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Eastern Kentucky University

The Underlying Determinants and Impacts of the Substance Abuse Crisis in Knox, Whitley,
and Laurel Counties

Honors Thesis

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Abstract

The Underlying Determinants and Impacts of the Substance Abuse Crisis in Knox, Whitley,
and Laurel Counties

Mikaela Rhodes

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Substance use has become a growing problem on a national, statewide, and local level. While the commonwealth of Kentucky has astonishing rates of substance use and abuse, the areas of Knox, Whitley, and Laurel counties of Kentucky are observing similar results within county lines.

There are many social determinants that could potentially lead an individual to substance use or abuse which can often be unique to an area as well as the adverse effects of substance abuse on a community. Interviews were conducted with individuals in professions that directly relate to the substance abuse crisis in Knox, Whitley, and Laurel counties. Participants identified depression, easy access to prescription drugs, poverty, and family values and morals as potential determinants that lead individuals to substance use or abuse in Knox, Whitley, and Laurel counties. Participants identified children and families of substance abusers as the individuals that suffer the most as a result of substance abuse. Participants also identified employment, the economy, officer safety, safety of the general public, and other aspects of the community as being directly affected by substance abuse. Findings from the study were consistent with current literature.

Keywords: Drug abuse, impacts, determinants, social determinants, substance abuse, substance use, rural populations, drug use, effects.

Background

As of Memorial Day 2017, there were 58,318 names inscribed on the Vietnam Memorial in Washington D.C. This memorial commemorates military personnel that lost their lives during the Vietnam War and personnel that were injured and later died of their injuries. In 2017 alone, 70,237 people died as a result of drug overdose in the United States (National Institute on Drug Abuse, 2019). Every year, America is losing more people to drug overdose than were lost in the Vietnam War. In addition to lives lost to drug overdose, there are approximately 20.1 million Americans suffering from a form of substance use disorder, as reported by the National Survey on Drug Abuse and Health (Ahrnsbrak et al, 2016). 7.4 of the 20.1 million people suffering from substance abuse disorder were suffering specifically from a drug use disorder (Ahrnsbrak et al, 2016). Nationally, America's drug problem is growing exponentially with overdose rates and prevalence of drug use disorder increasing with each calendar year. Not only is drug abuse on the rise nationally, but in the Commonwealth of Kentucky as well. In 2017, 1,468 people died as a result of drug overdose in Kentucky alone (Tilley & Ingram, 2017). Kentucky ranks in the top ten states with the highest opioid related deaths (National Institute on Drug Abuse, 2018). In 2016, the opioid overdose rate in Kentucky was 23.6 deaths per 100,000 people which was nearly double the national average (National Institute on Drug Abuse, 2018). Among Kentucky counties, those affected significantly by drug abuse are Knox, Whitey, and Laurel counties. These areas are primarily rural, however they have some of the highest rates of drug overdose per 100,000 residents. In 2017, Knox county had an overdose rate of 41.6 overdoses per 100,000 residents. Whitley county had an overdose rate of 33.1 overdoses per 100,000 residents. Lastly, Laurel county had an overdose rate of 18.3 overdoses per 100,000 people (Tilley & Ingram, 2017). This data can be found in Figure 1. Drug abuse is particularly common in these areas

which results from a series of potential determinants that are unique to the specific geographic regions. These potential determinants can be characterized as reasons or circumstances that have led one to substance use or abuse. Not only are there isolated determinants of substance abuse in these areas, but drug abuse has distinctive effects on the specific communities. There are unique determinants that commonly lead individuals to substance abuse in Knox, Whitley, and Laurel counties, which in return has adverse effects on the community.

In Knox, Whitley, and Laurel counties, there are particular drugs that are most commonly abused. Methamphetamine and prescription opioids are the most common drugs of choice. Prescription opioids are frequently abused in both medical and non-medical settings. In addition to methamphetamine and prescription opioids, the rural areas of southeastern Kentucky are beginning to experience a higher prevalence of heroin use which is currently ravaging bigger cities such as Lexington and Louisville. Methamphetamine and heroin are illicit drugs which makes them illegal to possess and use, which contributes to an increased amount of arrests. Prescription drugs are legal with a prescription from a physician, however there are an influx of prescription drugs available on street markets which results in increases in non-medical use of prescription drugs as well as more arrests due to possession of prescription drugs without obtaining a prescription. In 2017, the Kentucky State Police reported 1,033 drug-related arrests in Knox county alone. Of these arrests, 183 were methamphetamine related, 3 were heroin related, and 718 were a combination of prescription drug and synthetic narcotic related. The Kentucky State Police conducted 1,863 drug-related arrests in Laurel county in 2017. 345 of those arrests were methamphetamine related, 10 were heroin related, and 1,085 of the arrests were related to prescription drugs and synthetic narcotics. Lastly, the Kentucky State Police

reported 640 drug-related arrests in Whitley county. Of these arrests, 48 were methamphetamine related and 388 were prescription drug and synthetic narcotic related (Kentucky State Police).

Various drugs affect the body in different ways, however their general mechanisms are the same. In a very general sense, drugs that are commonly abused employ their reinforcing effects by triggering rushes of dopamine and initiate reinforcing effects by activating the reward circuits in the brain. This creates the overall euphoric effect felt by drug users. While initial drug experimentation is a largely voluntary act, persistent drug use impairs brain function by interfering with brain's capacity to exert self-control over drug-taking behaviors, which in return renders the brain more sensitive to stress and negative moods (Volkow & Morales, 2015).

