

DESCRIPTIVE ANALYSIS OF THE MOST VIEWED
YOUTUBE VIDEOS RELATED TO THE OPIOID EPIDEMIC

by

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ABSTRACT

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In 2016, over 11 million people misused prescription opioids and the economic costs were estimated to be over \$500 billion. In the same year, opioids killed 42,000 people, which was more than any year on record. These data highlight the need to reduce the harm caused to individuals, families, communities, and the nation. One element of a more comprehensive national strategy is increasing awareness among citizens, physicians and policy makers. Given its widespread reach YouTube can be very helpful. There is a large literature on the opiate epidemic, but no published studies describing the sources or content of YouTube videos on the opiate epidemic were identified. This study was, therefore, intended to help fill this gap in current knowledge.

YouTube was searched using two key terms, “opiate addiction” and “opioids.” The results were sorted by number of views, and the URL, title, and number of views were saved for videos with a minimum of 1,500 views. Videos were then screened for the inclusion and exclusion criteria. The remaining sample comprised 309 videos.

Collectively, these 309 videos were viewed 44,693,887 times. The results revealed the sources that were most viewed and the nature of content that was and was not likely to be covered. The two main sources of videos were Internet Based and Television news/Entertainment. Compared with videos with health professions as the main speaker, those featuring consumers garnered almost 10 times as many cumulative views (30.35% versus 3.24%). Government organizations uploaded 11 videos (< 4%), collectively garnering 343,983 views (less than 1% of cumulative views).

YouTube represents an important opportunity for health promotion and disease prevention regarding the opiate epidemic. However, improved understanding about ways to communicate accurate and useful information in ways that attract viewers is needed. Recommendations for research, policy and practice are presented relevant to how YouTube can help mitigate the harm caused by the opiate epidemic.

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Chapter I

INTRODUCTION

Background

Over the past two decades, prescription opioid misuse, opioid use disorder and overdose grew in United States into epidemic proportions (Cochran, Field, & Lawson, 2015). Prescription opioids overdose deaths surpassed all other drug-related deaths (Madras, 2017). As a result, the prevalence of prescription opioid dependency, abuse and overdose gained attention among the public, policy makers and the clinical community (Jones, 2016).

The opioid epidemic, involving both prescription opioids and heroin, received initial media attention in Maine and Ohio in 2000 (Whelan & Asbridge, 2013). Since then it has already killed more people than crack cocaine in the 1980's and heroin in the 1970's combined (Netherland & Hansen, 2016). In 2015, opioids killed 33 000 people and almost half of these fatalities were caused by prescription opioid (McIver, 2017). Physicians' prescriptions became a major source of opioids as its sales rose 300% in the past 20 years. The U.S. Department of Health and Human Services [HHS] in 1992 and the Joint Commission on Accreditation of Hospitals in 2001 introduced the emphasis of insufficient treatment of chronic pain in the U.S. (Committee on Substance Use and

Prevention, 2016). Despite missing scientific evidence that chronic pain can be safely and effectively treated by opioids, during the past two decades 50% of all opioid sales were designated for chronic non-cancer pain (Madras, 2017).

In 2011, all narcotic analgesic prescriptions exceeded 252 million. Even though the Centers for Disease Control and Prevention declared a prescription opioid overdose epidemic in 2011, opioid prescriptions increased and reached 255 million in 2012 (Sweeny, 2016b). Since 2012, the overall rate of opioid prescriptions declined and in 2016, it decreased to the lowest it has been in more than 10 years - to over 214 million total opioid prescriptions (Centers for Disease Control and Prevention [CDC], 2017l).

Prescribing rates are highest among providers specializing in pain medicine (49%), surgery (37%), and physical medicine/rehabilitation (36%). Primary care providers account for about half of opioid pain relievers dispensed (CDC, 2017g). As high prescribing rates continue to prevail across the country (CDC, 2017l), prescription opioids continue to be a primary cause of opioid-related deaths (Madras, 2017).

Because healthcare professionals prescribe opioids, users sometimes falsely believe that such substances are safer than illegal drugs (Foggers & McGuinness, 2014). The vast amount of prescription opioids has been associated with a concomitant increase in non-medical prescription opioid use. In the past few years, regulatory controls have reduced availability of prescription opioids (CDC, 2017k), and many insurance companies have encouraged access to pain medication that has a lower risk of addiction (Thomas & Orstein, 2017).

When prescription opioids became less accessible, or when individuals could not afford to buy them at the “pill mills” (Penm et al., 2017), those who were dependent often turned to the black market (Foggers & McGuiness, 2014). In underground markets, they were introduced to low-cost, more potent, widely available options, including heroin (Jones, 2016) and fentanyl analogs (Madras, 2017).

Prescription opioids can be a significant component for treatment of acute pain, cancer pain and for palliative care management (Martins, Santaella-Tenorio, Marshall, Maldonado, & Cerdá, 2015). However, they are not the first line of the treatment for chronic pain (Lembke, Humphreys, & Newmark, 2016). While changing prescribing practices would be a very meaningful step in the right direction, this alone will not fully address the current prescription opioid epidemic. In addition, major improvements are needed in the prevention of prescription opioid misuse, and in the treatment of both opioid use disorder and chronic pain.

YouTube

Officially launched in May 2005, YouTube has today over 1 billion users with one billion hours watched daily. People in 88 countries speaking 76 languages (YouTube, 2017) take some form of social action on YouTube (e.g. likes, shares, and comments) every week (Syed-Abdul et al., 2013). In a recent survey of teenagers, about 85% chose YouTube as their preferred source for video content (Romer, Jamieson, Jamieson, Jones, & Sherr, 2017). Considering its popularity and ease of access, YouTube has the potential

to increase awareness and interest in disease prevention and health promotion in general (Basch, Fung, Berdnik, & Basch, 2016) and, more specifically with respect to opioid misuse, overdose prevention and alternative therapies for chronic pain. Because stigma significantly impacts substance users as well as their families, YouTube could be the first communication medium where individuals or families affected by opioid misuse or chronic pain turn to for information and help.

Specific Aims

While there is a large and growing literature on prescription opioid dependency, misuse and overdose, we did not identify any published studies investigating the content, sources and characteristics of YouTube videos related to misuse of prescription opioids. Improving understanding about this topic is well aligned with objectives specified in Healthy People 2020, a blueprint used by the federal government, states, communities, and many other public and private sector agencies to guide health promotion and disease prevention efforts for all people in the United States (U.S. Department of Health and Human Services [HHS], 2016b). Healthy People 2020 includes the topic of Substance Abuse and one of its objectives is to reduce nonmedical use of prescription drugs. In 2008, 4.8 % of persons aged 12 years and over reported nonmedical use of pain relievers. This measure is targeted to be decreased by 2020 (Healthy People, 2018).

