surveys published previously.

In this study, I evaluated the potential relationship between those who reported opioid misuse of adults and sought mental health treatment, substance abuse treatment, or both in 2021 compared to 2019, collected by the National Survey on Drug Use and Health, with covariates including poverty level as calculated based on the federal poverty threshold of income of those reporting, county metro status of those respondents as classified by the 2013 Rural/Urban Continuum Codes, age, gender, alcohol use and illicit drug use.

Purpose of the Study

The purpose of this quantitative study was to examine whether there is a measurable impact of the COVID-19 pandemic on the seeking of mental health treatment and behavioral health treatment in those that identify as opioid misusers. Taking into consideration the social, ecological, and economic factors of age, gender, poverty status, alcohol use, illicit drug use and county of residence metropolitan status, quantifying the potential impact of the COVID-19 pandemic on the marginalized population of opioid

misusers could provide insight and data regarding the efficacy of existing public health programs as well as inform future public health programs that focus on substance abuse disorders and providing treatment resources for those affected. I made a correlation between the independent variable of opioid misuse and the dependent variables of mental health treatment, substance abuse treatment, and both treatments while controlling for the covariates of age, gender, alcohol use and illicit drug use. I did this with a comparison of the same data points generated for the 2019 pre-pandemic period and the 2021 period.

Research Questions and Hypotheses

Research Question 1 (RQ1): Is there a measurable impact of the COVID-19 pandemic on opioid misusers seeking mental health treatment in the year 2021 in adults in adults in the United States while controlling for poverty status, metropolitan status, age, gender, alcohol use and illicit drug use, when compared to 2019?

Null Hypothesis ($H_0$1): There is not a statistically relevant difference between opioid misusers reporting seeking mental health treatment in the year 2021 in adults in the United States while controlling for poverty status, metropolitan status (large metropolitan, small metropolitan, and non-metropolitan), age, gender, alcohol use and illicit drug use, compared to 2019.

Alternative Hypothesis (H_a1): There is a statistically relevant difference between opioid misusers reporting seeking mental health treatment in the year 2021 in adults in the United States while controlling for poverty status, metropolitan status (large metropolitan, small metropolitan, and non-metropolitan), age, gender, alcohol use and illicit drug use, compared to 2019.

Research Question 2 (RQ2): Is there a measurable impact of the COVID-19 pandemic on opioid misusers seeking substance abuse treatment in the year 2021 in adults in the United States while controlling for poverty status, metropolitan status, age, gender, alcohol use and illicit drug use, when compared to 2019?

Null Hypothesis ($H_0$2): There is no statistically relevant difference between opioid misuse and seeking substance abuse treatment in the year 2021 in adults in the United States while controlling for poverty status, metropolitan status (large metropolitan, small metropolitan, and non-metropolitan), age, gender, alcohol use and illicit drug use, compared to 2019.

Alternative Hypothesis (H_a2): There is a statistically relevant difference between opioid misuse and substance abuse treatment in the year 2021 in adults in the United States while controlling for poverty status, metropolitan status (large metropolitan, small metropolitan, and non-metropolitan), age, gender, alcohol use and illicit drug use, compared to 2019.

Research Question 3 (RQ3): Is there a measurable impact of the COVID-19 pandemic on opioid misusers seeking both mental health treatment and substance abuse treatment in the year 2021 in adults in the United States while controlling for poverty status, the metropolitan status of county or residence, age, gender, alcohol use and illicit drug use, when compared to 2019?

Null Hypothesis ($H_0$3): There is no statistically relevant difference between opioid misuse and seeking both mental health treatment and substance abuse treatment in adults in the United States while controlling for poverty status, metropolitan status (large

metropolitan, small metropolitan, and non-metropolitan), age, gender, alcohol use and illicit drug use, compared to 2019.

Alternative Hypothesis (H_a3): There is a statistically relevant difference between opioid misuse and seeking both mental health treatment and substance abuse treatment in adults in the United States while controlling for poverty status, metropolitan status (large metropolitan, small metropolitan, and non-metropolitan), age, gender, alcohol use and illicit drug use, compared to 2019.

Summary

In order to answer the three research questions, I evaluated the hypothesis and null hypothesis for each question individually for both the pre-pandemic start data of 2019 and the post pandemic-start year data of 2021. Once the three research questions regarding the independent variable, the dependent variables, and the covariate variables were evaluated, I compared the results from both years.

Section 2: Research Design and Data Collection

Introduction

The purpose of this quantitative study was to examine whether there is a statistically relevant impact of the COVID-19 pandemic on those who identified as opioid misusers and their seeking mental health treatment, seeking substance abuse treatment, and both treatments during the COVID-19 pandemic in 2021, taking into consideration the social, ecological, and economic factors of age, gender, poverty status and county of residence metropolitan status, as well as alcohol use and illicit drug use.

This study is significant in that to the best of my knowledge, despite there being a significant amount of ongoing research regarding opioid misuse and the public health interventions focused on mitigating it, there has been limited examination of the impact of mental health treatment and substance abuse treatment being received by opioid misusers in the setting of the added impact of COVID-19 on the myriad factors of access to care, mental health, social and economic factors. This study is significant in that the epidemic of opioid misuse, despite being identified as an ongoing public health threat that is being addressed, continues to adversely impact not only the physical health but the mental health of those suffering from the disease of opioid addiction. If quantified, the impact on opioid misuse of the impact of changes to access to treatments and resource availability may contribute to the body of knowledge. This could be used to modify existing available services providing care for mental health and substance abuse treatments. By providing data that supports the positive impacts on opioid misuse in diverse populations of the various covariates, this information has the potential to allow

for a more targeted or focused approach to programs based on age, gender, population density, and poverty status. Influencing or contributory factors of opioid misuse can be used to generate and support increased efforts to educate the public and regional public health professionals regarding the determinants of health-related to opioid misuse and potentially improve the impact of efforts to mitigate opioid misuse. Social change implications of this study include justifying the redistribution and modification of existing programs and resources in the public health services directed at opioid misuse. The determination of the strength of the relationship between seeking mental and substance abuse treatment of opioid misusers and access to care in the setting of a pandemic outbreak and quarantine measures could provide additional justification for increasing or redirecting remote or virtual mental health and substance abuse resources to those that would benefit the most from it, and hopefully reduce the incident and impact of opioid misuse on more people and vulnerable populations.

In this study, I compared the results of the data just made available in January of 2023 for the 2021 year to the data collected for the 2019 year, to compare the results and analyze them for a statistically relevant delta or difference from the pre-pandemic 2019 to the pandemic 2021 calendar year, which given the only recently available data is to my knowledge a unique analysis.

Study Design and Rationale

This study was a quantitative cross-year comparison of two independent cross-sectional studies that evaluate the research questions and data sets for 2019 and 2021, individually, using secondary retrospective data to examine the relationship between the

independent variable of opioid misuse and the dependent variables of seeking mental

health treatment, seeking substance abuse treatment, and seeking both treatments, while

controlling for the covariates of age, gender, alcohol use, illicit drug use, metropolitan

status of county of residence and poverty status. The cross-sectional study design was

appropriate given that I examined a given population in a single point in time (the single

year) and then compared the two sets of results. I conducted a quantitative study design

and used linear regressions to quantify the relationship and identify the varying

characteristics and deviations of the relationships between the variables and covariates, to

determine the accuracy of the hypothesized relationships between the variables. I

conducted the analysis for the 2021 data, then again for the 2019 data. I then conducted

binary logistic regression models to assess for the predictive relationships between the

interactions of the two years and the variables and covariates for RQ1, RQ2, and RQ3.

Data Source

To achieve the goals of the study and answer the research questions, I used

secondary data sets from the national survey conducted by the Substance Abuse and

Mental Health Services Administration (SAMSA) (Substance Abuse and Mental Health

Services Administration, 2020; Substance Abuse and Mental Health Services

Administration, 2023).This national survey, conducted annually, includes a sample size

of 56,136 records for the 2019 data, and 58,034 records for the 2021 data (Substance

Abuse and Mental Health Services Administration, 2020; Substance Abuse and Mental

Health Services Administration, 2023), was selected due to the ability to perform an

analysis of the retrospective data that collected data on multiple variables including age,

gender, alcohol use, illicit drug use, poverty status and county of residence metropolitan status. The sample size of the survey meant that I had reasonable confidence that an acceptable alpha and p-value could be established for both the hypothesis and null hypothesis being studied, respectively (see Serdar et al., 2021). Both the 2019 and 2021 SAMSA survey datasets and codebooks are accessible via their website and do not require permission to use, as they are publicly available (Substance Abuse and Mental Health Services Administration, 2023).

Table 1

Research Questions, Variables, Covariates and Proposed Statistical Tests

Research Question	Independent Variables	Dependent Variables	Covariates	Statistical Tests
RQ1: Is there a measurable impact of the COVID-19 pandemic on opioid misusers seeking mental health treatment in the in the year 2021 in adults while controlling for poverty status, metropolitan status, age, and gender, when comparing to 2019?	Opioid Misuse	Sought Mental Health Treatment in 2021 Sought Mental Health Treatment in 2019	Age Gender Metropolitan Status Poverty Status Alcohol Use Illicit Drug Use	Chi-squared tests for bivariate testing Logistic regression for multivariate testing
RQ2: Is there a measurable impact of the COVID-19 pandemic on opioid misusers seeking substance abuse treatment in the year 2021 in adults while controlling for poverty status, metropolitan status,	Opioid Misuse	Sought Substance Abuse Treatment in 2021 Sought Substance Abuse Treatment in 2019	Age Gender Metropolitan Status Poverty Status Alcohol Use Illicit Drug Use	Chi-squared tests for bivariate testing Logistic regression for multivariate testing

Research Question	Independent Variables	Dependent Variables	Covariates	Statistical Tests
age, and gender, when comparing to 2019?				
RQ3: Is there a measurable impact of the COVID-19 pandemic on opioid misusers seeking both mental health treatment and substance abuse treatment in the year 2021 in adults in the United States while controlling for poverty status, metropolitan status of county or residence, age, and gender, when comparing to 2019?	Opioid Misuse	Sought Both Substance and Mental Health Treatment in 2021 Sought Both Substance and Mental Health Treatment in 2019	Age Gender Metropolitan Status Poverty Status Alcohol Use Illicit Drug Use	Chi-squared tests for bivariate testing Logistic regression for multivariate testing

Variables

The National Survey on Drug Use and Health conducted for the calendar year of 2021 captured data reported from survey from respondents that included data regarding self-reported opioid misuse as well as seeking mental health and substance abuse treatment throughout the year (Substance Abuse and Mental Health Services Administration, 2023). I used these data, along with the data regarding age, sex, alcohol use, illicit drug use, metropolitan status of the county of respondents, and poverty status of respondents. National data are the most granular data available, as state-wise data for 2020 were removed from availability and it was suggested that the national data not be used due to methodology concerns during the COVID-19 pandemic, and 2021 state-level data are not currently available for this data.

I evaluated the potential relationship between these reported opioid misuses of adults and sought mental health treatment, substance abuse treatment, or both in 2021 to the National Survey on Drug Use and Health (Substance Abuse and Mental Health Services Administration, 2023). I compared the resulting data from the same research questions and results for both the 2021 data (see Substance Abuse and Mental Health Services Administration, 2023) and the data for the year 2019 (Substance Abuse and Mental Health Services Administration, 2020).