Opioids have relieved more human suffering than any other medication, however their use is still fraught with significant misuse, abuse, and addiction. Opioids attach to the opioid receptors of the brain. Once attached, they signal the brain which is called the "opioid effect." As a result of this, pain is blocked, breathing slows, and a general calming effect is felt by the body as well as an anti-depressant effect occurs. The human body naturally produces opioids, however they are not enough to stop chronic or strong pain. Prescription opioids mimic that of the natural opioids produced by the body which allows for activation of receptors. While the prescription opioids are very similar to the body's naturally produced opioids, they do not activate nerve cells in the same manner as natural neurotransmitters, which results in abnormal messages being transmitted through the network. The brain's reward circuit is flooded with dopamine, in return creating the sense of euphoria sought by chronic drug users. If a prescription opioid is administered in excess of need because of overdose, pharmacokinetic variables, or treating an individual without pain, then the body will react to perturbation by engaging opponent processes in the domains of both pain and negative emotional states (Shurman, Koob, & Gutstein, 2010). Heroin affects and

works on the receptors in the same method as prescription opioids, which supports the growing evidence that suggests a relationship between increased non-medical use of opioid analgesics and heroin use in the United States (Volkow, 2014). Excessive opioid use is hypothesized to disrupt the homeostatic regulation of emotional behavior, compromising neural substrates mediating positive emotional reward states and augmenting neural substrates mediating negative emotional states (Shurman, Koob, & Gutstein, 2010). Opiate addicts are generally prone to comorbidities, including neurological disease due to the toxic effects of the drug, the combined use of opiates and other neurotoxic substances, infections, bacteria from intravenous drug use, atherosclerosis from smoking or hyperlipidemia, trauma, reduced primitive reflexes during intoxication, compression neuropathies, rhabdomyolysis, or rhythm abnormalities and heart failure (Paur, Wallner, Hermann, Stollberger, & Finsterer, 2012).

In addition to the abuse of prescription opioids being commonly abused in Knox, Whitley, and Laurel counties, methamphetamine is also an extremely common drug of choice among residents of these areas. Methamphetamine is classified as a stimulant drug. Methamphetamine floods the brain with dopamine, which is the neurotransmitter that produces the feeling of pleasure. It overstimulates the brain which results in an extreme rush followed by a very intense, rebound low. Meth also initiates changes to the brain that alter the user's ability to experience pleasure. Methamphetamine is arguably one of the most addictive illicit drugs. In a very simple sense, methamphetamine trains the brain to see the drug as the only way to feel good, no matter the repercussions of use. Methamphetamine use can quickly result in increased tolerance which sets the precedence for a cycle of dependence (Meth Project, 2016). Long-term methamphetamine abuse can produce a large spectrum of psychiatric symptoms, including psychosis, depression, anxiety, and aggression, under conditions of intoxication and withdrawal.

These psychiatric states can be prolonged in the form of residual symptoms, and are easily exacerbated in some long-term abusers by methamphetamine reuse or by psychological stress (Sekine et al, 2006).

Behind every story of drug abuse, there are a series of potential determinants that lead the individual to the point of drug use. These potential determinants can be related to a geographical region, family circumstances, or socioeconomic status. The factors impacting substance use are multifaceted and complex. They also include environmental, interpersonal, social and individual level risks (Wu, Zerden, & Wu, 2016). Knox, Whitley, and Laurel counties are primarily rural which creates unique determinants such as poverty, unemployment, and close family kinship that could potentially lead an individual to drug use. These areas also have high levels of poverty and child abuse, which has been linked to adverse effects as children transition into adulthood. Drugs in these areas are readily available which could also be a contributing factor to the increased amount of drug use. Knox, Whitley, and Laurel counties are relatively close to an interstate system which allows for more drugs circulating through county lines. In addition, these areas have much higher dispensing and prescribing rates in terms of prescription opioids. In many cases, a series of potential social determinants could have played a role in an individual's drug use history. In addition to unique determinants that lead an individual to substance use, there are also unique effects that drug use has on the areas of Knox, Whitley, and Laurel counties. Drug abuse affects nearly every aspect of the community. Drug use affects children in the area, law enforcement officials, local court systems, the local economy, etc.

There are many social determinants that can potentially lead individuals to substance use or abuse in Knox, Whitley, and Laurel counties. Social determinants of health are condition in which people are born, live, learn, work, and age that affect a wide range of health, functioning,

quality-of-life and risks (Healthy People 2020). The social determinants of health create social and physical circumstances and environments promote good health for individuals of all races, ethnicities, and orientations. The social determinants of health include economic stability, neighborhood and built environment, health and healthcare, education, and social and community context. Economic stability refers to key concepts such as poverty, food insecurity, housing instability, and employment. The education determinant includes subparts such as early childhood development and education, higher education enrollment, high school graduation, language, and literacy. The social and community context concept includes civic participation, discrimination, incarceration, and social cohesion. The health and healthcare aspect of the social determinants of health include concepts like access to healthcare, health literacy, and access to primary care. Lastly, the neighborhood and built environment subpart contains concepts such as access to healthy foods, crime and violence, environmental conditions, and quality of housing (Healthy People 2020). Overall, the purpose of the study was to examine the potential social determinants that lead an individual to substance use or abuse in Knox, Whitley, and Laurel counties, as well as evaluating the effects that substance abuse has on each community.

Methods

Prior to beginning the study, IRB approval was sought from the Institutional Review Board at Eastern Kentucky University. Upon approval by the Institutional Review Board, participants were then identified based on their occupation and how it relates to the substance abuse crisis in Knox, Whitley, and Laurel counties. Participants identified ranged from law enforcement officials to elementary school faculty. An interview script was formed using questions that related to substance use determinants and effects on the community. Sample

questions are found in Table 1. Upon consent from potential participants, interviews were conducted at a mutually agreeable public location.

Results

Full results can be found in Table 1. All 5 participants identified poverty or the economy as potential determinant that commonly leads individuals to substance use or abuse in Knox, Whitley, and Laurel counties. All 5 participants stated that depression and desperation are circumstances that commonly lead individuals to substance use or abuse. 4 of the 5 participants identified the easy access to both prescription and illicit drugs in Knox, Whitley, and Laurel counties as a potential circumstance that commonly leads individuals to substance use or abuse. All 5 participants identified family values and history as a contributing factor to substance use and abuse in Knox, Whitley, and Laurel counties. Only 4 participants answered the questions regarding the effects of substance abuse and its communal effects. The 4 participants identified family members and children as the individuals that suffer the most as a result of substance abuse. Participants identified many aspects of the community that are affected as a result of substance abuse. These areas include law enforcement safety, the economy, levels of unemployment, safety of the general public, rates of crime, the criminal justice system, and the rate of homelessness.