This study has a short-term goal to describe the most viewed videos on YouTube related to opioid epidemic concerning source, speaker, format, number of views, length,

date uploaded, and content. The content analysis will examine the extent to which widely viewed videos are consistent with well-established facts and guidelines from authoritative sources. The longer-term agenda is to improve understanding about ways to reach large audiences of people with accurate and helpful information related to prevention and treatment of prescription opioid misuse and opioid use disorder.

The Specific Aims of the Study include the following

1. To examine the most widely viewed YouTube videos on the topic of prescription opiate addiction with respect to source, speaker, format, number of views, length, and date of upload.
2. To examine the most widely viewed YouTube videos on the topics of prescription opiate addiction with respect to content, including background information about the opioid epidemic; signs and symptoms of prescription opioid misuse; risk factors; first use; populations at risk for misuse; opioid dependency withdrawal symptoms; information on opioid use disorder and overdose and its reversal; stigma; treatment of opioid use disorder; alternative options for treatment of chronic pain; prevention strategies for individuals, providers and communities; information on locating a treatment or help; consequences; and barriers preventing discontinuation of prescription opioid misuse.
3. To explore the extent to which content covered in the videos varies when they are categorized by source.
4. To explore the extent to which content of videos varies when they are classified based on number of views.

Significance

YouTube is viewed by millions of people daily and content of videos may have significant impact on the viewer. There is a large literature on the opioid epidemic, however, no published studies describing the sources or content of YouTube videos on the topic were identified. This study will, therefore, help fill gaps in current knowledge by determining the sources and content of YouTube videos on the prescription opioid epidemic. Content presented in the most widely viewed videos will be coded and analyzed to assess the extent to which material presented is aligned with facts from agencies such as Centers for Disease Control and Prevention, National Institute on Drug Abuse, or Substance Abuse and Mental Health Services Administration.

Because of its widespread reach, YouTube is an important channel for communicating with the public about disease prevention and health promotion. Many people may turn to this medium because of its convenience, because its use does not require a high level of reading literacy, and because of stigma associated with addiction. For these reasons, affected individuals and families may be more inclined to seek information from this kind of source versus speaking with a health professional. In addition, in some areas such as rural areas, which have been greatly affected by the opiate epidemic, the health professionals' reception of the people struggling with opioid use disorder may be "cold at best" (McIver, 2017, p. 478). Description of the content in YouTube videos will help to determine if the information presented is consistent with recommendations of public health agencies. In addition, by examining the videos that are

most widely viewed, insight about ways to produce videos that appeal to individuals suffering from prescription opioid dependency, their family members and the public in general may be identified.

Given the extent and seriousness of the opioid epidemic, there is a great need for approaches to increase awareness and promote behavior change to prevent misuse of prescription opioids. Taming the opioid epidemic will require changes beyond health care (McIver, 2017). For example, West, Lister, Perry, Church and Vance (2014) suggested findings from research using YouTube videos on health-related issues could inform organizations that desire to create effective public service announcements and videos. Thus, this research is a first step in a longer-term agenda to help educate the public and assist them in making informed decisions about this important medical and public health problem.

Chapter II

LITERATURE REVIEW

This literature review begins by providing background of the prescription opioid epidemic, followed by the personal factors and social determinants that are associated with dependency on prescription opioids, and disparities that occur in various demographic subgroups of those who become addicted. Then selected literature regarding prevention strategies and treatment efforts is outlined, including the assessment of the YouTube platform for disease prevention and health promotion, particularly as it relates to prescription opioid dependency.

Section 1: Brief Background of the Prescription Opioid Epidemic

Prescription opioid is a semi-synthetic medicine that is derived from Opium Poppy (latin *Papaver somniferum*). Even though it is not known how the medicinal effects of Opium Poppy were first discovered, they were known in Mesopotamia since at least 3000 BC (Blakemore & White, 2002; Brook, Bennett, & Desai, 2017). Despite ancient knowledge about the analgesic and euphoria producing effects of opium that

created dependence, pain medications derived or semi-synthesized from opium were promoted to contemporary society as non-addictive, which largely contributed to today's opioid epidemic.

Opium was called the drug of gods (Ling, 2017). Its effects were depicted in the statues of several gods holding or wearing poppy plants, including, Minoan, goddess of the narcotics; Hypnos, god of sleep; Nyx, god of night; and Thanatos, god of death (Kritikos & Papadaki, 1967). Opium use became widespread in the Middle Ages through the Renaissance periods with wide use of opium for medicinal as well as recreational purposes. Many famous historical figures, including Benjamin Franklin, Samuel Johnson, Napoleon and Edgar Allan Poe, were known for use and addiction to opium (Brook et al., 2017). In 1806, Sertürner isolated the active molecule of opium in the pure form and named the white crystalline powder morphinum, after Morpheus, the Greek god of dreams (Blakemore & White, 2002). About 70 years later, researchers Heinrich Dreser and Friedrich Bayer discovered diacetylmorphine (diamorphine), which was marketed to Germans as a cough remedy under the brand name Heroin (derived from the German word for heroic). Diacetylmorphine is metabolized to morphine in the body, but it rapidly crosses the blood-brain barrier and creates a euphoric rush. This property makes the drug especially addictive (Blakemore & White, 2002).

In the 19th century, clinicians discouraged the use of pain remedies. They argued that pain was a sign of physical strength vital to the healing process, and it acquired spiritual benefit (Lembke, 2012). Pain was also viewed as an existential experience and natural consequence of aging (Tompkins, Hobelmann, & Compton, 2017). With the U.S.

Narcotic Act in 1914 physicians were aware that opioids could be addictive; therefore, they used them cautiously especially in the treatment of the chronic pain (Tompkins et al., 2017).

In the past few decades, views of pain have shifted (Lembke, 2012). The “opiophobic” 1980s (Webster et al., 2017) were replaced by skyrocketing rates of prescriptions of OxyContin sold by Purdue Pharma in late 1990s (Quinones, 2015). Modern-day opioids are no longer offered only to cancer and palliative care patients, but have been and continue to be widely prescribed to outpatients who suffer from acute and chronic pain.