Age

The age covariate, which was calculated based on the date of birth of respondents to the survey then correlated with additional entries to the date of birth of respondents throughout the survey to average or determine the age of respondents (Substance Abuse

and Mental Health Services Administration, 2020; Substance Abuse and Mental Health Services Administration, 2023). The final edited age of respondents was broken down into various ranges of age and will be re-coded to reflect the study variable of adult age, and to that of ages 18 to 25 years and age 26 years above of respondents.

Gender

The covariate of sex for the survey was a required value and only allowed for male or female selection. (Substance Abuse and Mental Health Services Administration, 2020; Substance Abuse and Mental Health Services Administration, 2023)

Alcohol Use

The alcohol use covariate captured respondents reported alcohol use and is recorded as used alcohol in past year, did not use in past year, number of days used (see Substance Abuse and Mental Health Services Administration, 2020; Substance Abuse and Mental Health Services Administration, 2023).

Illicit Drug Use

The covariate of illicit drug use records respondents reported illicit use of any of the following substances as either yes or no: Cocaine, heroin, hallucinogens, inhalants, sedatives, stimulants, marijuana, methamphetamines, pain relievers, tranquilizers (see Substance Abuse and Mental Health Services Administration, 2020; Substance Abuse and Mental Health Services Administration, 2023).

Metropolitan Status

The covariate of county metro status of the county of residence of survey respondents was based on the reported county of residence of respondents, which was

then correlated with the metropolitan status of the county of residence as per the assessment and classification of the United States Department of Agriculture that utilizes census data and the 2013 Rural/Urban Continuum Codes (see U.S. Department of Agriculture, 2020). The three levels of metropolitan status that respondents are assigned to are:

Large Metro: A population of 1 million or more

Small Metro: A population of less than 1 million but more than 250,000

Non-Metro: A population of less than 250, 000

Poverty status

Poverty status was a covariate. This was calculated based on the federal poverty threshold of income of those reporting and is determined by a formula that includes state of residence and number of persons in the household (see U.S. Office of the Assistant Secretary for Planning and Evaluation, 2020). The variable recorded was broken down into one of three categories for each respondent: living in poverty, income up to twice the federal poverty threshold, and income more than twice the federal poverty threshold (see Substance Abuse and Mental Health Services Administration, 2020; Substance Abuse and Mental Health Services Administration, 2023).

Opioid Misuse

This variable is a self-reported variable of either did or did not misuse opioids within the past year (Substance Abuse and Mental Health Services Administration, 2020; Substance Abuse and Mental Health Services Administration, 2023).

Sought Mental Health Treatment

This variable is a self-reported variable of either did or did not seek mental or behavioral health treatment within the past year (Substance Abuse and Mental Health Services Administration, 2020; Substance Abuse and Mental Health Services Administration, 2023).

Sought Substance Abuse Treatment

This variable is a self-reported variable of either did or did not seek substance abuse treatment within the past year (Substance Abuse and Mental Health Services Administration, 2020; Substance Abuse and Mental Health Services Administration, 2023).

Sought both Substance Abuse and Mental Health Treatment

This variable is a calculated variable that was determined by utilizing the recoding of individual responses by survey participants seeking mental health treatment and substance abuse treatment within the past year to generate this variable. (Substance Abuse and Mental Health Services Administration, 2020; Substance Abuse and Mental Health Services Administration, 2023).

Data Analysis Plan

Utilizing IBM SPSS version 28.0.1.0, after removing participants identifying as having been missing any of the variables being evaluated, frequencies and percentages were generated for the variables, all of which are nominal variables. Utilizing chi-square tests of independence, bi-variate testing was done, which as per Pallant (2020) is the proper test to evaluate the relationship strength of two nominal-level variables.   The chi-

square tests were conducted for each of the dependent variables and the covariates as they relate to the independent variable of opioid misuse. This was done for the variables from both datasets, 2019 and 2021.

For each research question of the three, a separate series of binary logistic regressions was done. A binary logistic regression is appropriate when assessing the strength of the predictive relationship between independent variable and a nominal dependent variable (Pallant, 2020). Then, for each research question, the covariates were entered, followed by the primary predictor: Sought mental health treatment for RQ1, Sought substance abuse treatment for RQ2, and Sought both mental health and substance abuse treatment for RQ3. Separate regression models were conducted to compare the 2019 and 2021 data. The χ^2 coefficient identified the strength of the collective regression model (Field, 2017). The Nagelkerke R^2 identified how much variance in opioid misuse can be explained by the predictors (Field, 2017). Individual Wald tests were used to assess the predictive ability of each covariate and the independent variable on the dependent variable (Tabachnick & Fidell, 2018). The odds ratios (*OR*) explain how the odds of opioid misuse fluctuate based on shifts to the covariates and independent variables. Statistical significance was evaluated at an $\alpha = .05$.

To evaluate the predictive relationship between the results from 2019 and 2021, I then conducted binary logistic regression models to assess for the predictive relationships between the interactions of the two years and the variables and covariates for RQ1, RQ2, and RQ3.

Limitations and Threats to Validity

This study utilizes a secondary dataset, therefore there are methodological limitations that include that the data collected was not my specific research questions, as well as potential data collection method biases. Also, the data was self-reported by respondents to the survey questions, which can result in biased results as a result of the reporting itself as well as the interpretation of the reporter of the question being asked, for example the interviewee's interpretation of "opioid misuse ". The gender question asked allowed only for the self-identification of "male" or "female", and these binary answer choices might cofound the answers and/or even potentially deter participants in the survey.

The survey, which is conducted annually, collects data potentially from different respondents or interviewees annually. This means that the demographics of respondents, including the covariates to be analyzed including age, gender, alcohol use, illicit drug use, poverty status and metropolitan status may differ per year.

The SAMSA dataset is a national survey, which collects data from a very large respondent size. Even after adjusting for non-respondents and age, the number of participants is very large. This large number of participants results in a power close to or equal to 1 for each research question, and therefore has the potential to dilute the significance of outcomes by impacting effect size (Faber & Fonseca, 2014).

Summary

This quantitative cross-sectional study utilizing secondary data collected independently for 2019 and 2021 in the United States, evaluating the relationship

between the independent variable of opioid misuse and the dependent variables of

seeking mental health treatment, seeking substance abuse treatment, and seeking both

treatments, while controlling for the covariates of age, gender, alcohol use, illicit drug

use, metropolitan status of county of residence and poverty status

Section 3: Presentation of the Results and Findings

The purpose of this quantitative study was to examine whether there is an impact of the COVID-19 pandemic on opioid misusers seeking mental health treatment and substance abuse treatment, taking into consideration the social, ecological, and economic factors of age, gender, poverty status, alcohol use, illicit drug use and county of residence metropolitan status. In this chapter I present the findings of the data analyses and describe the frequencies of missing data. To address each research question, I used a combination of chi-square tests of independence and logistic regressions. I then conducted binary logistic regression models to assess for the predictive relationships between the interactions of the two years and the variables and covariates for RQ1, RQ2, and RQ3.

Results

Pre-Analysis Data Screen

I examined spreadsheets for the 2019 and 2021 data. The 2019 spreadsheet initially contained 56,136 individuals. After adjustments for the age threshold ($\geq$ 18 years) and non-responses, the final sample size for the 2019 data consisted of 30,287 cases. The 2021 spreadsheet initially contained 58,034 individuals. After adjustments for the age threshold ($\geq$ 18 years) and non-responses, the final sample size for the 2021 data consisted of 31,833 cases.

RQ1: Is there a measurable impact of the COVID-19 pandemic on opioid misusers seeking mental health treatment in the in the year 2021 in adults while controlling for poverty status, alcohol use, illicit drug use, metropolitan status, age, and gender, when comparing to 2019?

To address RQ1, a series of chi-square tests were first run to examine the bivariate associations between age, gender, metropolitan status, poverty status, alcohol use, and illicit drug use, and opioid use on seeking mental health treatment. I then conducted a binary logistic regression to examine the predictive relationship between opioid misuse and seeking mental health treatment, while controlling for age, gender, metropolitan status, poverty status, alcohol use, and illicit drug use. I conducted separate analyses for the 2019 and 2021 datasets. Due to the categorical nature of the variables of interest, the predictors were dummy coded prior to entry into the logistic regression models. Table 2 shows the reference categories for each of the variables for all regression models presented in the Results chapter.

Table 2

Reference Categories for Predictor Variables in Logistic Regression Models

Variable (reference category)
Age (reference: 18-25 years)
26+ years
Gender (reference: Male)
Female
Metropolitan status (reference: Nonmetro)
Large metro
Small metro
Poverty status (reference: Poverty level)
Income up to 2X federal poverty threshold
Income more Than 2X Federal poverty threshold
Alcohol use (reference: 0-90 days)
91-180 days
181-270 days
271-365 days
Illicit drug use (reference: No)
Yes, used illicit drugs
Opioid Misuse (reference: No)
Yes, misused opioids

2019 Data

Chi-square tests with seeking mental health treatment (2019)

I used chi-square tests were used to examine the associations between the predictor variables and seeking mental health treatment for the 2019 data. Gender ($\chi^2 =$ 879.33, $p < .001$), metropolitan status ($\chi^2 = 28.91$, $p < .001$), poverty status ($\chi^2 = 14.90$, $p < .001$), illicit drug use ($\chi^2 = 437.98$, $p < .001$), and opioid misuse ($\chi^2 = 148.84$, $p < .001$)

were significantly associated to seeking mental health treatment. Table 3 shows the

findings of the chi-square tests seeking mental treatment for the 2019 data.

Table 3

Crosstabulation between Independent Variables with Seeking Mental Health Treatment

(2019)

Variable	Seeking Mental Health Treatment		χ^2	P
	No (n = 24,606)	Yes (n = 5,681)		
Age			0.79	.373
18-25	7,996 (32.50%)	1,881 (33.11%)		
26+	16,610 (67.50%)	3,800 (66.89%)		
Gender			879.33	<.001
Male	12,683 (51.54%)	1,690 (29.75%)		
Female	11,923 (48.46%)	3,991 (70.25%)		
Metropolitan Status			28.91	<.001
Large Metro	11,364 (46.18%)	2,400 (42.25%)		
Small Metro	8,657 (35.18%)	2,151 (37.86%)		
Nonmetro	4,585 (18.63%)	1,130 (19.89%)		
Poverty Status			14.90	<.001
Living in Poverty	3,356 (13.64%)	884 (15.56%)		
Income up to 2X Fed Pov Thresh	4,761 (19.35%)	1,047 (18.43%)		
Income more than 2X Fed Pov Thresh	16,489 (67.01%)	3,750 (66.01%)		
Alcohol Use			2.63	.453

1-90 days per year	15,397 (62.57%)	3,584 (63.09%)		
91-180 days per year	5,617 (22.83%)	1,251 (22.02%)		
181-270 days per year	2,285 (9.29%)	524 (9.22%)		
271-365 days per year	1,307 (5.31%)	322 (5.67%)		
Illicit Drug Use			437.98	<.001
Did not use in past year	16,898 (68.67%)	3,072 (54.07%)		
Used in past year	7,708 (31.33%)	2,609 (45.93%)		
Opioid Misuse			148.84	<.001
Did not misuse in the past year	23,490 (95.46%)	5,195 (91.45%)		
Misused in the past year	1,116 (4.54%)	486 (8.55%)		

Binary logistic regression with seeking mental health treatment (2019)

Table 4 shows the results of the regression model. The findings of the overall binary logistic regression model were statistically significant with seeking mental health treatment in 2019, $\chi^2(11) = 1,523.70$, $p < .001$, Nagelkerke $R^2 = .079$. Due to statistical significance of the collective model, the individual predictors were examined further.