Discussion

Many studies have linked the correlation between poverty and drug use (Nurco & Farrell, 1975). A recent study examined the correlation between childhood welfare participation and the prevalence of adulthood substance use (Wu, Zerden, & Wu, 2016). This particular study used survey data from the National Longitudinal Study of Adolescent to Adult Health, which is a

longitudinal study of a nationally represented cohort survey of 7th-12th grade students. The study tracked varying characteristics and parameters in the areas of social, psychological, economic, and physical well-being dimensions throughout adulthood. Ultimately, the study found that adolescents whose families had received welfare benefits before the age of 18 had a 30% lower chance of remaining free of marijuana use throughout adulthood (Wu, Zerden, & Wu, 2016). This was in comparison to children whose families had not received welfare benefits prior to their 18th birthday. In a similar fashion, the study also found that adolescents with prior welfare experiences before the age of 18 had a 16% lower chance of remaining free of other illicit drug use throughout adulthood (Wu, Zerden, & Wu, 2016). This was also in comparison to children whose families had not received welfare benefits before the age of 18.

The results of this study emphasize the long-term behavioral health risks of young adults whose families participated in welfare programs before the age of 18. The study also highlights the various risks of and protective factors that influence substance use into adulthood among adults who participated in welfare before the age of 18. The factors impacting substance use are multifaceted and complex. They also include environmental, interpersonal, social and individual level risks. However, it is important to note that participation in welfare is only a causal mechanism that can impact the rates of illicit drug use as one ages (Wu, Zerden, & Wu, 2016). From this study, it can be observed that there is a strong correlation between poverty, welfare participation, and substance use. This study can be directly applied to the areas of Knox, Whitley, and Laurel counties. These areas are primarily rural and high-poverty (Figure 2) which can often be correlated with increased welfare participation. Although poverty and welfare participation play strong roles in circumstances that may potentially lead one to substance use,

there are many more determinants to consider such as family structure, depression and mental health status, and experiences with trauma.

Knox Whitley and Laurel counties have increased levels of poverty, which in return, increases the likelihood that families may receive welfare benefits. Many of these areas also qualify to be considered as a high poverty area. A high poverty area is defined as a census tract in which 20% or more of the population lives below the national poverty line (Children living in high-poverty areas in Kentucky, 2018a). The Kids Count Data Center uses this criteria along with Census information to construct 5-year poverty estimates for each county in Kentucky. For the time interval 2012-2016, the Kids Count Data Center reported that 100% of children under the age of 18 living in Knox county were living in a high-poverty area. 100% of children under the age of 18 living in Whitley county were also living in a high-poverty area. The case was slightly different in Laurel county as 53% of children lived in a high-poverty area. This data can be found in Figure 2. With such substantial amounts of poverty in these areas, the chances of receiving a form of government aid, such as types of welfare, increases at a high rate. Poverty and welfare experiences are linked to more prevalent drug use (Wu, Zerden, & Wu, 2016), which can be directly applied to the areas of Knox, Whitley, and Laurel counties based on their county wide poverty levels.

There are many social determinants that can potentially play a role in substance use or abuse among the populations of Knox, Whitley, and Laurel counties. Poverty has direct links to substance abuse throughout adolescence and adulthood. In addition, depression can also be identified as a potential determinant in an individual's substance use disorder. A study examined the prevalence of Major Depressive Disorder, or MDD and either alcohol use disorder or drug use disorder (Deykin, Levy, & Wells, 1987). This study was a cross sectional study designed to

identify manifestations and correlations of major depressive disorder among adolescents. Participants in the study consisted of college aged students ranging from ages 16 to 19 that were attending different Boston colleges. A mail in survey was distributed and data was collected from the survey using the Diagnostic Interview Schedule or DIS. The study also used DSM III criteria to evaluate mental health disorders. The study ultimately found that college aged students who met the criteria for MDD and for either drug use or alcohol use disorders were almost always subject to the depressive illness first and the substance use disorder subsequently. More specifically, 79% of the drug or alcohol abusers in the study had another primary psychiatric disorder prior to the development of drug or alcohol use disorder (Deykin, Levy, & Wells, 1987). The findings of this study are consistent with the “self-medication” hypothesis that is associated with undiagnosed or untreated mental health problems.

The state of Kentucky has been recognized nationally for its average poor mental health among its residents. The Foundation For a Healthy Kentucky produced a survey in 2017, that simply asked if the responder knew someone suffering from a serious depression. 49% of respondents replied that they knew someone suffering from a serious depression (Foundation for a Healthy Kentucky, 2017). Not only is Kentucky ranked poorly in terms of mental health, but the areas of Knox, Whitley, and Laurel counties have been associated with poor mental health as well. Poor mental health days are often used as a measure to express mental health status. A poor mental health day is simply a self-reported day that a person feels mentally unhealthy. In 2019, the state of Kentucky averaged 4.8 poor mental health days. During the same year, Knox county averaged 5.8 poor mental health days. Laurel county averaged 4.6 poor mental health days. Lastly, Whitley county averaged 5.0 poor mental health days in 2019 (County Health Rankings, 2019). In addition to the overall high rates of self-reported poor mental health, rural areas

typically do not have access to mental health services (Thornton & Deitz-Allyn, 2010) . Many people living in this area only have access to a primary care or emergency department physician, both of which are not properly trained to treat mental health problems. With such high poverty in Knox, Whitley, and Laurel counties, individuals in these areas would probably not be able to afford the services offered by many mental healthcare professionals. This can lead to undiagnosed and untreated mental health problems, which may result in the self-medication in the form of drugs or alcohol (Keyes, Cerda, Brady, Havens, & Galea, 2014).