In 1995, the American Pain Society supported a campaign to consider pain as the ‘Fifth Vital Sign’. They believed pain, a subjective unpleasant sensory and emotional experience, was undertreated (Tompkins et al., 2017). In 2000, the Joint Commission on Accreditation of Hospitals released Standards on Pain Management where they acknowledged the right of the patients to proper assessment of pain (Glod, 2017).

In patient satisfaction surveys, hospitals have begun to link measures of quality services to questions of pain (Sweeny, 2016a). Clinicians who were not keen on prescribing the opioids or who suspected misuse received poor ratings, which often affected their compensation (Lembke, 2012). In 2015, the Center for Medicaid and Medicare recognized the impact of questions about pain and uncoupled them with the surveys (Sweeny, 2016b).

Many practitioners were not taught the necessary skills to integrate risk reduction and addiction assessment into routine clinical practice while in training (Biswanger &

Gordon, 2016, p. 1). Webster et al. (2017) investigated studies related to training of medical students and found that opioid addiction education was lacking; instead medical schools were offering lectures supporting pharmaceutical companies, and educators were downplaying the harmful effects of opioids (Webster et al., 2017). Their review also suggested that medical education barely touched the non-pharmacological approaches for managing chronic pain (Webster et al., 2017).

Pharmaceutical companies downplayed the addictive properties of new opioid medicines based on a letter in the *New England Journal of Medicine* that was taken out of context (Quinones, 2015). In 1980, a brief paragraph in the *New England Journal of Medicine* stated, “despite the widespread use of narcotics in hospitals, development of addiction is rare” (Porter & Jick, 1980, p. 123; Quinones, 2015). The statement was based on a retrospective study in which the sample consisted solely of hospitalized patients. The claim that the new opioid medications were non-addictive (Schwartz, 2017) was taken out of context and was heavily cited and used to justify the safety of prescribing opioids to outpatients suffering from chronic pain (Tompkins et al., 2017). Pain specialists offered physicians attending conferences sponsored by pharmaceutical companies biased “evidence.” Prescription opioids became a magic answer and a quick fix to pain management (Sweeny, 2016c). Even though many physicians had an honest goal helping people in pain, the missing information about opioids’ dark side contributed to over prescribing and, to a great extent, caused the current opiate epidemic (Sweeny, 2016c).

The prevalence of treating non-acute pain with opioids by primary care physicians increased dramatically during the past 20 years (Sweeny, 2016c). Pharmaceutical

companies implemented marketing strategies involving personal visits to doctors by pharmaceutical representatives, free give away trips for continuing education, and free coupons and samples of opioids (Quinones, 2015). Sixty percent of the abused opioids were often obtained from physicians; who were sometimes aware that their patients were misusing or diverting the medication (Lembke, 2012); and more than half of the patients with chronic pain who used opioid therapy for 90 days were still receiving opioids four years later (Martin et al., 2011). As many as 1 in 4 people who received prescription opioids for treatment of long term noncancerous pain in primary care settings struggles with addiction (CDC, 2017b). Access to opioids caused a corresponding upsurge in misuse and abuse (Wachholtz, Foster, & Cheatle, 2015) and gave roots to the contemporary opioid epidemic where fatal opioid overdoses have escalated exponentially, resulting in more than 16,000 deaths per year (Barth, Guille, McCauley, & Brady, 2017).

The revolution in pain management opened the door to a massive supply of opioids, which affected many areas of the U.S. as a modern plague (Sweeny, 2016c, Lembke et al., 2016). In some localities, opioid pills were used to trade for goods and services. A Medicaid card became a 'gold card' with which people could obtain pills worth thousands of dollars. As a result, millions of lives were ruined (Sweeny, 2016c). On one hand, it is a velvet opioid epidemic without the underground violence typically associated with illicit drugs such as crack (Sweeny, 2016c). On the other hand, it is the deadliest drug epidemic that U.S. has ever faced.

Geographic and Economic Impact

Prescription opioid misuse and opioid use disorder did not only become a major public health problem, but it developed into a significant economic burden for the United States and other developed nations (Worley, Shoptaw, Bickel, & Ling, 2015). It is estimated that between 26.4 million and 36 million people abuse opioids worldwide, including an estimated 2.1 million people in the United States (National Institute on Drug Abuse [NIDA], 2014). While the U.S. accounts for about a quarter of the world's drug-related deaths (Wen, Behrle, & Tsai, 2017), prescription opioid abuse and dependency is a growing problem in other countries such as Australia and Canada (Martins et al., 2017).

In Canada, nonmedical use of prescription opioids is more common in adolescents than in adults and use among adolescents is higher than in pertinent U.S. comparisons (Fisher et al., 2013). In 2015, the number of opioids prescribed in the U.S. was nearly 4 times higher than in Europe (Schuchat, Houry, & Guy, 2017). The International Narcotics Board reported that in 2009 U.S. demand for hydrocodone was about 27.4 million grams per year compared to 3,237 grams for Britain, France, Germany, and Italy combined. In 2012, pharmaceutical companies produced more than 75 tons of Oxycodone of which more than 80% was used in U.S. (Laxmaiah Manchikanti et al., 2012).

In the U.S., a statistically significant increase in opioid deaths between 2014 and 2015 occurred in Connecticut, Florida, Illinois, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, Tennessee, Washington and West Virginia (Quinones,

2015; Schwartz, 2017). According to the CDC (2017g), the highest prescribing state is Alabama, where health providers wrote almost three times as many prescriptions per person compared with those in the lowest prescribing state, Hawaii.

From 2011 to 2013, the total economic burden of the prescription opioid epidemic increased from an estimated \$55 billion (Jones, 2016) to an estimated \$78.5 billion (Florence, Zhou, Lue, & Hu, 2016). These costs include treatment, criminal justice, and loss of productivity. The total economic burden, however, does not account for the reduction of quality of life of prescription opioid dependents, or the pain and suffering of their family members (Florence et al., 2016). Diagnosis code ICD-9 for opioid abuse and dependence does not distinguish between heroin and prescription pills, which may create a bias in these estimates. However, based on recently reported U.S. data, 1.9 million people are affected by prescription opioid abuse or dependence and 517,000 by addiction to heroin (Florence et al., 2016).