Age (Wald $= 12.08$, $p < .001$, $OR = 1.13$) was a significant predictor, indicating that individuals who were 26+ years of age were 13% more likely to seek mental health treatment in comparison to individuals who were aged 18 to 25 years.

Gender (Wald $= 924.14$, $p < .001$, $OR = 2.69$) was a significant predictor, indicating that females were 168% more likely to seek mental health treatment in comparison to males.

Metropolitan status – large metro (Wald = 24.31, *p* < .001, *OR* = 0.82) was a significant predictor, indicating that individuals in large metros were 18% less likely to seek mental health treatment in comparison to individuals in nonmetropolitan areas.

Illicit drug use (Wald = 425.06, *p* < .001, *OR* = 2.02) was a significant predictor, indicating that individuals who used illicit drugs were 102% more likely to seek mental health treatment in comparison to individuals who did not use illicit drugs.

Opioid misuse (Wald = 25.09, *p* < .001, *OR* = 1.36) was a significant predictor, indicating that individuals who misused opioids were 36% more likely to seek mental health treatment in comparison to individuals who did not use opioids.

Table 4

Logistic Regression with Age, Gender, Metropolitan Status, Alcohol Use, Illicit Drug Use, and Opioid Misuse Predicting Seeking Mental Health Treatment (2019)

Variable	B	SE	Wald Test	p	OR
Age (reference: 18-25 years)					
26+ years	0.12	0.03	12.08	< .001	1.13
Gender (reference: Male)					
Female	0.99	0.03	924.14	< .001	2.69
Metropolitan status (reference: Nonmetro)					
Large metro	-0.20	0.04	24.31	< .001	0.82
Small metro	-0.02	0.04	0.29	.587	0.98
Poverty status (reference: Poverty level)					
Income up to 2X federal poverty threshold	-0.10	0.05	3.76	.053	0.90
Income more Than 2X Federal poverty threshold	0.04	0.04	0.69	.407	1.04
Alcohol use (reference: 0-90 days)					
91-180 days	-0.07	0.04	3.00	.083	0.94
181-270 days	-0.02	0.05	0.12	.729	0.98
271-365 days	0.09	0.07	1.60	.205	1.09
Illicit drug use (reference: No)					
Yes, used illicit drugs	0.70	0.03	425.06	< .001	2.02
Opioid Misuse (reference: No)					
Yes, misused opioids	0.31	0.06	25.09	< .001	1.36

Note. $X^2(11) = 1{,}523.70$, $p < .001$, Nagelkerke $R^2 = .079$.

2021 Data

Chi-square tests with seeking mental health treatment (2021)

Chi-square tests were used to examine the associations between the predictor variables and seeking mental health treatment for the 2021 data. Age ($\chi^2 = 17.32$, $p <$ .001), gender ($\chi^2 = 889.52$, $p < .001$), metropolitan status ($\chi^2 = 11.29$, $p = .004$), poverty status ($\chi^2 = 30.39$, $p < .001$), alcohol use ($\chi^2 = 10.90$, $p = .012$), illicit drug use ($\chi^2 =$ 638.44, $p < .001$), and opioid misuse ($\chi^2 = 176.47$, $p < .001$) were significantly associated to seeking mental health treatment. Table 5 shows the findings of the chi-square tests with seeking mental treatment for the 2021 data.

Table 5

Crosstabulation between Independent Variables with Seeking Mental Health Treatment (2021)

Variable	Seeking Mental Health Treatment		χ^2	p
	No (*n* = 24,952)	Yes (*n* = 6,931)		
Age			17.32	<.001
18-25	6,946 (27.84%)	2,106 (30.39%)		
26+	18,006 (72.16%)	4,825 (69.61%)		
Gender			889.52	<.001
Male	12,189 (48.85%)	1,991 (28.73%)		
Female	12,763 (51.15%)	4,940 (71.27%)		
Metropolitan Status			11.29	.004
Large Metro	11,438 (45.84%)	3,029 (43.70%)		
Small Metro	9,352 (37.48%)	2,737 (39.49%)		
Nonmetro	4,162 (16.68%)	1,165 (16.81%)		
Poverty Status			30.39	<.001
Living in Poverty	3,261 (13.07%)	1,068 (15.41%)		
Income up to 2X Fed Pov Thresh	4,167 (16.70%)	1,204 (17.37%)		
Income more than 2X Fed Pov Thresh	17,524 (70.23%)	4,659 (67.22%)		
Alcohol Use			10.90	.012
1-90 days per year	15,446 (61.90%)	4,288 (61.87%)		
91-180 days per year	5,479 (21.96%)	1,486 (21.44%)		

	Seeking Mental Health Treatment			
181-270 days per year	2,410 (9.66%)	749 (10.81%)		
271-365 days per year	1,617 (6.48%)	408 (5.89%)		
Illicit Drug Use			638.44	<.001
Did not use in past year	17,363 (69.59%)	3,697 (53.34%)		
Used in past year	7,589 (30.41%)	3,234 (46.66%)		
Opioid Misuse			176.47	<.001
Did not misuse in the past year	24,221 (97.07%)	6,493 (93.68%)		
Misused in the past year	731 (2.93%)	438 (6.32%)		

Binary logistic regression with seeking mental health treatment (2021)

Table 6 shows the results of the regression model. The findings of the overall binary logistic regression model were statistically significant with seeking mental health treatment in 2021, $\chi^2(11) = 1{,}678.03$, $p < .001$, Nagelkerke $R^2 = .079$. Due to statistical significance of the collective model, the individual predictors were examined further.

Gender (Wald = 924.69, $p < .001$, $OR = 2.50$) was a significant predictor, indicating that females were 150% more likely to seek mental health treatment in comparison to males.

Metropolitan status – large metro (Wald = 4.01, $p = .045$, $OR = 0.92$) was a significant predictor, indicating that individuals in large metros were 8% less likely to seek mental health treatment in comparison to individuals in nonmetropolitan areas.

Alcohol use – 181-270 days (Wald = 5.84, $p = .016$, $OR = 1.12$) was a significant predictor, indicating that individuals who used alcohol 181-270 days per year were 12%

more likely to seek mental health treatment in comparison to individuals who used alcohol 0-90 days.

Illicit drug use (Wald = 549.66, $p < .001$, $OR = 2.05$) was a significant predictor, indicating that individuals who used illicit drugs were 105% more likely to seek mental health treatment in comparison to individuals who did not use illicit drugs.

Opioid misuse (Wald = 29.84, $p < .001$, $OR = 1.44$) was a significant predictor, indicating that individuals who misused opioids were 44% more likely to seek mental health treatment in comparison to individuals who did not use opioids.

Table 6

Logistic Regression with Age, Gender, Metropolitan Status, Alcohol Use, Illicit Drug Use, and Opioid Misuse Predicting Seeking Mental Health Treatment (2021)

Variable	B	SE	Wald Test	p	OR
Age (reference: 18-25 years)					
26+ years	0.01	0.03	0.20	.657	1.01
Gender (reference: Male)					
Female	0.92	0.03	924.69	< .001	2.50
Metropolitan status (reference: Nonmetro)					
Large metro	-0.08	0.04	4.01	.045	0.92
Small metro	0.02	0.04	0.21	.646	1.02
Poverty status (reference: Poverty level)					
Income up to 2X federal poverty threshold	-0.06	0.05	1.58	.209	0.94
Income more Than 2X Federal poverty threshold	-0.01	0.04	0.02	.875	0.99
Alcohol use (reference: 0-90 days)					
91-180 days	-0.04	0.04	1.46	.227	0.96
181-270 days	0.11	0.05	5.84	.016	1.12
271-365 days	-0.05	0.06	0.57	.452	0.96
Illicit drug use (reference: No)					
Yes, used illicit drugs	0.72	0.03	549.66	< .001	2.05
Opioid Misuse (reference: No)					
Yes, misused opioids	0.36	0.07	29.84	< .001	1.44

Note. $X^2(11) = 1,678.03$, $p < .001$, Nagelkerke $R^2 = .079$.

RQ2 was: Is there a measurable impact of the COVID-19 pandemic on opioid misusers seeking substance abuse treatment in the year 2021 in adults while controlling

for poverty status, alcohol use, illicit drug use, metropolitan status, age, and gender, when comparing to 2019? $H_0 2$: There is no statistically relevant difference between opioid misuse and seeking substance abuse treatment in the year 2021 in adults in the United States while controlling for poverty status, metropolitan status (large metropolitan, small metropolitan, and non-metropolitan), age, gender, alcohol use and illicit drug use, compared to 2019.

$H_a 2$: There is a statistically relevant difference between opioid misuse and substance abuse treatment in the year 2021 in adults in the United States while controlling for poverty status, metropolitan status (large metropolitan, small metropolitan, and non-metropolitan), age, gender, alcohol use and illicit drug use, compared to 2019.

To address RQ2, a series of chi-square tests were first run to examine the bivariate associations between age, gender, metropolitan status, poverty status, alcohol use, and illicit drug use, and opioid use on seeking substance abuse treatment. A binary logistic regression was then conducted to examine the predictive relationship between opioid misuse and seeking substance abuse treatment, while controlling for age, gender, metropolitan status, poverty status, alcohol use, and illicit drug use. Separate analyses were conducted for the 2019 and 2021 datasets.

2019 Data

Chi-square tests with seeking substance abuse treatment (2019)

Chi-square tests were used to examine the associations between the predictor variables and seeking substance abuse treatment for the 2019 data. Gender ($\chi^2 = 23.89$, $p < .001$), poverty status ($\chi^2 = 42.80$, $p < .001$), alcohol use ($\chi^2 = 9.25$, $p = .026$), illicit drug

use ($\chi^2 = 71.34$, *p* < .001), and opioid misuse ($\chi^2 = 259.70$, *p* < .001) were significantly

associated to seeking substance abuse treatment. Table 7 presents the findings of the chi-

square tests with seeking substance abuse for the 2019 data.