Both depression and poverty serve as potential social determinants that may lead an individual to drug use or abuse. The increased access to prescription drugs proposes a major influence on the growing drug problem in Knox, Whitley, and Laurel counties. When prescription drugs are easier to obtain, more prescription drugs emerge in street markets which results in more people using prescription opioids for non-medical use. A recent study discussed the risk factors that drive illicit use of prescription opioids in rural populations. This study mentioned aspects such as lower perceptions of harm, self-medication for pain, close social and kinship networks, stressors of living a rural lifestyle, and the increased access to drugs. Prescription opioids have become widely available since they were introduced to the medical community in the early 1990's (Keyes, Cerda, Brady, Havens, & Galea, 2014). In fact, they have become so widely available that by 2012, enough prescription opioids were sold to medicate every adult in the United States with a dosage of 5 milligrams of hydrocodone every 4 hours for 1 month (Keyes, Cerda, Brady, Havens, & Galea, 2014). There is no shortage of prescription opioids in rural populations which eventually leads to sharing or selling of prescription opioids. Studies indicate that the majority of adults who use opioids nonmedically obtain them from friends and relatives or from street-level dealers(Keyes, Cerda, Brady, Havens, & Galea, 2014).

This eventually results in a substantial proportion of overdose deaths and emergency department visits among individuals who have never received a prescription for opioids (Keyes, Cerda, Brady, Havens, & Galea, 2014).

The areas of Knox, Whitley, and Laurel show trends of overprescribing of prescription opioids which in return results in more opioids being used for non-medical purposes. In 2014, 10.3 million people in America reported using prescription opioids nonmedically (Compton, Jones, & Baldwin, 2016). The Kentucky All Schedule Electronic Reporting database or KASPER is an effective controlled substance prescription monitoring system that provides information to assist physicians and pharmacists in providing medical and pharmaceutical patient care using controlled substance medications. KASPER is also used as an investigative tool for law enforcement and regulatory agencies like the Drug Enforcement Administration or DEA to assist with authorized reviews and investigations. KASPER has many benefits, however it is important to note that KASPER is not intended to prevent patients from receiving needed controlled substances (Quesinberry, 2018). KASPER produces quarterly reports for each quarter of the year. These reports are very detailed in that they document opioid dispensing rates by county, prescription rates by specific drug, and many other features. In the second quarter of 2018, KASPER reported an opioid dispensing rate of 337 opioid prescriptions dispensed per 1,000 people (Quesinberry, 2018). During the same time period, KASPER reported an opioid dispensing rate of 245 opioid prescriptions dispensed per 1,000 people in Laurel county. KASPER reported an opioid dispensing rate of 468 opioid prescriptions dispensed per 1,000 people in Whitley county (Quesinberry, 2018). This data can be found in Figure 3. In Knox county, this converts to 1 in every 3 people receiving an opioid prescription. This results in 1 in every 2 people receiving an opioid prescription in Whitley county. Based on these rates and

ratios, it can clearly be observed that overprescribing of opioids is a major problem in Knox and Whitley counties. As previously mentioned, both of these counties also had the highest rates of overdose at 41.6 and 33.1 overdoses per 100,000 people (Tilley & Ingram, 2017). As discussed in the study by Keys and colleagues, overprescribing of opioids results in a surplus of prescription drugs available on street-markets for non-medical purposes. As a result of this, overdoses and emergency room visits are more frequent among users who have never obtained an opioid prescription themselves (Keyes, Cerda, Brady, Havens, & Galea, 2014). These trends may be occurring in the areas of Knox and Whitley counties as they have the highest rates of overdose and highest rates of prescription opioid dispensing.

The overprescribing of prescription opioids is not only detrimental in terms of increased access for non-medical use, but it can also have an impact on the prevalence of heroin use in the area. Addiction commonly begins with an individual being prescribed opioids for circumstances such as accidents, surgeries, and chronic pain. In many cases, pain resulting from these circumstances can be managed through different approaches such as physical therapy, occupational therapy, anesthesiology interventions (Ashburn & Staats, 1999). Other studies have found success in behavioral therapies among chronic pain patients (Morley, Eccleston, & Williams, 1999). Primarily prescribing opioids without trying other approaches can be determinantal to patients due to the addictive nature of prescription opioids. Prescription opioids are pharmaceutically similar to heroin. These drugs produce their action through the endogenous opioid systems that regulate a wide range of functions. In addition, prescription opioids and heroin both have the potential to use similar pharmacologic mechanisms to induce euphoria (or analgesia), different opioid molecules have different euphorigenic properties and withdrawal-syndrome patterns (Compton, Jones, & Baldwin, 2016). Since opioids and heroin act in the same

manners and affect the same brain receptors, it is common for opioid addicts to change their drug of choice to heroin. This is a very common action among opioid addicts once their prescription runs out or they can no longer afford the cost of prescription opioids. This also occurs among individuals living in areas where legislation is much stricter. Many state legislatures have developed controlled prescription monitoring systems, like KASPER, in order to cut down on overprescribing and shut down pill mills (Compton, Jones, & Baldwin, 2016). Heroin is also much cheaper in price than prescription opioids, in return making it more appealing to lower income populations. Overprescribing of prescription opioids can potentially ignite addiction in patients, which could have possibly been avoided with the intervention of other treatment methods for chronic and acute pain. This leaves many individuals addicted to opioids which are not always attainable due to regulations and costs, which in return could lead an individual to heroin use.

In addition to depression, increased prescribing of opioids, and poverty, there are many other potential determinants that lead individuals to substance use and abuse in Knox, Whitley, and Laurel counties. Many studies have linked trauma and drug use as well as experiences associated with having a substance abusing guardian. A recent study examined the likelihood of childhood abuse or maltreatment when living in the same household as a substance using guardian (Kelley, Lawrence, Milletich, Hollis & Henson, 2015). The study consisted of interviews of families in which one or both parents exerted symptoms of either drug-use or alcohol-use disorder. The study ultimately found that children living with a substance abusing guardian were at an increased risk of abuse or maltreatment (Kelley, Lawrence, Milletich, Hollis & Henson, 2015). This is important to note given the prevalence of individuals in Knox, Whitley, and Laurel counties that are suffering from drug-use disorder. Many of these

individuals may have children that are at an increased risk of abuse or maltreatment. Childhood trauma and maltreatment are known to have direct linkages to drug use in adolescents (Taplin, Saddichha, & Krausz, 2014).