Characteristics of Prescription Opioids

Prescription opioids are man-made drugs produced to treat the pain. CDC (2017a) recognizes four categories of opioids. The first involves the natural opioid analgesics such as morphine and codeine (called opiates) and semi-synthetic opioid analgesics as Oxycodone (OxyContin[®]), hydrocodone (Vicodin[®]), oxymorphone. The second category is Methadone, a synthetic opioid. Next category includes synthetic opioid analgesics as tramadol or fentanyl. The illegally manufactured opioid such as heroin and fentanyl

present the fourth category of opioids (CDC, 2017a; Dasgupta et al., 2013).

Opioid use can cause decreased blood pressure and heart rate, and drowsiness; at high doses, it can cause sedation and respiratory depression. It can also cause euphoria, increase tolerance to distress and pain, and produce hedonic effects (Wachholtz et al., 2015, p. 3). Side effects of opioids include constipation, nausea, sleepiness, confusion, depression, decreased testosterone, itching and sweating. The CDC (2017h) states that even when taken as directed, the use of these substances will cause tolerance and has a high risk for habituation (Sweeny, 2016c). Research has shown that those who use opioids for a prolonged time, even as prescribed by a physician, are at high risk of developing physical dependency and opioid use disorder (CDC, 2017b; Lembke et al., 2016). The use of too many opioids, alone or with other substances, can cause sleepiness, and confusion (Substance Abuse and mental Health Services Administration [SAMHSA], 2015b) or can lead to respiratory depression leading to death (CDC, 2017h).

Prescription and illegally manufactured opioids are chemically similar and affect two systems in the human brain. In addition to their effects on pain receptors, they also interact with the opioid receptors and produce euphoria, which significantly increases their potential for misuse (NIDA, 2017). Opioids increase the amount of dopamine, the neurotransmitter that causes intense pleasure in the limbic reward system, which can drive users to seek out the drug repeatedly (NIDA, 2014). When drugs of abuse come in and “hijack” the same circuit, people learn to use drugs in the same way. If the drug is used again and again, neurons begin to reduce the number of dopamine receptors or make less dopamine so the ability to feel any pleasure is reduced. Now, the person feels

depressed and is unable to enjoy things that once brought pleasure. Drugs are needed just to bring dopamine levels up to normal, and more of the drug is needed to create a dopamine flood, or “high”—an effect known as “tolerance” (NIDA, 2015).

Misuse, Dependence and Opioid Use Disorder

Prescription opioid misuse and abuse includes intentional or unintentional use 1) without a prescription, 2) in a way other than as prescribed (Han et al., 2017) or 3) for the feeling it triggers (SAMSHA, 2017; West et al., 2014). People who are dependent on or who abuse prescription opioids often change the way they take it (e.g., snorting or injecting) to intensify the effect (SAMHSA, 2016). Co-abuse of opioids and other drugs such as benzodiazepines (Hwang et al., 2014), tranquilizers or stimulants (Jones, 2016) is also common. From 2002-2014 the use of opioids with sedatives contributed to nearly one third of all opioid deaths (Hwang et al., 2014). The use of alcohol over the past year, as well as marijuana and heroin use was significantly associated with opioid analgesic abuse (Jones, 2016).

Physical dependency and withdrawal symptoms are often present in people that use or misuse opioids or have an opioid use disorder. Physically dependent individuals rely on the opioid to maintain physiological homeostasis. When the drug is discontinued, the person will experience severe adverse physiological and mental symptoms of withdrawal. Such symptoms include nausea and vomiting, cold and hot flashes, anxiety, insomnia, perspiration, muscle cramps, and diarrhea (World Health Organization, 2009).

Lengthened opioid exposure also heightens pain sensitivity, known as hyperalgesia (Wachholtz et al., 2015). Individuals with opioid-induced hyperalgesia may experience pain in the same anatomic location under treatment, and they increase their dosage to improve ability to tolerate such pain. Individuals with opioid-induced hyperalgesia will also experience pain in other locations, which would be improved by decrease in opioid dose.

It is important to note that individuals will not necessarily be diagnosed with addiction if they experience tolerance, physical dependency and withdrawals, while using opioids as prescribed. The Diagnostic and Statistical Manual of Mental Illness 5th Edition (DSM-5) excludes physiological tolerance and detrimental medical effects from diagnosing opioid use disorder (Lembke et al., 2016). Opioid use disorder (addiction) is described by DSM-5 by the presence of the three “C” s: control loss, compulsion, and continuous use. Thus, to be diagnosed with opioid use disorder, an individual has to demonstrate damaging behaviors involving using larger numbers of pills than prescribed, seeking early refills, or doctor shopping. Such individuals will also compulsively use every available resource to attain and use the drug and continue to use the opioid regardless of the harmful consequences. Individuals who experience withdrawals, physical tolerance and dependency while using opioids as prescribed thus do not exhibit the characteristics of addiction (Lembke et al., 2016, p. 983; Sweeny, 2016; Wachholtz et al., 2015).

Shift to Heroin

Substantial evidence has shown that individuals with previous nonmedical use of prescription opioids are at higher risk of heroin use (Martins et al., 2015). In the raging opioid epidemic, several recent measures have been taken to cut the excess supply of prescription opioids that are diverted for non-medical use.

In 2010, Oxycodone, which is one of the widely prescribed prescription opioid analgesics, was reformulated so it could not be dissolved in water (Foggers & McGuiness, 2014). This prevented it from being dissolved and injected. The National All Schedules Prescription Electronic Reporting Act and establishment of state-run monitoring system in 49 states decreased the supply of medication. The Centers for Disease Control and Prevention released Guidelines for Prescribing Opioids, which advise careful prescribing of these substances (CDC, 2017d). However, these measures may have the unintended consequence of sending prescription opioid users to a black market where they were introduced to a much cheaper, more potent and more widely available option with a similar molecule, heroin (Jones, 2016; Martins et al., 2015).

The addiction to prescription opioids indirectly created markets for heroin within communities around U.S. where the heroin market had not existed previously (Quinones, 2015). Black tar heroin dealers from Jalisco, Mexico, with the “pizza delivery” drug marketing model, started infiltrating small towns with heroin that was one fifth the price of very expensive opioid pills. Just as Purdue Pharma was forcing opioids on physicians

with plentiful visits, Jalisco heroin dealers were visiting their customers with small amounts of heroin to make sure they continued using (Sweeny, 2016c).

The fact, that some dealers sell both illegal drugs and prescription drugs may facilitate the gradual intensification of drug use. Those who transfer from prescription pills to heroin are usually more likely to be in an advanced stage in their drug use history (Martins et al., 2015). Some users may be already injecting the prescription drug at that point, so the fear of needles is not an issue anymore (Quinones, 2015).