Table 7

Crosstabulation between Independent Variables with Seeking Substance Abuse Treatment
(2019)

Variable	Seeking Substance Abuse Treatment		χ^2	p
	No (*n* = 30,137)	Yes (*n* = 150)		
Age			0.74	.391
18-25	9,833 (32.63%)	44 (29.33%)		
26+	20,304 (67.37%)	106 (70.67%)		
Gender			23.89	<.001
Male	14,272 (47.36%)	101 (67.33%)		
Female	15,865 (52.64%)	49 (32.67%)		
Metropolitan Status			0.13	.938
Large Metro	13,698 (45.45%)	66 (44.00%)		
Small Metro	10,753 (35.68%)	55 (36.67%)		
Nonmetro	5,686 (18.87%)	29 (19.33%)		
Poverty Status			42.80	<.001
Living in Poverty	4,200 (13.94%)	40 (26.67%)		
Income Up to 2X Fed Pov Thresh	5,761 (19.12%)	47 (31.33%)		
Income More Than 2X Fed Pov Thresh	20,176 (66.95%)	63 (42.00%)		
Alcohol Use			9.25	.026
1-90 days per year	18,901 (62.72%)	80 (53.33%)		
91-180 days per year	6,832 (22.67%)	36 (24.00%)		

Variable	Seeking Substance Abuse Treatment		χ^2	p
	No (*n* = 30,137)	Yes (*n* = 150)		
181-270 days per year	2,786 (9.24%)	23 (15.33%)		
271-365 days per year	1,618 (5.37%)	11 (7.33%)		
Illicit Drug Use			71.34	<.001
Did not use in past year	19,920 (66.10%)	50 (33.33%)		
Used in past year	10,217 (33.90%)	100 (66.67%)		
Opioid Misuse			259.70	<.001
Did not misuse in the past year	28,587 (94.86%)	98 (65.33%)		
Misused in the past year	1,550 (5.14%)	52 (34.67%)		

Binary logistic regression with seeking substance abuse treatment (2019)

Table 8 summarizes the results of the regression model. The findings of the overall binary logistic regression model were statistically significant with seeking substance abuse treatment in 2019, $\chi^2(11) = 199.44$, $p < .001$, Nagelkerke $R^2 = .108$. Due to statistical significance of the collective model, the individual predictors were examined further.

Age (Wald = 8.13, $p = .004$, *OR* = 1.70) was a significant predictor, indicating that individuals who were 26+ years of age were 70% more likely to seek substance abuse treatment in comparison to individuals who were aged 18-25 years.

Gender (Wald = 20.26, $p < .001$, *OR* = 0.45) was a significant predictor, indicating that females were 55% less likely to seek substance abuse treatment in comparison to males.

Poverty status – income more than 2x federal poverty threshold (Wald = 25.46, p < .001, OR = 0.34) was a significant predictor, indicating that individuals in with income more than 2x the federal poverty threshold were 66% less likely to seek substance abuse treatment in comparison to individuals living in poverty.

Illicit drug use (Wald = 11.56, p < .001, OR = 2.04) was a significant predictor, indicating that individuals who used illicit drugs were 104% more likely to seek substance abuse treatment in comparison to individuals who did not use illicit drugs.

Opioid misuse (Wald = 70.72, p < .001, OR = 5.55) was a significant predictor, indicating that individuals who misused opioids were 455% more likely to seek substance abuse treatment in comparison to individuals who did not use opioids.

Table 8

Logistic Regression with Age, Gender, Metropolitan Status, Alcohol Use, Illicit Drug

Use, and Opioid Use Predicting Seeking Substance Abuse Treatment (2019)

Variable	B	SE	Wald Test	p	OR
Age (reference: 18-25 years)					
26+ years	0.53	0.19	8.13	.004	1.70
Gender (reference: Male)					
Female	-0.80	0.18	20.26	< .001	0.45
Metropolitan status (reference: Nonmetro)					
Large metro	-0.02	0.23	0.01	.944	0.98
Small metro	-0.01	0.23	0.00	.961	0.99
Poverty status (reference: Poverty level)					
Income up to 2X federal poverty threshold	-0.13	0.22	0.33	.569	0.88
Income more Than 2X Federal poverty threshold	-1.07	0.21	25.46	< .001	0.34
Alcohol use (reference: 0-90 days)					
91-180 days	0.08	0.20	0.17	.679	1.09
181-270 days	0.40	0.24	2.69	.101	1.49
271-365 days	0.12	0.33	0.13	.722	1.12
Illicit drug use (reference: No)					
Yes, used illicit drugs	0.71	0.21	11.56	< .001	2.04
Opioid Misuse (reference: No)					
Yes, misused opioids	1.71	0.20	70.72	< .001	5.55

Note. $X^2(11) = 199.44$, $p < .001$, Nagelkerke $R^2 = .108$.

2021 Data

Chi-square tests with seeking substance abuse treatment (2021)

Chi-square tests were used to examine the associations between the predictor

variables and seeking substance abuse treatment for the 2021 data. Gender ($\chi^2 = 13.97$, *p*

< .001), metropolitan status (χ^2 = 16.77, p < .001), poverty status (χ^2 = 92.31, p < .001),

alcohol use (χ^2 = 13.62, p = .003), illicit drug use (χ^2 = 135.21, p < .001), and opioid

misuse (χ^2 = 483.36, p < .001) were significantly associated to seeking substance abuse

treatment. Table 9 presents the findings of the chi-square tests with seeking substance

abuse for the 2021 data.

Table 9

Crosstabulation between Independent Variables with Seeking Substance Abuse Treatment

(2021)

	Seeking Substance Abuse Treatment			
Variable	No (n = 31,728)	Yes (n = 155)	χ^2	P
Age			0.29	.593
18-25	9,005 (28.38%)	47 (30.32%)		
26+	22,723 (71.62%)	108 (69.68%)		
Gender			13.97	<.001
Male	14,088 (44.40%)	92 (59.35%)		
Female	17640 (55.60%)	63 (40.65%)		
Metropolitan Status			16.77	<.001
Large Metro	14,416 (45.44%)	51 (32.90%)		
Small Metro	12,028 (37.91%)	61 (39.35%)		
Nonmetro	5,284 (16.65%)	43 (27.74%)		
Poverty Status			92.31	<.001
Living in Poverty	4,282 (13.50%)	47 (30.32%)		

Variable	Seeking Substance Abuse Treatment		χ^2	P
	No (n = 31,728)	Yes (n = 155)		
Income Up to 2X Fed Pov Thresh	5,316 (16.75%)	55 (35.48%)		
Income More Than 2X Fed Pov Thresh	22,130 (69.75%)	53 (34.19%)		
Alcohol Use			13.62	.003
1-90 days per year	19,656 (61.95%)	78 (50.32%)		
91-180 days per year	6,929 (21.84%)	36 (23.23%)		
181-270 days per year	3,135 (9.88%)	24 (15.48%)		
271-365 days per year	2,008 (6.33%)	17 (10.97%)		
Illicit Drug Use			135.21	<.001
Did not use in past year	21,026 (66.27%)	34 (21.94%)		
Used in past year	10,702 (33.73%)	121 (78.06%)		
Opioid Misuse			483.36	<.001
Did not misuse in the past year	30,616 (96.50%)	98 (63.23%)		
Misused in the past year	1,112 (3.50%)	57 (36.77%)		

Binary logistic regression with seeking substance abuse treatment (2021)

Table 10 summarizes the results of the regression model. The findings of the overall binary logistic regression model were statistically significant with seeking substance abuse treatment in 2021, $\chi^2(11) = 314.78$, $p < .001$, Nagelkerke $R^2 = .165$. Due to statistical significance of the collective model, the individual predictors were examined further.

Gender (Wald = 13.15, *p* < .001, *OR* = 0.54) was a significant predictor, indicating that females were 46% less likely to seek substance abuse treatment in comparison to males.

Metropolitan status – large metro (Wald = 8.01, *p* = .005, *OR* = 0.55) was a significant predictor, indicating that individuals in large metros were 45% less likely to seek substance abuse treatment in comparison to individuals in nonmetropolitan areas.

Poverty status – income more than 2x federal poverty threshold (Wald = 35.24, *p* < .001, *OR* = 0.29) was a significant predictor, indicating that individuals in with income more than 2x the federal poverty threshold were 71% less likely to seek substance abuse treatment in comparison to individuals living in poverty.

Illicit drug use (Wald = 31.81, *p* < .001, *OR* = 3.42) was a significant predictor, indicating that individuals who used illicit drugs were 242% more likely to seek substance abuse treatment in comparison to individuals who did not use illicit drugs.

Opioid misuse (Wald = 106.22, *p* < .001, *OR* = 6.99) was a significant predictor, indicating that individuals who misused opioids were 599% more likely to seek substance abuse treatment in comparison to individuals who did not use opioids.

Table 10

Logistic Regression with Age, Gender, Metropolitan Status, Alcohol Use, Illicit Drug Use, and Opioid Use Predicting Seeking Substance Abuse Treatment (2021)

Variable	B	SE	Wald Test	p	OR
Age (reference: 18-25 years)					
26+ years	0.32	0.18	3.01	.083	1.38
Gender (reference: Male)					
Female	-0.61	0.17	13.15	< .001	0.54
Metropolitan status (reference: Nonmetro)					
Large metro	-0.60	0.21	8.01	.005	0.55
Small metro	-0.40	0.20	3.79	.052	0.67
Poverty status (reference: Poverty level)					
Income up to 2X federal poverty threshold	0.05	0.20	0.06	.808	1.05
Income more Than 2X Federal poverty threshold	-1.25	0.21	35.24	< .001	0.29
Alcohol use (reference: 0-90 days)					
91-180 days	0.17	0.21	0.71	.399	1.19
181-270 days	0.46	0.24	3.60	.058	1.58
271-365 days	0.44	0.28	2.52	.113	1.56
Illicit drug use (reference: No)					
Yes, used illicit drugs	1.23	0.22	31.81	< .001	3.42
Opioid Misuse (reference: No)					
Yes, misused opioids	1.94	0.19	106.22	< .001	6.99

Note. $X^2(11) = 314.78$, $p < .001$, Nagelkerke $R^2 = .165$.

RQ3 was: Is there a measurable impact of the COVID-19 pandemic on opioid misusers seeking both mental health treatment and substance abuse treatment in the year 2021 in adults in the United States while controlling for poverty status, alcohol use, illicit

drug use, metropolitan status of county or residence, age, and gender, when comparing to 2019?

$H_0$3: There is no statistically relevant difference between opioid misuse and seeking both mental health treatment and substance abuse treatment in adults in the United States while controlling for poverty status, metropolitan status (large metropolitan, small metropolitan, and non-metropolitan), age, gender, alcohol use and illicit drug use, compared to 2019.

H_a3: There is a statistically relevant difference between opioid misuse and seeking both mental health treatment and substance abuse treatment in adults in the United States while controlling for poverty status, metropolitan status (large metropolitan, small metropolitan, and non-metropolitan), age, gender, alcohol use and illicit drug use, compared to 2019.

To address RQ3, a series of chi-square tests were first run to examine the bivariate associations between age, gender, metropolitan status, poverty status, alcohol use, and illicit drug use, and opioid use on seeking both mental health and substance abuse treatment. A binary logistic regression was then conducted to examine the predictive relationship between opioid misuse and seeking both mental health and substance abuse treatment, while controlling for age, gender, metropolitan status, poverty status, alcohol use, and illicit drug use. Separate analyses were conducted for the 2019 and 2021 datasets.

2019 Data

Chi-square tests with seeking both mental health and substance abuse treatment (2019)

Chi-square tests were used to examine the associations between the predictor variables and seeking both mental health and substance abuse treatment for the 2019 data. Poverty status (χ^2 = 39.96, p < .001), alcohol use (χ^2 = 27.10, p < .001), illicit drug use (χ^2 = 220.74, p < .001), and opioid misuse (χ^2 = 402.53, p < .001) were significantly associated to seeking both mental health and substance abuse treatment. Table 11 presents the findings of the chi-square tests with seeking both mental health and substance abuse treatment for the 2019 data.