Childhood abuse and prior experiences with trauma are known to have direct effects on drug use as a child ages. . Even potentially traumatic events are an established risk factor for substance use in adults (Carliner et al., 2016). A recent study examined the correlation between childhood trauma age of first drug injection. Injection drug use is often the most dangerous of all drug administration methods. This study was comprised of participants that were chronic injection opioid users who had volunteered to participate in the NAOMI heroin-assisted opiate dependence treatment study. The participants were given questionnaires regarding childhood trauma and maltreatment. The study found that 72.9% of the chronic injection opioid users had experienced some form of childhood abuse or neglect. In terms of physical neglect, the average age of first drug injection was 2 years earlier than someone that did not experience childhood physical neglect (Taplin, Saddichha, & Krausz, 2014). Overall, the study showed the correlation between increased severity of reported childhood abuse and an early age of initiation into injection drug use. Further, this reinforces the link between childhood trauma and early initiation into drug use. From previous studies, it is evident that living with a substance abusing guardian results in increased risks of maltreatment or abuse which can often fall into the category of traumatic events. As a result of these traumatic events, children with addicted parents may be initiated into injection drug at a much faster rate.

Many forms of traumatic experiences can often leave an individual with Post Traumatic Stress Disorder or PTSD. Another recent study examined how trauma exposure and the contribution of PTSD and depression can be used to predict substance use problems (Waldrop &

Cohen, 2014). This study was conducted using data from the Heart and Soul Study. The Heart and Soul Study was a prospective cohort that was designed to determine the mechanisms of associations between psychological factors and increased risk of cardiovascular events in high-risk patients. History of traumatic events were assessed through the use of the Computerized Diagnostic Interview Schedule for DSM-IV (CDIS), which is a validated computer-based interview administered by trained research personnel. Drug and alcohol use was assessed through follow up questions from the study. The study found that exposure to a larger number of trauma types was associated with an increased report of drug problems at baseline. In addition, specific types of trauma such as physical and sexual assault and serious accidents were independently associated with self-reported drug problems (Waldrop & Cohen, 2014). Overall, the study highlighted that different types of trauma can result in different degrees of substance use disorders. Specifically in the study, those that had experienced interpersonal traumas were more consistently related to drug outcomes.

There are many different forms of trauma that are categorized in different ways. Some of the most common forms of trauma include sexual abuse, physical abuse, bullying, and domestic violence. While these are common forms of trauma, there are other varying forms. In 2016, 558 cases in Knox county were reported to the Department of Community Based Services for suspected neglect, physical abuse, or sexual abuse that met the criteria as a report of abuse or neglect. In the same year, Whitely county reported 596 cases reported to DCBS which met the criteria for abuse or neglect. From the same study, Laurel county reported 801 cases which met DCBS criteria for abuse or neglect (Kids Count Data Center, 2018b) . These areas each have a staggering number of childhood abuse or neglect, which could contribute to the growing drug problem in each of the areas.

This knowledge is an important implication to previously mentioned studies regarding the role that childhood trauma plays in adult drug abuse. If a child has a parent with a substance use disorder experiences maltreatment or trauma as a result of this, this could increase their risks of potentially developing a substance use disorder or experimenting with drugs. This correlation is due to the connection between childhood trauma and potential substance use and abuse. Knox, Whitley, and Laurel counties have increased reports of child abuse and neglect, which could potentially be a determinant for substance use and abuse that is specific to the designated areas.

The growing drug problem in Knox, Whitley, and Laurel counties has had tremendous adverse effects on the community. Nearly every aspect of the community is affected by this epidemic. The unemployment rate is impacted drastically by substance abuse. Many studies have linked drug use and increased unemployment (Hammer, 1992). A recent study examined correlations between unemployment and drug use in rural areas of Appalachia. The study ultimately found that one-third of the respondents who reported having unemployment problems as well as substance abuse problems (Thornton & Deitz-Allyn, 2010). Another study found an association between high unemployment rates and high rates of opiate exposure among populations of Kentucky (Gascon & Spiller, 2009). Many businesses require mandatory drug screenings throughout the hiring process and throughout employment. Employees are often dismissed from employment if their drug screenings are positive for illicit substances. This contributes to the unemployment rate tremendously given that the substance abuse crisis in Knox, Whitley, and Laurel counties is so substantial.

In 2019, the average unemployment rate for the state of Kentucky was 4.8% (County Health Rankings, 2019). The areas of Knox, Whitley, and Laurel counties were substantially larger at the same given time. Knox county reported an average unemployment rate of 7.9%.

Whitley county reported an average unemployment rate 5.8%. Lastly, Laurel county had an unemployment rate of 5.9% (County Health Rankings, 2019). These areas have a much higher unemployment rate than the Kentucky statewide average as well as having some of the highest overdose rates and numerous drug related arrests. The growing drug problem in the tri-county area of Knox, Whitley, and Laurel counties also prevents new business from moving to the area. If a business can not find a qualified workforce that is capable of passing drug screenings, then they will not move to the specified area because it would result in a loss of revenue for the business. As a result of this, the community remains in the same cycle of poverty.

In addition to having an effect on the economy and unemployment rate, drug abuse also proposes a threat to the safety of law enforcement. Law enforcement officials come into contact with many individuals that may exhibit symptoms of drug use disorder. Many diseases, such as varying forms of Hepatitis and Human Immunodeficiency Virus or HIV, are common injection drug users (Alter, 2006). This diseases can be transmitted through blood and other bodily fluids which can be commonly spread through the sharing of drug paraphernalia and used needles. Officers commonly come into contact with individuals who are hepatitis or HIV positive which can be easily transmitted to the officer via even the smallest open wounds. Officers also have potential to transmit the diseases to their families which increases the spread and detrimental effects of the disease.

Law enforcement officials are affected by substance abuse in many other ways. Officers are often exposed to different forms of drugs as they arrest drug related offenders. Fentanyl is a drug that is extremely potent as it is 80-100 times stronger than morphine (Frank & Pollack, 2017). The drug proposes a major public health threat as it takes a very small amount in order to initiate an overdose. Fentanyl is becoming more popular among drug users as it can be cut with

other drugs such as cocaine that will make the drugs last longer and a stronger high can be achieved (Frank & Pollack, 2017). Since the drug takes only a small amount to overdose and produce negative physiological effects, it is every dangerous to inhale or come in contact with. It is very common for offenders to hide their drugs or attempt to dispose of them in various ways if they are appended by police. One common example of this is rubbing a powdered drug into carpet of a car or home in order to decrease the likelihood that an officer may see the drugs. If an officer is searching an offenders home or vehicle with drugs disposed in an unknown location, it could be very dangerous for them as they could accidentally inhale the potent drug which can be very harmful. In addition, officers may come into contact with offenders that may be under the influence of drugs that may cause them to act erratically or violently, in return putting the officers life in danger.