The cost of heroin greatly contributes to this shift. Heroin can be purchased for \$15 to \$20 for 100 milligrams. One opioid pill purchased illegally can cost about \$20-\$30 (Foggers & McGuinness, 2014), depending on its weight (usually \$1 for 1 milligram). Thus, with a prescription, an 80-mg tablet will cost about \$6, but when sold on the black market, the cost will be about \$80 (Connecticut Clearing House, 2017).

Martins et al. (2015) revealed the substantial rise in the yearly rate of heroin use between 2002-2005 and 2008-2011 was only seen among non-Hispanic whites that reported non-medical use of prescription opioids. The rise in heroin use and prescription opioid use among non-Hispanic whites seemed to be parallel. Even more, the rate of heroin dependence among heroin users from the 2002-2005 to 2008-2011 did not significantly increase. When the general population was used as a denominator, a significant rise in the annual rate of heroin abuse and overdoses among non-Hispanic whites was observed. These results support the suggestion that non-medical prescription opioid use is connected to heroin use and heroin overdoses within this population (Martins et al., 2015).

Section 2: Risk Factors for Prescription Opioid Misuse

Person Risk Factors

Even though much of the research states that opioid use disorder, prescription opioid overdoses and deaths can happen to anyone, certain disparities exist. Disparities are grounded not only based on sex, age, and racial differences, but also on religion, tribe, national origin or refugee status, sexual orientation, and social position (Braverman, 2006, p. 184). According to the 2014 National Survey on Drug Use and Health, an estimated 2.1 million Americans used prescription drugs non-medically for the first time within the past year, which averages to approximately 5,750 initiates per day. Fifty-four % were females and about 30 % were adolescents (SAMHSA, 2015a).

Although, on average, more men die from drug use overdoses than women (Kozhimannil et al., 2017), the complex risk factors associated with abuse of prescription opioids among women are concerning (Hemsing, Greaves, Poole, & Schmidt, 2015, p. 2). About 18 women die every day of a prescription opioid analgesic overdose in the U.S. Between 1999 and 2010, deaths caused by prescription opioid-related overdose among women increased 400% compared with a 237% increase in men (CDC, 2013).

Biopsychosocial (Clark, Anderson, Clark, & Williams, 1999) and environmental determinants drastically contribute to disparities between men and women who misuse and overdose on prescription opioids (David & Collins, 2008, p. 175). Women have longer life expectancy than men, so they may be more likely to suffer chronic pain for a

longer time. Different sex hormones may contribute to different perception of pain between men and women. Other reasons for long-term opioid use among women involve endocrine disruption, infertility, neonatal health risks, increased risk for anxiety and depression (Hemsing et al., 2016).

Increased prescription opioid abuse in women is not necessary solely the result of neurological responses (Hemsing et al., 2016, p. 2). David and Collins (2008) suggest that social and environmental factors may be more important than genetic ones (p. 175). Hemsing et al. (2016, p. 2) state that expression of pain is more acceptable from girls than from boys because of the gender role socialization that we are accustomed to since a young age. Women are more likely to “experience trauma, gender-based violence and psychological effects of trauma” (Hemsing et al., 2016, p. 3). In general, women who have experienced trauma, including intimate partner violence and sexual abuse, are more likely to suffer unrecognized or hard to treat medical conditions such as physical injuries (Hemsing et al., 2016, p. 3).

Many qualitative studies have shown that women started to misuse prescription opioids as an attempt to care for themselves, as this may be the most accessible form of self-care (Buer et al., 2016, p. 2). Buer et al. (2016) conducted face-to-face semi-structured interviews with women in Appalachia who reported that, despite their desire to decrease prescription opioid use, they are overwhelmed with the stress and social isolation of caretaking work. Especially in rural areas, women indicated that poverty, unemployment, lack of affordable health care, lack of mental health care, inaccessibility of expensive substance abuse treatment and waiting for less costly treatment services,

limit their options to decrease use. Others revealed they continue using because it was their only means to cope with physical and emotional pain (Buer et al., 2016, pp.7-8). This resulted in women being targeted more than men by pharmaceutical marketing, and being prescribed higher doses of opioids by physicians. Using prescription opioids to cope with traumatic experiences expose women to a higher risk for opioid additive side effects and possible overdose (Manubay et al., 2015).

Over the past 10 years, non-medical use of opioids in pregnancy almost doubled (Kozhimannil et al., 2017). The rise in prenatal opioid use poses a substantial public health concern, with the health and social risks not only for women, but for the infants and families as well. Opioid use during pregnancy is linked to heightened risk of preterm birth and neonatal abstinence syndrome. These newborn withdrawals are a large contributor to infant mortality.

Kozhimannil et al. (2017) examined cross-sectional data from 2005 to 2014 from the National Survey of Drug Use and Health (NSDUH) of over 8000 women ages 18-44 and selected women who identified past 30-day non-medical opioid use. The sample was asked 10 questions about the source of opioids while they were ensured privacy when answering survey questions in their home. Delicate questions were asked confidentially via computer with headphones. They separately studied data for the women who reported that they were pregnant at the time of the survey. Researchers investigated associations between the three most common sources of opioid non-medical use – doctor, friend or relative, and dealer – and pregnancy status. Almost half of pregnant women in this sample reported a physician as the source of opioids, while three-fourths of non-pregnant

women reported a friend or relative as source. This suggests the need for targeted policy efforts to address opioid use during pregnancy and over the reproductive years (Kozhimannil et al., 2017).

HHS (2016b) states that lack of special treatment programs for adult, pregnant or postpartum women as well as low treatment utilization of the existing programs may contribute to the discrepancy between men and women in prescription opioid misuse. Future research should systematically evaluate the impact of interventions while considering the unique aspects of women across age, race, and socioeconomic spectrums (HHS, 2016b). Research recognizing gender-based differences (Kozhimannil et al., 2017) holds the potential for improving clinical evaluation, tailoring pain management strategies, minimizing misuse and improving treatment programs (Manubay et al., 2015).

Netherland and Hansen (2016) indicate that prescription opioids were initially marketed to a predominantly white and prosperous, suburban population. These individuals had private health insurance and regular access to primary care physicians. Prescription opioids thus entered the universe of drug trade as legal drugs dispensed by healthcare practitioners (Netherland & Hansen, 2016). Resulting non-medical use of prescription opioids was found to be almost twice as high among whites as Blacks (Netherland & Hansen, 2016). As prescription's opioid overdose deaths in women more than quadrupled in the past decades (Han, et al. 2017), death rates especially among white and indigenous women have significantly increased. At the same time, opiate 'overdose' death rates among Blacks or Hispanic have decreased (HHS, 2016b). Research suggests that white non-Hispanic middle-class women, American Indian and

Alaskan Native women are at a higher risk for prescription opioid misuse, overdose and death in comparison to African American or Hispanic women (HHS, 2016b).