Table 11

Crosstabulation between Independent Variables with Seeking Mental Health and

Substance Abuse Treatment (2019)

| Variable | Seeking Mental Health and Substance Abuse Treatment | | χ^2 | p |
	No (n = 30,067)	Yes (n = 220)		
Age			0.11	.745
18-25	9,803 (32.60%)	74 (33.64%)		
26+	20,264 (67.40%)	146 (66.36%)		
Gender			0.01	.936
Male	14,268 (47.45%)	105 (47.73%)		
Female	15,799 (52.55%)	115 (52.27%)		
Metropolitan Status			0.65	.723
Large Metro	13,659 (45.43%)	105 (47.73%)		
Small Metro	10,735 (35.70%)	73 (33.18%)		
Nonmetro	5,673 (18.87%)	42 (19.09%)		
Poverty Status			39.96	<.001
Living in Poverty	4,178 (13.90%)	62 (28.18%)		
Income Up to 2X Fed Pov Thresh	5,763 (19.17%)	45 (20.45%)		
Income More Than 2X Fed Pov Thresh	20,126 (66.94%)	113 (51.36%)		
Alcohol Use			27.10	<.001
1-90 days per year	18,865 (62.74%)	116 (52.73%)		

| Variable | Seeking Mental Health and Substance Abuse Treatment | | χ^2 | p |
	No ($n = 30,067$)	Yes ($n = 220$)		
91-180 days per year	6,823 (22.69%)	45 (20.45%)		
181-270 days per year	2,774 (9.23%)	35 (15.91%)		
271-365 days per year	1,605 (5.34%)	24 (10.91%)		
Illicit Drug Use			220.74	<.001
Did not use in past year	19,929 (66.28%)	41 (18.64%)		
Used in past year	10,138 (33.72%)	179 (81.36%)		
Opioid Misuse			402.53	<.001
Did not misuse in the past year	28,543 (94.93%)	142 (64.55%)		
Misused in the past year	1,524 (5.07%)	78 (35.45%)		

Binary logistic regression with seeking both mental health and substance abuse treatment (2019)

Table 12 summarizes the results of the regression model. The findings of the overall binary logistic regression model were statistically significant with seeking both mental health and substance abuse treatment in 2019, $\chi^2(11) = 326.28$, $p < .001$, Nagelkerke $R^2 = .130$. Due to statistical significance of the collective model, the individual predictors were examined further.

Age (Wald $= 6.59$, $p = .010$, $OR = 1.47$) was a significant predictor, indicating that individuals who were 26+ years of age were 47% more likely to seek both mental health and substance abuse treatment in comparison to individuals who were aged 18-25 years.

Poverty status – income up to 2x federal poverty threshold (Wald = 7.16, p = .007, OR = 0.59) was a significant predictor, indicating that individuals with income up to 2x the federal poverty threshold were 41% less likely to seek both mental health and substance abuse treatment in comparison to individuals living in poverty. Poverty status – income more than 2x federal poverty threshold (Wald = 18.78, p < .001, OR = 0.49) was a significant predictor, indicating that individuals in with income more than 2x the federal poverty threshold were 51% less likely to seek both mental health and substance abuse treatment in comparison to individuals living in poverty.

Alcohol use – 181-270 days (Wald = 4.93, p = .026, OR = 1.56) was a significant predictor, indicating that individuals who used alcohol 181-270 days per year were 56% more likely to seek both mental health and substance abuse treatment in comparison to individuals who used alcohol 0-90 days. Alcohol use – 271-365 days (Wald = 5.67, p = .017, OR = 1.74) was a significant predictor, indicating that individuals who used alcohol 271-365 days per year were 74% more likely to seek both mental health and substance abuse treatment in comparison to individuals who used alcohol 0-90 days.

Illicit drug use (Wald = 83.22, p < .001, OR = 5.70) was a significant predictor, indicating that individuals who used illicit drugs were 470% more likely to seek both mental health and substance abuse treatment in comparison to individuals who did not use illicit drugs.

Opioid misuse (Wald = 82.89, p < .001, OR = 4.08) was a significant predictor, indicating that individuals who misused opioids were 308% more likely to seek both

mental health and substance abuse treatment in comparison to individuals who did not

misuse opioids.

Table 12

Logistic Regression with Age, Gender, Metropolitan Status, Alcohol Use, Illicit Drug

Use, and Opioid Use Predicting Seeking Mental Health and Substance Abuse Treatment

(2019)

Variable	B	SE	Wald Test	p	OR
Age (reference: 18-25 years)					
26+ years	0.38	0.15	6.59	.010	1.47
Gender (reference: Male)					
Female	0.12	0.14	0.73	.394	1.13
Metropolitan status (reference: Nonmetro)					
Large metro	0.01	0.19	0.01	.938	1.01
Small metro	-0.13	0.20	0.44	.506	0.88
Poverty status (reference: Poverty level)					
Income up to 2X federal poverty threshold	-0.53	0.20	7.16	.007	0.59
Income more Than 2X Federal poverty threshold	-0.72	0.17	18.78	< .001	0.49
Alcohol use (reference: 0-90 days)					
91-180 days	-0.13	0.18	0.49	.484	0.88
181-270 days	0.44	0.20	4.93	.026	1.56
271-365 days	0.55	0.23	5.67	.017	1.74
Illicit drug use (reference: No)					
Yes, used illicit drugs	1.74	0.19	83.22	< .001	5.70
Opioid Misuse (reference: No)					
Yes, misused opioids	1.41	0.15	82.89	< .001	4.08

Note. X2(11) = 326.28, p < .001, Nagelkerke R^2 = .130.

2021 Data

Chi-square tests with seeking both mental health and substance abuse treatment (2021)

Chi-square tests were used to examine the associations between the predictor variables and seeking both mental health and substance abuse treatment for the 2021 data. Age (χ^2 = 4.89, p = .027), metropolitan status (χ^2 = 19.59, p < .001), poverty status (χ^2 = 114.61, p < .001), alcohol use (χ^2 = 33.29, p < .001), illicit drug use (χ^2 = 219.29, p < .001), and opioid misuse (χ^2 = 437.77, p < .001) were significantly associated to seeking both mental health and substance abuse treatment. Table 13 presents the findings of the chi-square tests with seeking both mental health and substance abuse treatment for the 2021 data.

Table 13

Crosstabulation between Independent Variables with Seeking Mental Health and Substance Abuse Treatment (2021)

Variable	Seeking Mental Health and Substance Abuse Treatment		χ^2	p
	No (n = 30,067)	Yes (n = 220)		
Age			4.89	.027
18-25	9,000 (28.44%)	52 (21.94%)		
26+	22,646 (71.56%)	185 (78.06%)		
Gender			0.54	.463
Male	14,069 (44.46%)	111 (46.84%)		
Female	17,577 (55.54%)	126 (53.16%)		

| Variable | Seeking Mental Health and Substance Abuse Treatment | | χ^2 | p |
	No (n = 30,067)	Yes (n = 220)		
Metropolitan Status			19.59	<.001
Large Metro	14,381 (45.44%)	86 (36.29%)		
Small Metro	12,002 (37.93%)	87 (36.71%)		
Nonmetro	5,263 (16.63%)	64 (27.00%)		
Poverty Status			114.61	<.001
Living in Poverty	4,243 (13.41%)	86 (36.29%)		
Income Up to 2X Fed Pov Thresh	5,324 (16.82%)	47 (19.83%)		
Income More Than 2X Fed Pov Thresh	22,079 (69.77%)	104 (43.88%)		
Alcohol Use			33.29	<.001
1-90 days per year	19,617 (61.99%)	117 (49.37%)		
91-180 days per year	6,911 (21.84%)	54 (22.78%)		
181-270 days per year	3,127 (9.88%)	32 (13.50%)		
271-365 days per year	1,991 (6.29%)	34 (14.35%)		
Illicit Drug Use			219.29	<.001
Did not use in past year	21,011 (66.39%)	49 (20.68%)		
Used in past year	10,635 (33.61%)	188 (79.32%)		
Opioid Misuse			437.77	<.001
Did not misuse in the past year	30,546 (96.52%)	168 (70.89%)		
Misused in the past year	1,100 (3.48%)	69 (29.11%)		

Binary logistic regression with seeking both mental health and substance abuse treatment (2021)

Table 14 summarizes the results of the regression model. The findings of the overall binary logistic regression model were statistically significant with seeking both mental health and substance abuse treatment in 2021, $\chi^2(11) = 402.20$, $p < .001$, Nagelkerke $R^2 = .149$. Due to statistical significance of the collective model, the individual predictors were examined further.

Age (Wald = 23.45, $p < .001$, $OR = 2.22$) was a significant predictor, indicating that individuals who were 26+ years of age were 122% more likely to seek both mental health and substance use treatment in comparison to individuals who were aged 18-25 years.

Metropolitan status – large metro (Wald = 10.82, $p = .001$, $OR = 0.57$) was a significant predictor, indicating that individuals in large metros were 43% less likely to seek both mental health and substance abuse treatment in comparison to individuals in nonmetropolitan areas. Metropolitan status – small metro (Wald = 7.64, $p = .006$, $OR = 0.63$) was a significant predictor, indicating that individuals in small metros were 37% less likely to seek both mental health and substance abuse treatment in comparison to individuals in nonmetropolitan areas.

Poverty status – income up to 2x federal poverty threshold (Wald = 16.59, $p < .001$, $OR = 0.47$) was a significant predictor, indicating that individuals with income up to 2x the federal poverty threshold were 53% less likely to seek both mental health and substance abuse treatment in comparison to individuals living in poverty. Poverty status – income more than 2x federal poverty threshold (Wald = 64.29, $p < .001$, $OR = 0.29$) was a significant predictor, indicating that individuals in with income more than 2x the federal

poverty threshold were 71% less likely to seek both mental health and substance abuse treatment in comparison to individuals living in poverty.

Alcohol use – 271-365 days (Wald = 12.47, $p < .001$, $OR = 2.06$) was a significant predictor, indicating that individuals who used alcohol 271-365 days per year were 106% more likely to seek both mental health and substance abuse treatment in comparison to individuals who used alcohol 0-90 days.

Illicit drug use (Wald = 86.93, $p < .001$, $OR = 5.09$) was a significant predictor, indicating that individuals who used illicit drugs were 409% more likely to seek both mental health and substance abuse treatment in comparison to individuals who did not use illicit drugs.

Opioid misuse (Wald = 83.49, $p < .001$, $OR = 4.23$) was a significant predictor, indicating that individuals who misused opioids were 323% more likely to seek both mental health and substance abuse treatment in comparison to individuals who did not misuse opioids.

Table 14

Logistic Regressions with Age, Gender, Metropolitan Status, Alcohol Use, Illicit Drug Use, and Opioid Use Predicting Seeking Mental Health and Substance Abuse Treatment (2021)

Variable	B	SE	Wald Test	p	OR
Age (reference: 18-25 years)					
26+ years	0.80	0.16	23.45	< .001	2.22
Gender (reference: Male)					
Female	-0.04	0.13	0.11	.740	0.96
Metropolitan status (reference: Nonmetro)					
Large metro	-0.56	0.17	10.82	.001	0.57
Small metro	-0.47	0.17	7.64	.006	0.63
Poverty status (reference: Poverty level)					
Income up to 2X federal poverty threshold	-0.76	0.19	16.59	< .001	0.47
Income more Than 2X Federal poverty threshold	-1.25	0.16	64.29	< .001	0.29
Alcohol use (reference: 0-90 days)					
91-180 days	0.15	0.17	0.82	.365	1.16
181-270 days	0.31	0.21	2.32	.128	1.37
271-365 days	0.72	0.20	12.47	< .001	2.06
Illicit drug use (reference: No)					
Yes, used illicit drugs	1.63	0.17	86.93	< .001	5.09
Opioid Misuse (reference: No)					
Yes, misused opioids	1.44	0.16	83.49	< .001	4.23

Note. $X^2(11) = 402.20$, $p < .001$, Nagelkerke $R^2 = .149$.