Not only does substance abuse have potential harmful effects on the safety of law enforcement officials, but on the general public as well. Many studies have linked increased drug use with aggressive crime in impoverished areas (Valdez, Kalpan, & Curtis, 2007). Aggressive crimes include extortion/ threat offenses, assault, robbery, family offenses, burglary, and disturbance of public peace. Increases in crime rates puts everyone in danger, even that of the general public.

As mentioned by many of the participants, children are among the individuals that suffer the most as a result of substance abuse. Many studies show that substance abuse has adverse effects on children in almost every aspect (Jaaskelainen, Holmila, Notkola, & Raitasalo, 2016). Children with substance abusing guardians are at greater risk for mental health issues, risk-taking behavior, neglect, maltreatment, and alcohol or drug abuse as they age (Jaaskelainen, Holmila, Notkola, & Raitasalo, 2016). In addition, children that are abused or neglected are much more

likely to develop a substance use disorder as well as being introduced to injection drug use at a much earlier age (Taplin, Saddichha, & Krausz, 2014). Substance abuse has an effect on a child's mental state, which could cause them to perform poorly in school due to the stresses of living with a substance abusing guardian. Many school districts in the tri-county area of Knox, Whitley, and Laurel may be seeing the signs of these effects. The Knox county school district is underperforming in comparison to statewide averages of KPREP assessment in almost every area (Kentucky Department of Education, 2016). For the 2016-2017 school year, the Knox county school district had 49.9% of elementary school students scoring proficient or distinguished in reading assessment whereas the statewide average was 54.3% (Figure 4). For the same time period, Knox county schools had 41.3% of elementary students scoring proficient or distinguished in mathematics assessment in comparison to the statewide average of 49.1% (Kentucky Department of Education, 2016). Knox county also had the highest rates of depression, poverty, and the highest rates of drug related overdose. While many factors can contribute to the assessment scores of school districts, it can be reasonably assumed that the drug problem in Knox county may be contributing to underperformance of students in the district.

Not only does substance abuse affect children in detrimental ways, but it also has an effect on the family members of individuals with a substance use disorder. In fact, families of substance users are among those most affected as a result of substance abuse. Having an addicted family member is often troubling for loved ones. Family members often worry and trouble themselves due to the circumstances of their addicted loved one. Not only is having an addicted loved one troubling, but family members constantly worry about the well-being of their loved one. Overdoses are very common which can possibly leave families without their loved one. The overall aspect of having an addicted family member is troubling, but addicts may often steal

from their family members in order to support their habit and drug of choice. Drug use is linked to offenses such as burglary and domestic offenses (Valdez, Kalpan, & Curtis, 2007). This is particularly common and it can lead to criminal charges for the offender as well as broken family bonds. There are numerous effects that substance abuse has on families of those whom are addicted.

Conclusion:

Drug abuse is a growing problem, which is resulting in a national epidemic and public health crisis. Not only is substance abuse a national growing trend, it is also very prevalent in the state of Kentucky as shown by state overdose rates. Substance abuse is also a local problem as it is ravaging the tri-county area of Knox, Whitley, and Laurel counties. There are many potential social determinants that can lead an individual to substance use or abuse. These determinants can fall into the categories of economic stability, neighborhood and built environment, health and healthcare, education, and social and community context. Substance use determinants can be unique to a geographic area, community, or kinship. There are many determinants that are often observed among drug users in the areas of Knox, Whitley, and Laurel.

Studies have linked poverty and drug use, which can be directly applied to the areas of Knox, Whitley, and Laurel counties. Knox and Whitley counties had the highest rates of children living in high poverty areas as well as the highest rates of drug overdose. As a result of this, the link between poverty and drug abuse can be observed in the areas of Knox and Whitley counties. Another potential determinant observed in these areas is the prevalence of depression and mental health problems. Many studies have shown the linkage between depression and drug use. Some of the most important findings showed that major depressive disorder is often developed first and the substance use disorder subsequently. This directly applies to the areas of Knox and Whitley

counties as they averaged many more poor mental health days than the statewide average of Kentucky. In addition, these counties also had the highest rates of overdose, poverty, and depression, thus showing that the social determinants of depression and poverty may be contributing to the growing drug problem in these counties.

Another potential determinant of substance abuse is the exposure to trauma or abuse. Many studies have shown a relationship between childhood abuse and neglect and increased prevalence of drug use in adolescents. The same study found that children that are abused are initiated into injection drug use much earlier than children that have not reported abuse. The areas of Knox, Whitley, and Laurel counties had a significant amount of cases reported to DCBS which met the criteria for child abuse or neglect. This further shows that the amount of child abuse and neglect occurring in these counties could be potentially playing a role in the drug problem in these areas.

The overprescribing of prescription drugs in the areas of Knox, Whitley, and Laurel counties can also be labeled as a potential determinant that could play a role in substance use and abuse. Overprescribing of prescription drugs leads to an increase in the amount of prescription drugs on street markets as well as an increase in the number of individuals using prescription opioids for nonmedical use. Knox and Whitley counties had the highest opioid dispensing rates, resulting in 1 in 3 people receiving an opioid prescription in Knox county and 1 in every 2 people receiving an opioid prescription in Whitley county. These counties also had the highest rates of drug overdose, highest rates of children living in poverty, and highest rates of depression which further shows that the combination of social determinants may be contributing to the substantial drug problem in the area.