The U.S. Department of Health and Human Services (HHS, 2016b) proposed that middle class white women are more likely to be treated for chronic pain than minority women, which contributes to an increase in opioid prescriptions for this group. Other studies support that institutional racism (Clark et al., 1999) interlaced with socioeconomic status indicates the high risk of prescription opioid abuse and dependency of indigenous women (Netherland & Hansen, 2016). According to the HHS (2016), clinicians' bias contributes to inequality in rates of prescribing opioids such that "minorities are being less likely to be prescribed opioids" (p. 16).

Bias in prescribing pain medication for minorities is plausibly influenced by race, moral, and legal inequities that resulted from the crack cocaine epidemic of the 1980s–1990s. Policy responses to the crack epidemic focused on degrading African-American and Latino crack users, while leaving white powder cocaine users relatively unaffected (Netherland & Hansen, 2016). Discrimination by prescribers may have contributed to racial disparities in opioid prescribing (HHS, 2016b).

Disparities also exist with respect to age. Adults aged 40 years and older are more likely to use prescription opioids than adults aged 20–39 (CDC, 2017g). But, older adults are at higher risk for medication misuse than the general population because of their high rates of pain, sleep disorders/insomnia, and anxiety. Their possible cognitive decline could lead to improper use of medications (SAMHSA, 2016).

Just as opioid prescriptions have increased for adults, prescription sales in the United States since 1994 doubled for adolescents (Foggers & McGuiness, 2014). The rise of opioid prescriptions has been linked to increase in non-medical use among youth. Additionally, initial prescription opioid misuse occurring at an early age, has been linked to heroin use in late adolescence (Sharp, Estrada, Elio, Prendergast, & Carpenter, 2017). On a typical day, 74 adolescents aged 12-to-17 visited an emergency department because of prescription or nonprescription pain relievers (SAMHSA, 2015c). Among adolescent patients who were hospitalized due to trauma, 12.5% were still taking opioids one year after admittance (Pattinson-Sharp, Estrada, Elio, Prendergast, & Carpenter, 2017).

Adolescents may start using prescription opioids by legitimate prescription, for example due to a sports injury (Veliz, Boyd, & McCabe, 2013). Miech, Johnson, O'Malley, Keyes and Heard (2015) state that legitimate use of opioid analgesic before finishing high school significantly predicts risk of future opioid misuse after high school. Surprisingly, this association is linked to individuals who had little to no history of drug use and they strongly disapproved use of illegal drugs. Adolescents may also get prescription opioids from friends and family (Foggers & McGuiness, 2014), or at the 'Pharming' parties (Zosel et al., 2013). Forty-seven percent of adolescents that medically misused prescription opioids were motivated exclusively by pain relief, and 30% of nonmedical users were driven by other motives, such as 'to get high' (McCabe, West, & Boyd, 2013).

Physiologically, the human brain is vulnerable to addictive chemical substances, especially during adolescence (including individuals under 25 years of age) when the

brain is not fully developed. Substances of abuse act by altering neurotransmission in the brain; thus, prescription opioid use may have unfavorable and long-term consequences on the developing brain (Wu, Blazer, Li, & Woody, 2011). Because of its effects on opioid receptors that trigger feelings of euphoria and stimulate brain rewards system (Foggers & McGuiness, 2014, p. 18) they acquire high misuse potential (SAMHSA, 2015c). In order to re-create the feelings caused by pain medication, adolescents repeatedly engage in misuse. Since opioids were prescribed by a physician, adolescents often falsely believed that opioid analgesics were safer than other illegal substances (Wu et al., 2011; Foggers & McGuiness, 2014; Ford, Sacra, & Yohros, 2017).

According to Wu et al. (2011), it seems that only when adolescents develop severe or legal problems they come to the attention of adults and seek treatment. Their study with a sample of 72 adolescents showed that the majority of the adolescents who exhibited symptoms of opioid dependence (83%), abuse (84%), or sub-threshold use (91%) did not receive any substance abuse service or treatment. Failure to seek treatment could be attributed to fears of stigma and missing knowledge about dangers of prescription opioid use (Wu et al., 2011, p. 8).

In addition to the demographic factors outlined above, according to the CDC (2017a), the following personal risk factors increase susceptibility to prescription opioid misuse and abuse: overlapping prescriptions from multiple pharmacies; high daily dosage; mental illness or history of substance abuse; living in rural areas or having a low income. In addition to mental illness and history of substance abuse (CDC, 2017a), those

with a preadolescent history of sexual abuse and psychiatric comorbidities may also be at an increased risk for prescription opioid misuse (Lembke et al., 2016).

Although pain is reported as a primary reason for use of opioids, those with chronic pain reported opioid use more significantly. In a study by Weiss et al. (2014), compared with 49% of those without chronic pain, over 80% of those with chronic pain stated the pain relief as the main reason for initiating opioid use. Other reasons for misuse included getting high, and a small group of the sample in one study reported reasons such as anxiety, depression, inability to sleep, or forgetting bad memories. Individuals using opioids who did not have chronic pain reported that they used for reasons such as boredom, social/interpersonal reasons or cravings (Weiss et al., 2014).

Consistent with these findings, Han (2017) concluded that 63.4% of American adults who misuse prescription opioids reported that the main motivation for their most recent misuse was to relieve physical pain. Adults who misuse but do not have an opioid use disorder report relief from physical pain as the most common motivation (66.3%), to relax (11.2%) and to get high (10.8%). Finding alternative ways to manage pain would help reduce the misuse of prescription opioids.

Social Environmental Risk Factors

While much of the research has focused on individual risk factors, social environmental risk factors have also played an important role in the opiate epidemic (CDC, 2017h). The biggest drivers of addictions are absence of jobs, poor housing and

health compromising environments (McIver, 2017). During the Modern Healthcare briefing on the opioid epidemic in U.S., Nash stated: “It is all about social determinants” (McIver, 2017, p. 478). Research suggests that physician prescribing practices, past experiences, socio-economic factors, geography, and demography all contribute to misuse of prescription opioids (HHS, 2016b).