Comparison of 2019 to 2021 Results

A series of binary logistic regression models were conducted results from the 2019 and 2021 results were then conducted to examine the predictive relationship of the 2019 and 2021 data between opioid misuse and seeking mental health treatment, while controlling for age, gender, metropolitan status, poverty status, alcohol use, and illicit drug use. Interaction terms were created by multiplying year (coded 1 = 2019 and 2 = 2021) by each independent variable.

RQ1: Is there a measurable impact of the COVID-19 pandemic on opioid misusers seeking mental health treatment in the in the year 2021 in adults while controlling for poverty status, alcohol use, illicit drug use, metropolitan status, age, and gender, when comparing to 2019?

$H_0 1$: There is not a statistically relevant difference between opioid misusers reporting seeking mental health treatment in the year 2021 in adults in the United States while controlling for poverty status, metropolitan status (large metropolitan, small metropolitan, and non-metropolitan), age, gender, alcohol use and illicit drug use, compared to 2019.

$H_a 1$: There is a statistically relevant difference between opioid misusers reporting seeking mental health treatment in the year 2021 in adults in the United States while controlling for poverty status, metropolitan status (large metropolitan, small metropolitan, and non-metropolitan), age, gender, alcohol use and illicit drug use, compared to 2019.

To address RQ1, a binary logistic regression with seeking mental health treatment was done. Table 15 summarizes the results of the regression model. The findings of the overall binary logistic regression model were statistically significant with seeking mental health treatment, $\chi^2(11) = 2{,}511.08$, $p < .001$, Nagelkerke $R^2 = .062$. Due to statistical significance of the collective model, the individual predictors were examined further.

Age

Year*Age (2021 and 26+ years; Wald = 108.45, $p < .001$, $OR = 0.88$) was a significant predictor, indicating that participants aged 26+ years in 2021 were 12% less likely to seek mental health treatment in comparison to 2019. This difference between the 2019 and 2021 data is potentially significant in that an inference can be made that the COVID-19 pandemic has negated some of the age-related differences in opioid misusers seeking mental health treatment and supports the hypothesis (H_a1) that there is a difference between adult opioid misusers reporting seeking mental health treatment in the year 2021 in the United States while controlling for age, compared to 2019.

Gender

Year*Gender (2021 and female; Wald = 1301.11, $p < .001$, $OR = 1.50$) was a significant predictor, indicating that females in 2021 were 50% more likely to seek mental health treatment in comparison to 2019. This significant predictive value of female gender between the 2019 and 2021 data can be attributed potentially to COVID-19 encouraging more male opioid misusers to seek mental health treatment, supporting the hypothesis (H_a1) that there is a difference between adult opioid misusers reporting

seeking mental health treatment in the year 2021 in the United States while controlling

for gender, compared to 2019.

Metropolitan Status

Year*Metropolitan status (2021 and large metro; Wald = 93.21, $p < .001$, $OR =$

0.85) was a significant predictor, indicating that participants in 2021 who lived in large

metros were 15% less likely to seek mental health treatment in comparison to 2019.

Year*Metropolitan status (2021 and small metro; Wald = 33.66, $p < .001$, $OR = 0.91$)

was a significant predictor, indicating that participants in 2021 who lived in small metros

were 9% less likely to seek mental health treatment in comparison to 2019. These

differences in significant predictive value of metropolitan status by year supports the

hypothesis (H_a1) that there is a difference between adult opioid misusers reporting

seeking mental health treatment in the year 2021 in the United States while controlling

for metropolitan status, compared to 2019.

Illicit Drug Use

Year*Illicit drug use (2021 and used illicit drugs; Wald = 641.22, $p < .001$, $OR =$

1.40) was a significant predictor, indicating that individuals who used illicit drugs in

2021 were 40% more likely to seek mental health treatment in comparison to 2019. This

change is statistically significant between 2019 and 2021, supporting the hypothesis (H_a1) that

there was a statistically relevant difference between opioid misusers reporting seeking

mental health treatment in the year 2021 in adults in the United States while controlling

for illicit drug use, compared to 2019.

Opioid Misuse

Year*Opioid use (Wald = 68.49, $p < .001$, $OR = 1.27$) was a significant predictor, indicating that individuals who used opioids in 2021 were 27% more likely to seek mental health treatment in comparison to 2019. This supports the hypothesis (H_a1) that there was a difference between adult opioid misusers reporting seeking mental health treatment in the year 2021 in the United States compared to 2019.

Alcohol Use

Year*Alcohol use (2021 and 91-180 days; Wald = 9.58, $p = .002$, $OR = 0.95$) was a significant predictor, indicating that individuals in 2021 who used alcohol 91-180 days per year were 5% less likely to seek mental health treatment in comparison to 2019. This is further support of the hypothesis (H_a1) that there is a difference between adult opioid misusers reporting seeking mental health treatment in the year 2021 in the United States while controlling for alcohol use to 2019.

Year*Alcohol use (2021 and 181-270 days; Wald = 2.18, $p = .140$, <u>$OR = 1.03$)</u> <u>and</u> Year*Alcohol use (2021 and 271 – 365 days; Wald = .58, $p = .445$, $OR = 1.43$) were not significant predictors, supporting the null hypothesis (H_o1).

Poverty Status

Year*Poverty status (2021 and income up to 2x federal poverty threshold; Wald = 55.35, $p < .001$, $OR = 0.85$) was a significant predictor, indicating that participants in 2021 who had income up to 2x the federal poverty threshold were 15% less likely to seek mental health treatment in comparison to 2019. Year*Poverty status (2021 and income more than 2x federal poverty threshold; Wald = 27.77, $p < .001$, $OR = 0.91$) was a

significant predictor, indicating that participants in 2021 who had income more than 2x

the federal poverty threshold were 9% less likely to seek mental health treatment in

comparison to 2019. This validates the hypothesis (H_a2) that there is a difference between

adult opioid misusers reporting seeking substance mental health treatment in the year

2021 in the United States while controlling for poverty status, compared to 2019.

Table 15
Logistic Regression Regressions with Interactions between Year and Independent
Variables Predicting Seeking Mental Health Treatment

Variable	B	SE	Wald Test	p	OR
Year*Age (2021 and 26+ years)	-0.13	0.01	108.45	<.001	0.88
Year*Gender (2021 and female)	0.40	0.01	1301.11	<.001	1.50
Year*Metropolitan status (2021 and large metro)	-0.16	0.02	93.21	<.001	0.85
Year*Metropolitan status (2021 and small metro)	-0.10	0.02	33.66	<.001	0.91
Year*Poverty status (2021 and Income up to 2X federal poverty threshold)	-0.16	0.02	55.35	<.001	0.85
Year*Poverty status (2021 and Income more than 2X federal poverty threshold)	-0.09	0.02	27.77	<.001	0.91
Year*Alcohol use (2021 and 91-180 days)	-0.05	0.02	9.58	.002	0.95
Year*Alcohol use (2021 and 181-270 days)	0.03	0.02	2.18	.140	1.03
Year*Alcohol use (2021 and 271-365 days)	-0.02	0.03	0.58	.445	0.98
Year*Illicit drug use (2021 and used illicit drugs)	0.34	0.01	641.22	<.001	1.40
Year*Opioid use (2021 and used opioids)	0.24	0.03	68.49	<.001	1.27

Note. $\chi^2(11) = 2511.08$, $p < .001$, Nagelkerke $R^2 = .062$.

RQ2: Is there a measurable impact of the COVID-19 pandemic on opioid misusers seeking substance abuse treatment in the year 2021 in adults while controlling for poverty status, alcohol use, illicit drug use, metropolitan status, age, and gender, when comparing to 2019?

$H_0$2: There is no statistically relevant difference between opioid misuse and seeking substance abuse treatment in the year 2021 in adults in the United States while controlling for poverty status, metropolitan status (large metropolitan, small metropolitan, and non-metropolitan), age, gender, alcohol use and illicit drug use, compared to 2019.

H_a2: There is a statistically relevant difference between opioid misuse and substance abuse treatment in the year 2021 in adults in the United States while controlling for poverty status, metropolitan status (large metropolitan, small metropolitan, and non-metropolitan), age, gender, alcohol use and illicit drug use, compared to 2019.

To address RQ2, a binary logistic regression with seeking substance abuse treatment was done. Table 16 summarizes the results of the regression model. The findings of the overall binary logistic regression model were statistically significant with seeking substance abuse treatment, $\chi^2(11) = 482.63$, $p < .001$, Nagelkerke $R^2 = .129$. Due to statistical significance of the collective model, the individual predictors were examined further.

Age

Year*Age (2021 and 26+ years; Wald $= 8.65$, $p = .003$, $OR = 1.22$) was a significant predictor, indicating that participants aged 26+ years in 2021 were 22% more likely to seek substance abuse treatment in comparison to 2019. This difference between

the 2019 and 2021 data is potentially significant in that an inference can be made that the COVID-19 pandemic has negated some of the age-related differences in opioid misusers seeking substance abuse treatment and supports the hypothesis (H_a2) that there is a difference between adult opioid misusers reporting seeking substance abuse treatment in the year 2021 in the United States while controlling for age, compared to 2019.

Gender

Year*Gender (2021 and Female; Wald = 38.54, $p < .001$, $OR = 0.65$) was a significant predictor, indicating that females in 2021 were 35% less likely to seek substance abuse treatment in comparison to 2019. This negative delta of 35% in the predictive value of female gender between the 2019 and 2021 data can be attributed potentially to COVID-19 encouraging more male opioid misusers to seek substance abuse treatment, supporting the hypothesis (H_a2) that there is a difference between adult opioid misusers reporting seeking substance abuse treatment in the year 2021 in the United States while controlling for gender, compared to 2019.

Poverty Status

Year*Poverty status (2021 and income more than 2x federal poverty threshold; Wald = 59.11, $p < .001$, $OR = 0.49$) was a significant predictor, indicating that participants in 2021 who had income more than 2x the federal poverty threshold were 51% less likely to seek substance abuse treatment in comparison to 2019. This is a statistically relevant confirmation of the hypothesis (H_a2) that there is a difference between adult opioid misusers reporting seeking substance abuse treatment in the year 2021 in the United States while controlling for poverty status, compared to 2019.

Year*Poverty status (2021 and Income up to 2X federal poverty threshold; Wald = .001, p = .933, OR = 0.99) was not a significant predictor.

Metropolitan Status

Year*Metropolitan status (2021 and large metro; Wald = 7.10, p = .008, OR = 0.78) was a significant predictor, indicating that participants in 2021 who lived in large metros were 22% less likely to seek substance abuse treatment in comparison to 2019. This change or delta supports the hypothesis (H_a2) that there is a difference between adult opioid misusers reporting seeking substance abuse treatment in the year 2021 in the United States while controlling for metropolitan status, compared to 2019.