Substance abuse has numerous adverse effects on the community. It affects the unemployment rate tremendously as many employers require drug screenings from employees. The drug problem in Knox, Whitley, and Laurel counties also prevents new businesses from moving to the area due to the inability to find a qualified workforce that is capable of passing their mandatory drug screenings. As a result of this, job options are limited as well as the community remains in the same cycle of poverty which has been linked with drug use. The safety of citizens of these areas is also affected by the substance abuse crisis. Increased drug use has been associated with increased rates of aggressive crime. This includes burglary, domestic violence, disturbance of peace, and many other offenses. As a result, the lives of the general public are put in danger. Not only is the safety of the general public affected by drug abuse, but the lives of law enforcement officials are put into danger as well. Officers may contract infectious diseases such as varying forms of Hepatitis and HIV from coming in contact with needles or injection drug users that may have tested positive for the disease. Exposure to fentanyl also proposes a major threat to officer safety as it is very potent and takes a very small amount in order to initiate a drug overdose. Officers may come into contact with offenders that may be under the influence of certain drugs that may cause them to act erratically or violently, in return, putting the officers life in danger.

Nearly every aspect of the community is affected by substance abuse, however children and families of substance abusers are among the population that is most affected as a result of substance abuse. Children of substance users are more likely to suffer abuse or neglect which has a direct correlation with drug use as they age. In addition, children of substance abusers may perform poorly in school due to the stresses of their home life. Families of those suffering from drug use disorder are directly affected by their loved ones disease. Having a family member that

is addicted to drugs is often troubling mentally and emotionally which takes a toll on family members of addicts. In addition, addicts may steal from their families in order to support their addiction. Overall, drug abuse has a substantial amount of adverse effects on the community as well as their loved ones.

Limitations

The study was conducted in one geographical area, therefore trends and correlations observed in this area may not be the same in a different geographical region. The sample size was very small which could have contributed to similar perspectives among participants. For further study, more participants should be surveyed as well as a different geographical region.

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Appendix

Table 1: Interview Questions and Participant Responses

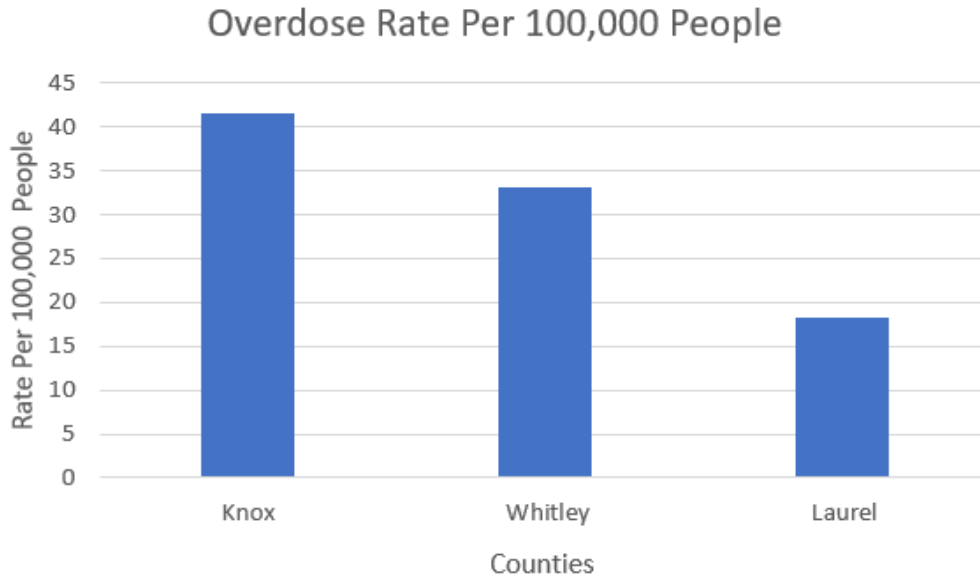
	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Out of the arrest that you see, what percentage of people have some sort of substance abuse problem?	95%	75%	80%	90%	*
Would you say that you see more of a prescription drug use problem or an illicit drug problem?	A combination of both	More illegal	A combination of both	A combination of both	*
What do you think are some of the most common circumstances that lead drug use and eventually drug abuse?	Depression, family values, peer pressure, easy access to drugs,	Lack of jobs, family values and morals, the economy, depression,	Desperation, unemployment, easy access to drugs, family values and morals	Depression and the economy	Economy, depression, family values and morals
What makes drug use so prevalent in this area rather than others?	Poverty, trying to fit in, being underprivileged, nonacceptance, and falling back into the same cycle as parents or family members	Living in an economically depressed area and drugs are readily available in this area	Poverty and generational drug use and poverty	The location in proximity to the interstate, over prescription of pharmaceutical drugs,	Low economic development, low socioeconomic status, lack of entertainment in the area, generational drug use, unemployment, and self-medication
What do you think has led to this	Laws, societal acceptance,	Lack of jobs, generational trends in	Easy access to drugs, location and proximity	Easy access to drugs, punishments	*

problem getting so out of hand?		Appalachia, education, decline in family values, single parent households, and increase	to major roadways, punishments are not severe.	are not severe, jails are rehabs are overcrowded, society is nurturing the problem.	
What are the best methods to prevent the next generation from becoming addicted?	Show people the reality of drug use, educate kids at a young age, have government ads and commercials, and have local people talk to schools.	We cant jail our way out of this, it will come from educating our kids. We have lost a generation.	*	*	*
Do you think it is possible to resolve an issue once it has gotten this big?	There is no 100% fix, but stiffer laws and making it harder to get drugs will definitely make a difference.	I think we can solve it but the community is going to have to come together and realize that everybody is going to have to work together to fix it.	*	*	*
What are some barriers/problems that your agency faces when fighting the epidemic?	Officer safety	Having enough officers, and finances	It is very emotionally and mentally troubling for us	Officer safety	*
What impacts does substance abuse have on you	Exposure to fentanyl, diseases like hepatitis and	Increased call volume	*	Officer safety, exposure to fentanyl and carafentanyl, needle	*

specifically in your line of work?	HIV, and used needles			exposure, exposure to infectious diseases such as hepatitis and HIV, and coming into contact with people high in hallucinogens	
What impacts does substance abuse have on a community?	It affects families, coworkers, schools, it affects everyone in the community	It affects the economy, it creates danger for the general public, and increases crime	It puts innocent people in danger, affects the unemployment rate tremendously, and keeps this area in poverty	It affects everything poverty, homelessness, safety of people	*
Who suffers most from substance abuse?	Kids	Families	Kids	Families, loved ones, and the entire community.	