According to the CDC (2017h), people living in rural areas or having a low income are at higher risk for misuse of prescription opioids. Adults who had lower family income, and who did not obtain health insurance or employment are more commonly diagnosed with prescription opioid use disorder. For example, people with a family income less than \$50 000, have higher rates of misuse and use disorder (Han et al., 2017). Data from the National Survey on Drug Use and Health, showed that among 71,000 people aged 12 and older, prescription misuse and abuse occur more in rural areas (Ford et al., 2017). One example of the immense impact of overprescribing practices and dispensing practices of local pharmacies is a rural town with 392 inhabitants. In a period of 24 months, the pharmacy in this town received six million OxyContin pills. To consume this number of opioids, each person of this town would have to ingest 31 pills every 24 hours (Schwartz, 2017).

Such a pharmacy presents characteristics of a “pill mill”. It is a term for a clinic or pharmacy that prescribes or dispenses without a legitimate purpose and consistently violates standard medical practice (Penm et al., 2017). In such situations, it is obvious those recipients had overlapping prescriptions, took more pills than prescribed, and that large numbers of pills were diverted. The originator of the pill mill clinic was Dr. Procter,

practicing in Ohio, who was known to prescribe large amounts of opioids to people waiting in the line at his clinic without appropriately diagnosing them (Quinones, 2015).

Besides physician and pharmacy practices, neighborhood type is another social determinant that influences prescription opioid misuse. Ford et al. (2017) used data from the National Household Survey on Drug Abuse of 19,430 adolescents aged 12-17 to examine neighborhood characteristics and prescription drug misuse, and found that two variables were significantly related. Their study revealed that, compared with adolescents who lived in urban areas, those living in suburban and rural areas were more likely to report prescription drug misuse. They also found that lack of social capital and social disorganization were significantly related to prescription opioid misuse. Findings regarding social participation revealed an interesting point, namely that adolescents living in places with a lower level of social disorganization were less likely to report prescription opioid misuse. Social disorganization connects prescription opioid misuse and disadvantage of the neighborhood. Further, social capital is very important in preventing crime and deviance as it endorses the growth of solid social bonds. The analysis revealed that adolescents involved in school or community activities reported less prescription drug misuse, but when adjusting for age, race, and gender, participation was only significant for respondents who did not use marijuana or other drugs. The desire for social acceptance, increased interaction with others (Ford et al., 2017) and peer pressure to use opioids helped explain why higher levels of social participation were related to prescription drug misuse.

Rural living offers limited access to drug treatment and mental health care, both of which affects increased prescription drug misuse. The removal of structural barriers (transportation, insurance issues, child care, availability) in rural areas could hypothetically increase the use of the substance abuse treatment services (Buer et al., 2016). The prevention of prescription opioid misuse will require policies and interventions that include characteristics of neighborhoods (Ford et al., 2017), and includes both downstream and upstream determinants of this problem (Braveman, Egerter, & Williams, 2011).

Section 3: Prevention and Treatment

The drug epidemic is not a simple momentary problem; it is a complex, ongoing tragedy that is here to stay (DuPont, 2017). To ensure that opioids are prescribed safely for those with legitimate pain needs and that the drugs' benefits outweigh their potential harm should be a main interest of everyone involved. The Commission on Social Determinants and Health (CSDH) suggests that key roles of the health care system include increased focus on disease prevention and health promotion (Marmot, Allen, Bell, & Goldblatt, 2011), including education about potential harms of prescription opioids. Endorsing laws to educate physicians about prescribing practices is only one part of the response to the epidemic. To succeed will require partnerships across the sectors (Schuchat et al., 2017) where legislators, federal and state governments, health care

communities, researchers, academics and public will have to make major improvements in prevention, treatment and understanding of the problem (DuPont, 2017).

Education

According to CDC (2017j), allocating resources and increasing awareness about risks of prescription opioids is one of the prevention efforts that could save families from the devastation of overdose due to prescription opioid misuse. One role of health educators is to disseminate information about the risks and effects of prescription opioids, increase awareness about misuse and opioid use disorder, help alleviate stigma surrounding substance abuse, and increase the likelihood that people will ask for help. Many educational efforts on drug misuse prevention in the past were not successful (Lembke et al., 2016).

The D.A.R.E. program that was widely used in the U.S. in the late 1980s and early 1990s was an example of a prevention effort that was not effective. Young people were educated on the risks of drugs and how drugs can affect them. The results of the program backfired, as it seemingly invited adolescents to try drugs, and their consequent drug use actually increased (Caputi & Thomas McLellan, 2017).

In contrast, a theoretically grounded, evidence-based approach to community adolescent substance use prevention in the Icelandic Model had success. By relying on global research and policy makers, practitioners and a non-profit research institute developed a theory-driven intervention aimed at the neighborhood level. In spite of

changes in policies, divorce rates, and youth unemployment, there has been an overall decline of adolescent substance use in the ten years since the implementation of this project. This showed that cooperation between parents, community, schools and cultural traditions are key to effective substance use prevention among adolescents (Sigfusdottir, Thorlindson, Kristjanssonm, Roe, & Allegrante, 2008).

Effective prevention efforts do not teach about the addictive substances, but encourage pro-social behaviors even when the drugs are never mentioned. Interventions that have been shown to be effective in reducing substance use teach young people effective skills such as how to be on time, how to create persuasive argument, and how to incorporate ethics and morals into their lives (Sweeny, 2016b). Community-based interventions should, however, incorporate knowledge and skills that are directly related to prescription opioids. Examples include information on safely disposing of unused medications, disseminating awareness on how the Samaritan law related to overdose can save many lives, as well as a naloxone training program (Binswanger & Gordon, 2016).

Policy

The rise in prescription opioid misuse, dependency, overdoses and deaths prompted creation of federal and state policies to reduce opioid supply and expand treatment of opioid use disorder (Madras, 2017). The U.S. Office on National Drug Control Policy released a set of recommendations for all states to have efficient prescription drug monitoring (Florence et al. 2016). Congress passed the National All

Schedules Prescription Electronic Reporting Act and authorized grants to establish state-run monitoring programs in 49 states. Naloxone—a drug that reverses overdose effects—extension policies have been ratified in 43 states and Washington DC, yet naloxone cost remains as a notable barrier to widespread uptake (Barth et al., 2017).