Year*Metropolitan status (2021 and small metro; Wald = 3.77, p = .052, OR = 0.84) was not a significant predictor.

Illicit Drug Use

Year*Illicit drug use (Wald = 51.33, $p < .001$, OR = 1.90) was a significant predictor, indicating that individuals who used illicit drugs in 2021 were 90% more likely to seek substance abuse treatment in comparison to 2019. This was a significant change from 2019 to 2021, strongly supporting the hypothesis (H_a2) that there is a difference between adult opioid misusers reporting seeking substance abuse treatment in the year 2021 in the United States while controlling for metropolitan status, compared to 2019.

Opioid Misuse

Year*Opioid use (Wald = 164.84, $p < .001$, OR = 2.98) was a significant predictor, indicating that individuals who used opioids in 2021 were 198% more likely to seek substance abuse treatment in comparison to 2019. This significant change strongly

supports the hypothesis (H_a2) that there is a difference between adult opioid misusers reporting seeking substance abuse treatment in the year 2021 in the United States while controlling for metropolitan status, compared to 2019, which can be inferred as potentially a result of COVID-19.

Alcohol Use

Year*Alcohol use (2021 and 181-270 days; Wald = 5.74, p = .017, OR = 1.29) was a significant predictor, indicating that individuals in 2021 who used alcohol 181-270 days per year were 29% more likely to seek substance abuse treatment in comparison to 2019. This validates the hypothesis (H_a2) that there is a difference between adult opioid misusers reporting seeking substance abuse treatment in the year 2021 in the United States while controlling for alcohol use, compared to 2019.

Year*Alcohol use (2021 and 181-270 days; Wald = 2.18, p = .140, OR = 1.03) and Year*Alcohol use (2021 and 271 – 365 days; Wald = .58, p = .445, OR = 1.43) were not significant predictors, supporting the null hypothesis (H_o2).

Table 16

Logistic Regression Regressions with Interactions between Year and Independent

Variables Predicting Seeking Substance Abuse Treatment

Variable	B	SE	Wald Test	p	OR
Year*Age (2021 and 26+ years)	0.20	0.07	8.65	.003	1.22
Year*Gender (2021 and female)	-0.43	0.07	38.54	<.001	0.65
Year*Metropolitan status (2021 and large metro)	-0.25	0.09	7.10	.008	0.78
Year*Metropolitan status (2021 and small metro)	-0.18	0.09	3.77	.052	0.84
Year*Poverty status (2021 and Income up to 2X federal poverty threshold)	-0.01	0.09	0.01	.933	0.99
Year*Poverty status (2021 and Income more than 2X federal poverty threshold)	-0.72	0.09	59.11	<.001	0.49
Year*Alcohol use (2021 and 91-180 days)	0.08	0.09	0.79	.374	1.08
Year*Alcohol use (2021 and 181-270 days)	0.26	0.11	5.74	.017	1.29
Year*Alcohol use (2021 and 271-365 days)	0.20	0.13	2.30	.129	1.22
Year*Illicit drug use (2021 and used illicit drugs)	0.64	0.09	51.33	<.001	1.90
Year*Opioid use (2021 and used opioids)	1.09	0.09	164.84	<.001	2.98

Note. $\chi^2(11) = 482.63$, $p < .001$, Nagelkerke $R^2 = .129$.

RQ3: Is there a measurable impact of the COVID-19 pandemic on opioid misusers seeking both mental health treatment and substance abuse treatment in the year 2021 in adults in the United States while controlling for poverty status, alcohol use, illicit drug use, metropolitan status of county or residence, age, and gender, when comparing to 2019?

$H_0 3$: There is no statistically relevant difference between opioid misuse and seeking both mental health treatment and substance abuse treatment in adults in the United States while controlling for poverty status, metropolitan status (large metropolitan, small metropolitan, and non-metropolitan), age, gender, alcohol use and illicit drug use, compared to 2019.

$H_a 3$: There is a statistically relevant difference between opioid misuse and seeking both mental health treatment and substance abuse treatment in adults in the United States while controlling for poverty status, metropolitan status (large metropolitan, small metropolitan, and non-metropolitan), age, gender, alcohol use and illicit drug use, compared to 2019.

To address RQ3, a binary logistic regression with seeking mental health and substance abuse treatment was done. Table 17 summarizes the results of the regression model. The findings of the overall binary logistic regression model were statistically significant with seeking substance abuse treatment, $\chi^2(11) = 633.20$, $p < .001$, Nagelkerke $R^2 = .122$. Due to statistical significance of the collective model, the individual predictors were examined further.

Age

Year*Age (2021 and 26+ years; Wald = 9.36, p = .002, OR = 1.18) was a significant predictor, indicating that participants aged 26+ years in 2021 were 18% more likely to seek mental health and substance abuse treatment in comparison to 2019. This significant change supports the hypothesis (H_a3) that there was difference on adult opioid misusers reporting seeking both substance abuse and mental health treatment in the year 2021 in the United States while controlling for age compared to 2019, which can be inferred as potentially a result of COVID-19.

Gender

Year*Gender (2021 and Female; Wald = 8.78, p = .003, OR = 0.86) was a significant predictor, indicating that females in 2021 were 14% less likely to seek mental health and substance abuse treatment in comparison to 2019. This validates the hypothesis (H_a3) that there is a difference between adult opioid misusers reporting seeking both substance abuse and mental health treatment in the year 2021 in the United States while controlling for gender, compared to 2019.

Metropolitan Status

Year*Metropolitan status (2021 and large metro; Wald = 15.41, p < .001, OR = 0.75) was a significant predictor, indicating that participants in 2021 who lived in large metros were 25% less likely to seek mental health and substance abuse treatment in comparison to 2019. Year*Metropolitan status (2021 and small metro; Wald = 16.08, p < .001, OR = 0.74) was a significant predictor, indicating that participants in 2021 who lived in small metros were 26% less likely to seek mental and substance abuse treatment

in comparison to 2019. This supports the hypothesis (H_a3) that there was difference on adult opioid misusers reporting seeking both substance abuse and mental health treatment in the year 2021 in the United States while controlling for metropolitan status compared to 2019.

Poverty Status

Year*Poverty status (2021 and income up to 2x federal poverty threshold; Wald = 30.53, $p < .001$, $OR = 0.64$) was a significant predictor, indicating that participants in 2021 who had income up to 2x the federal poverty threshold were 36% less likely to seek mental and substance abuse treatment in comparison to 2019. Year*Poverty status (2021 and income more than 2x federal poverty threshold; Wald = 96.30, $p < .001$, $OR = 0.51$) was a significant predictor, indicating that participants in 2021 who had income more than 2x the federal poverty threshold were 49% less likely to seek mental health and substance abuse treatment in comparison to 2019. This is a statistically relevant confirmation of the hypothesis (H_a2) that there is a difference between adult opioid misusers reporting seeking both substance abuse and mental health treatment in the year 2021 in the United States while controlling for poverty status, compared to 2019.

Illicit Drug Use

Year*Illicit drug use (Wald = 149.57, $p < .001$, $OR = 2.36$) was a significant predictor, indicating that individuals who used illicit drugs in 2021 were 136% more likely to seek mental health and substance abuse treatment in comparison to 2019. This was a significant change from 2019 to 2021, strongly supporting the hypothesis (H_a3) that there is a difference between adult opioid misusers reporting seeking both substance abuse

and mental health treatment in the year 2021 in the United States while controlling for illicit drug use, compared to 2019.

Opioid Misuse

Year*Opioid use (Wald = 158.72, $p < .001$, $OR = 2.36$) was a significant predictor, indicating that individuals who used opioids in 2021 were 136% more likely to seek mental health and substance abuse treatment in comparison to 2019. This supports the hypothesis (H_a3) that there is a difference between adult opioid misusers reporting seeking both substance abuse and mental health treatment in the year 2021 in the United States compared to 2019, which can be inferred as potentially a result of COVID-19.

Alcohol Use

Year*Alcohol use (2021 and 181-270 days; Wald = 4.20, $p = .040$, $OR = 1.20$) was a significant predictor, indicating that individuals in 2021 who used alcohol 181-270 days per year were 20% more likely to seek mental health and substance abuse treatment in comparison to 2019. Year*Alcohol use (2021 and 271-365 days; Wald = 15.56, $p < .001$, $OR = 1.44$) was an even more significant predictor, indicating that individuals in 2021 who used alcohol 271-365 days per year were 44% more likely to seek mental health and substance abuse treatment in comparison to 2019. This supports the hypothesis (H_a3) that there was a change in the predictive impact of alcohol use on opioid abusers seeking both substance abuse and mental health treatment when comparing 2019 with 2021. Year*Alcohol use (2021 and 91-180 days; Wald = .01, $p = .936$, $OR = 1.01$) was not a significant predictor.

Table 17

Logistic Regression Regressions with Interactions between Year and Independent Variables Predicting Seeking Mental and Substance Abuse Treatment

Variable	B	SE	Wald Test	p	OR
Year*Age (2021 and 26+ years)	0.16	0.05	9.36	<.001	1.18
Year*Gender (2021 and female)	-0.15	0.05	8.78	<.001	0.86
Year*Metropolitan status (2021 and large metro)	-0.29	0.07	15.41	<.001	0.75
Year*Metropolitan status (2021 and small metro)	-0.29	0.07	16.08	<.001	0.74
Year*Poverty status (2021 and Income up to 2X federal poverty threshold)	-0.45	0.08	30.53	<.001	0.64
Year*Poverty status (2021 and Income more than 2X federal poverty threshold)	-0.67	0.07	96.30	<.001	0.51
Year*Alcohol use (2021 and 91-180 days)	0.01	0.07	0.01	.936	1.01
Year*Alcohol use (2021 and 181-270 days)	0.18	0.09	4.20	.040	1.20
Year*Alcohol use (2021 and 271-365 days)	0.36	0.09	15.56	<.001	1.44
Year*Illicit drug use (2021 and used illicit drugs)	0.86	0.07	149.57	<.001	2.36
Year*Opioid use (2021 and used opioids)	0.86	0.07	158.72	<.001	2.36

Note. $\chi^2(11) = 633.20$, $p < .001$, Nagelkerke $R^2 = .122$.

Summary of Comparison of 2019 to 2021 Results

In comparing the data from the 2019 and 2021 surveys of reported opioid misusers to determine the potentially identifiable impact of the COVID-19 pandemic on seeking mental health, substance abuse and both mental health and substance abuse treatment, the covariates had a measurable impact from 2019 to 2021, as described above. The potential utility and contribution of this information to the existing body of knowledge will be discussed in Section 4.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

The purpose of this cross-sectional quantitative study was to evaluate whether there was a measurable impact of the COVID-19 pandemic on opioid misusers seeking mental health and substance abuse treatment, comparing national data collected via surveys by the Substance Abuse and Mental Health Services Administration from 2019 and 2021, to identify if there were differences that could contribute to refining the existing public health efforts to positively impact opioid misusers, while considering age, gender, alcohol use, illicit drug use, poverty status and metropolitan status of the county of residence.

Key Findings

When comparing the results of the data analysis of the data from the surveys from 2019 and 2021, several key findings were noted. These findings are described below by covariate and research question.