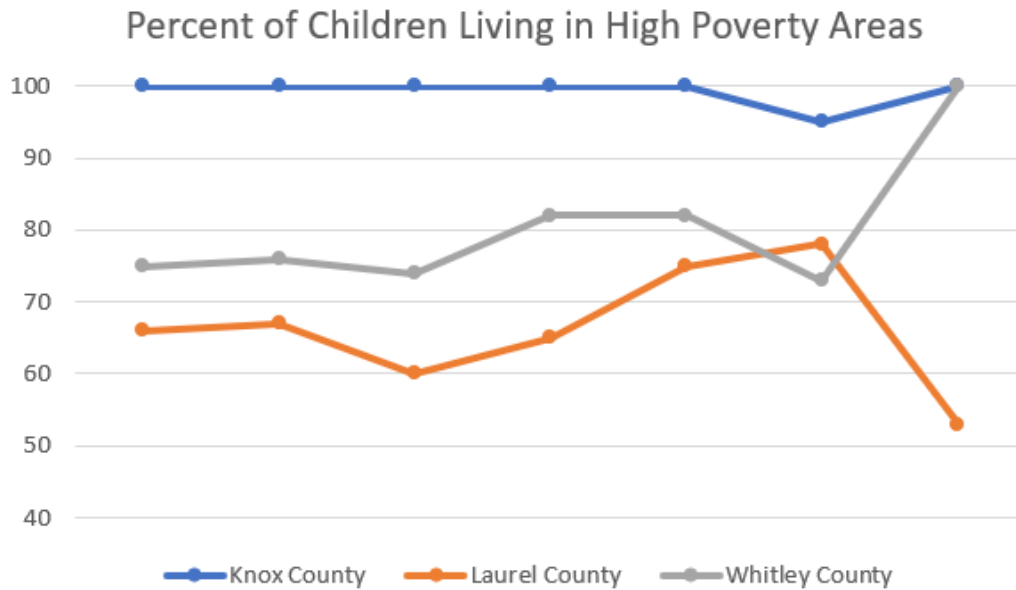
* indicates missing information or the participant failed to answer the question

Figure 1: Overdose Rates Per 100,000 People in Knox, Whitley, and Laurel Counties



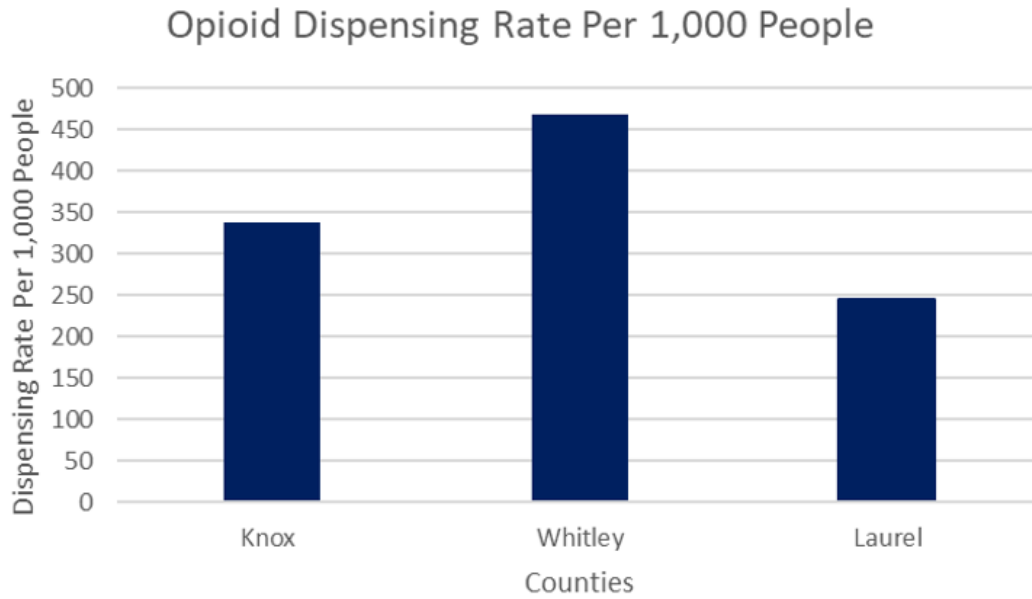
(Tilley & Ingram, 2017)

Figure 2: Percentage of Children Living in High Poverty Areas



(Kids Count Data Center, 2018a)

Figure 3: Opioid Dispensing Rates Per 1,000 People



(Quesinberry, 2018)

Figure 4: KPREP Test Scores for the Knox County School District in the 2016-2017 School Year

READING - Performance Level																
Level	Enrollment		Number Tested		Participation Rate		Percent Novice		Percent Apprentice		Percent Proficient		Percent Distinguished		Percent Proficient/Distinguished	
	District	State	District	State	District	State	District	State	District	State	District	State	District	State	District	State
▶ Elementary School - All Students	1,024	156,716	1,023	155,661	99.9	99.3	23.9	22.3	26.2	23.4	36.0	37.2	13.9	17.1	49.9	54.3
▶ Middle School - All Students	987	150,768	982	149,679	99.5	99.3	19.1	19.4	26.0	23.8	42.0	39.6	12.9	17.3	54.9	56.9

MATHEMATICS - Performance Level																
Level	Enrollment		Number Tested		Participation Rate		Percent Novice		Percent Apprentice		Percent Proficient		Percent Distinguished		Percent Proficient/Distinguished	
	District	State	District	State	District	State	District	State	District	State	District	State	District	State	District	State
▶ Elementary School - All Students	1,024	156,716	1,023	155,661	99.9	99.3	17.1	16.3	41.5	34.5	32.6	35.8	8.7	13.3	41.3	49.1
▶ Middle School - All Students	987	150,768	982	149,679	99.5	99.3	15.8	17.0	43.4	35.9	34.2	35.4	6.6	11.7	40.8	47.0

(Kentucky Department of Education, 2016)