Age

The key findings include that the age of opioid misusing adults over the age of 25 were more likely to seek mental health treatment, RQ1, or substance abuse treatment, RQ2, than those ages 18 to 25 in 2019, but age was not a significant predictor in seeking mental health treatment or substance abuse treatment in 2021, RQ1 or RQ2. When asked about seeking both mental health and substance abuse treatment, RQ3 age was a significant predictor in 2021, resulting in the predictive value the subjects 26 years of age

or more were 122% more likely to seek both mental health and substance use treatment in comparison to individuals ages 18 to 25 years.

Survey respondents aged 26+ years in 2021 were 12% less likely to seek mental health treatment, 22% more likely to seek substance abuse treatment, and 18% more likely to seek mental and substance abuse treatment compared to 2019.

Gender

Gender was a predictor of seeking either mental health treatment, RQ1, with females reportedly being significantly more likely to seek mental health treatment in both 2019 and 2021, but the predictability declined from 168% more likely than males in 2019 to 150% in 2021. Females were less likely to seek substance abuse treatment, RQ2, compared to males in both 2019 and 2021, but this was a stronger predictor, 55% less for females compared to males in 2019, then in 2021, which is was 46% less predictive. In both 2019 and 2021, gender was not a significant predictor of opioid misusers seeking both mental health and substance abuse treatment, RQ3.

Survey respondents female survey respondents in 2021 were 50% more likely to seek mental health treatment, 35% less likely to seek substance abuse treatment, and 14% less likely to seek mental and substance abuse treatment in comparison to 2019.

Metropolitan Status

Respondents in large metro areas were less likely than those in non-metropolitan areas to seek mental health treatment, RQ1, in both 2019 and 2021, with there being a change from being 18% predictive of less likelihood of seeking mental health treatment in 2019 and only 8% less likely in 2021. Large metropolitan residents who identified as

opioid misusers were 45% less likely to seek substance abuse treatment, RQ2, while in 2019 it was not a significant predictor. For opioid misusers seeking both mental health and substance abuse treatment, RQ3, in 2021 a significant predictor, being 43% less likely compared to those in nonmetropolitan areas. Small metro residence was a negative predictor of 37% compared to nonmetropolitan areas in 2021, while it was not predictive in 2019.

Survey respondents in 2021 who lived in large metros were 15% less likely to seek mental health treatment, 22% less likely to seek substance abuse treatment, and 25% less likely to seek mental and substance abuse treatment in comparison to 2019. Survey respondents in 2021 that lived in small metros were 9% less likely to seek mental health treatment and 26% less likely to seek mental and substance abuse treatment in comparison to 2019.

Illicit Drug Use

Illicit drug use was a significant predictor of seeking mental health treatment, RQ1, substance abuse treatment, RQ2, as well as seeking both mental health and substance abuse treatment, RQ3. There was not a significant difference in predictive value regarding RQ1 between 2019 and 2021, while regarding RQ2 and RQ3, illicit drug was a stronger predictor in than in 2019 and a stronger predictor in 2021, respectively.

Survey respondents who reported using illicit drugs in 2021 were 40% more likely to seek mental health treatment, 90% more likely to seek substance abuse treatment, and 136% more likely to seek mental and substance abuse treatment in comparison to 2019.

Opioid Misuse

Opioid misuse was a significant predictor of seeking mental health treatment, RQ1, seeking substance abuse treatment, RQ3, and seeking both mental health and substance abuse treatment, RQ3, in both 2019 and 2021. For all three research questions, the predictive significance was greater in 2021 than 2019.

Survey respondents who reported using opioids in 2021 were 27% more likely to seek mental health treatment, 198% more likely to seek substance abuse treatment, and 136% more likely to seek mental and substance abuse treatment in comparison to 2019.

Alcohol Use

Alcohol use reported in 2021 was a significant predictor of seeking mental health treatment, RQ1, but not significant in 2019, and not significant in seeking substance abuse treatment, RQ2, in both 2019 and 2021. In 2019 and 2021 alcohol use was a significant predictor in seeking both mental health and substance abuse treatment, RQ3, and in 2021 the predictive strength was greater at all ranges of days of alcohol use compared to those ranges in 2019.

Survey respondents who reported using alcohol 91-180 days in 2021 were 5% less likely to seek mental health treatment, those that reported using alcohol 181-270 days in 2021 were 29% more likely to seek substance abuse treatment, and those that reported using alcohol 181-270 days in 2021 were 20% more likely to seek mental and substance abuse treatment in comparison to 2019. Those respondents that reported using alcohol 271-365 days in 2021 were 44% more likely to seek mental and substance abuse treatment in comparison to 2019.

Poverty Status

Poverty status, specifically those opioid misusers that reported an income of more than two times the federal poverty threshold, was a significant predictor in both 2019 and 2021 of seeking substance abuse treatment, RQ2, and seeking both mental health and substance abuse treatment, RQ3, in both 2019 and 2021. In both years the responders with more than twice the federal poverty threshold of income was less likely to seek both mental health and substance abuse treatment, in 2019 being 51% and in 2021 being 71%. Responders with a reported poverty status up to two times the federal poverty level was 51% in 2019 and 53% in 2021 less likely to seek both mental health and substance abuse treatment.

Survey respondents who reported income up to 2x the federal poverty threshold were 15% less likely to seek mental health treatment, 36% less likely to seek mental health and substance abuse treatment in 2021 in comparison to 2019. Survey respondents who reported income more than 2x the federal poverty threshold were 9% less likely to seek mental health treatment, 51% less likely to seek substance abuse treatment, and 49% less likely to seek mental and substance abuse treatment in 2021 in comparison to 2019.

Interpretation of the Findings

The study results provide implications, based primarily on the differences of results from the data collected for 2019 and 2021, that COVID-19 may have had a measurable impact on opioid misusers seeking both mental health and substance abuse treatment. When examining the covariates and their impact on the predictive significance of opioid misusers seeking mental health treatment, substance abuse treatment, or both, it

is worth revisiting the study conducted by Bennett et al. (2022) discussed in Section 1 of this study. Bennett et al. (2022) identified the potential impact of the COVID-19 pandemic on mental health treatment access in New York City of illicit opioid abusers for a period from 2020 to 2021. I expanded this in part to include the relevance and predictive strength of multiple other factors.

When considering the covariates of age and gender, while both were significant predictors for seeking mental health treatment and substance abuse treatment, it was not significantly altered in the comparison of 2019 and 2021. The other covariates, metropolitan status of residence, poverty status, opioid misuse, and alcohol use all had stronger predictive values in 2021 compared to 2019.

In this study grounded in the social-ecological framework, I determined that there were measurable geographical and economic influences, the covariates, that were potentially impacted by COVID-19 as well. Structural and social determinants of health impacting opioid misusers are also evaluated by this study, identifying impactful influences including economic and environmental factors.

Limitations of the Study

There were several limitations of this study. First was that I compared data from 2019, pre-pandemic, and 2021, which was during the pandemic, while 2022 is generally considered the year in which the COVID-19 pandemic became endemic and no longer pandemic at the conclusion of the calendar year and was officially declared so by the World Health Organization in 2023. (Sarker et al., 2023). The results of the comparison of results from the two years make inferences that COVID-19 impacted the results from

2021, with the potential for other influences not being measured. This can result in an ecological fallacy, falsely inferring or attributing impact or influence (Ya-Chen et al., 2023).

The secondary data source that I used is the source of the other potential limitations. The survey by SAMSA (Substance Abuse and Mental Health Services Administration, 2020; Substance Abuse and Mental Health Services Administration, 2023) is an annual survey, and the 2 years of data compared have potentially different respondents per year. The survey also allowed only for binary gender response; the gender question allowed only for the self-identification of "male" or "female," and these binary answer choices might cofound the answers and/or even potentially deter participants in the survey. The dataset itself is also very large, which has the potential to dilute the significance of outcomes (Faber & Fonseca, 2014).

There are potential methodological limitations regarding the dataset itself, including the potential data collection method biases; interviews and computer-assisted, in-person versus hybrid method. The respondent's data were self-reported, which can result in biased results as a result of the reporting itself as well as the interpretation of the reporter of the question being asked, for example the interviewee's definition of "opioid misuse."

Recommendations

Further study is certainly indicated by this study. A more detailed study that looks at data on a more granular level not currently available, such as a single state, is warranted. Collecting additional data regarding the perceived or actual impact of the

COVID-19 pandemic, and perhaps the impact of COVID-19 specifically collected regarding the impact of COVID-19 on opioid misusers and the potential barriers associated with seeking mental health treatment and substance abuse treatment, would enhance the results and advance the utility of this study.

Implications for Professional Practice and Social Change

The social change and professional practice implications of this study include providing justification for the redistribution and modification of existing programs and resources in the public health services directed at opioid misuse. This study could provide additional justification for increasing or redirecting mental health and substance abuse treatment resources to those that would benefit the most from it, and hopefully reduce the incident and impact of opioid misuse on more people and vulnerable populations. The results may also support or refute the targeting of specific regional/geographic and socioeconomic for specific interventions and provision of resources to combat the misuse of opioids and its consequences.

This study is significant in that the epidemic of opioid misuse, despite being identified as an ongoing public health threat that is being addressed, continues to adversely impact not only the physical health but the mental health of those suffering from the disease of opioid addiction. If quantified, the impact on opioid misuse of the impact of changes to access to treatments and resource availability may contribute to the body of knowledge. This additional information can be used to modify existing available services and justify the continued efforts to expand access to care for mental health and substance abuse treatments. This has the potential to allow for a more targeted or focused

approach to programs based on age, gender, population density and poverty status. These influencing or contributory factors of opioid misuse can be used to generate, focus and support increased efforts to educate the public and regional public health professionals regarding the determinants of health related to opioid use, and potentially improve the impact of efforts to mitigate opioid misuse.

Given the significant impact of opioid misuse continuing despite the efforts to combat it, and the societal impact of the opioid pandemic and the impact of social factors on the opioid pandemic (Jalali et al, 2020) the social change impact can be viewed from both the opioid misuse impacting society and the societal impact on opioid misuse perspectives. This study also contributes to the body of knowledge regarding access to care for mental health and substance abuse treatments, including the justification for increasing or redirecting mental health and substance abuse resources to those that would benefit the most from it. My hope is that the results can be used to reduce the incident and impact of opioid misuse on more people and vulnerable populations, providing justification for the redistribution and modification of existing programs and resources in the public health services directed at opioid misuse. The results may also support or refute the targeting of specific regional/geographic and socioeconomic for specific interventions and provision of resources to combat the misuse of opioids and its consequences.

Conclusion

Opioid misuse continues to significantly impact the health of the public, despite significant and ongoing assessment and enactment of interventions targeting myriad

contributory factors. In 2019 there were over 49,000 opioid-involved deaths in the United States, and over 80,000 in 2021, as per the Centers for Disease Control and Prevention (National Institutes of Health – National Institute on Drug Abuse, 2023). It is worth continuing to investigate opioid misuse and investing in more research into the factors that contribute to not only the opioid epidemic itself, but also the inter-related factors of seeking mental health and substance abuse treatment. By further evaluating the potential impacts of public health events such as pandemics and quantifying the predictive values, or lack thereof, of some of the myriad socioeconomic factors, there is the potential to advance the knowledge of potential impacts of and justify the allocation of funding and focus of future public health research and efforts targeting opioid misuse.

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