In 2005, the CDC released Guidelines for Prescribing Opioids (CDC, 2017c); a set of evidence-based recommendations on prescribing practices of opioids by primary doctors treating chronic pain. Five years later, the U.S. Surgeon General, Dr. Murthy, released the first report involving addiction in America—Report on Alcohol, Drugs and Health. Long overdue, on October 26th, 2017, the U.S. President declared the opioid crisis as a public health emergency. Despite the rhetoric, the President’s budget for fiscal year 2018 from May 2017 shows \$279.7 million increased funding for drug control efforts, which is a 1% increase from previous year (Reinl, 2017). At this time, policy changes remain insufficient as indicated by the continuing number of opioid deaths (Madras, 2017, E2).

In the period between 2006 and 2015 numerous states implemented policies intended to decrease prescribing of opioids and overdose deaths. Ohio and Kentucky implemented requirements for certification of pain clinics and started to require clinicians to review the prescription drug-monitoring program (Schuchat et al., 2017). Despite similar actions in other states, national overdose death rates increased due to use of illicit opioids.

Insurance coverage for treatment services related to opioid misuse, dependency and opioid use disorder are also concerning. HHS (2016b) suggested there is a need for

change. Many alternative treatments for treating pain, such as acupuncture or massages are not covered by private insurance or Medicaid, while they are listed as one of the options of the first line of treatment for the chronic pain by CDC (2017e).

Our social system needs to provide alternatives to incarceration of opioid-using individuals (HHS, 2016a). For decades, policies have implied that people addicted to drugs are morally damaged and lacking in willpower. Society's responses to drug abuse were shaped by those views, treating it as a moral failing rather than health issue. This led to an emphasis on punishment rather than prevention and treatment (NIDA, 2014).

Drug courts are emerging now in many states. As they are tremendously progressive, they also could affect a woman's decision to seek help when they become dependent on prescription opioids. For example, potential loss of a child's custody plays a crucial role in the decision to seek help and, therefore, it is important to create social systems where women will not have to choose between seeking treatment and losing custody of her child(ren).

One family-centered treatment identified is the *Exodus* program. *Exodus* allows the entire family to live in the flats within the treatment environment. This program reports 80% completion rates and 90% family reunification rates (HHS, 2016a). This program has characteristics of cultural humility, and being other-oriented in regard to the facets of cultural identity that may be important (Waters & Asbill, 2013).

Physicians' Practices

Ensuring that opioids are prescribed safely should be the main interest of everyone involved (Brook et al., 2017), particularly physicians who may inadvertently play a major role in the diversion of drugs for non-therapeutic purposes (Cicero & Ellis, 2017). Changes in medical training that emphasize culturally sensitive education on prescription opioids and that recognize that addiction is a disease are indispensable. To minimize the environmental obtainability of opioids, it is essential that clinicians adhere to prescribing guidelines (Han, 2017). Contemporary experiences of prescription opioid misuse should drive medical schools to improve dissemination of knowledge about prevention, identifying people at risk, evaluating alternative programs, and referring those with opioid use disorders to care and management (Binswanger & Gordon, 2016). Insufficient training of physicians about opioids was reflected in recent data that showed that 91% of overdosed patients had received a prescription from a physician (Madras, 2017).

The significance of empathy in the delivery of high quality care has been advocated, but education and training in “compassionate care” has too often been absent (Webster et al., 2017, p. 1471). Incorporating cultural competency and cultural humility into education and practice is a stepping-stone to better care for people with prescription opioid dependency and opioid use disorder. Appropriate gender, race and culture specific screenings (Hemsing, Greaves, Poole, & Schmidt, 2016) are significant strategies that should be placed in the training curriculum and clinical practice to address the disparities

in prescription opioid misuse. Manubay et al. (2015) stated that understanding sex-specific clinical profiles might help clinicians identify negative consequences of pain syndromes and opioid analgesics early in treatment.

For example, treatment approaches for women need to be women-centered, trauma-informed, and involve harm reduction methods. This will empower women in sharing their realities of prescription opioid misuse and dependency (Hemsing et al., 2016). When clinicians incorporate interventions and approaches that will provide a safe, respectful, and nonjudgmental environment, it may enable women to share their stories and prompt their healing processes (Hemsing et al., 2016).

Currently practicing physicians should be required to take a course on addiction, just like they had to take a course on pain treatment in 2001 (Lembke, 2012). Since there is not an objective measure for the severity of the pain, physicians have to use their judgment and knowledge to decide whether opioids are appropriate. It is also very challenging for physicians to determine which patients are currently abusing opioids or are at risk for abuse. When they conclude that opioids are needed, providing patients with information about side effects, withdrawal symptoms, risks for addiction, risks for unintentional overdose, and ways to avoid death caused by overdose must be standardized in their practice (Barth et al., 2017).

If clinician suspects that a patient is misusing opioids, they have to confront the patient even if it is faster and easier to diagnose pain and prescribe opioids than it is to diagnose and treat addiction (Lembke et al., 2016). Cicero, Ellis and Kasper (2017) suggested that in more than 95% of their treatment-based sample, patients misusing

opioids had experience with addictive substances such as alcohol, nicotine and other illicit or prescribed drugs prior to receiving their first opioid prescription. Despite clinicians' and patients' embarrassment, about use of illicit substances or other prescribed medications, physicians have to overcome reluctance and ask these sensitive questions (Cicero et al., 2017). Incorporation of comprehensive screening for concurrent psychiatric conditions, review of patients' history of substance use, brief interventions and referral to treatment would considerably help doctors to limit the opioid supply and prevent diversion, misuse and inappropriate prescribing of opioids (Cicero & Ellis, 2017; Madras, 2017).

Treatment of Opioid Use Disorder and Chronic Pain

The benefits of opioid therapy for acute pain are sustained by multiple clinical trials (Lembke et al., 2016), just as are the harms associated with increased opioid prescribing for chronic pain in the United States (Bonnie, Kesselheim, & Clark, 2017; Han et al., 2017; Lembke, 2016). Recognition of the escalating prevalence of opioid use disorder with chronic pain management suggests more consistent use of better options (McIver, 2017) for this difficult-to-treat condition (Wachholtz et al., 2015). People already addicted to opioids could be successfully treated through Medically Assisted Treatment (MAT). A significant step to saving lives was development of Naloxone, a medication referred to as "Vitamin N" by emergency department personnel because it reverses respiratory depression occurring during overdoses.

As opioids are not a first line therapy for chronic pain, following recommended alternatives to pain treatments (CDC, 2017e) may actually work better. Some of the options include non-opioid pain medicine as ibuprofen, Acetaminophen (Tylenol[®]) or ibuprofen (Advil[®]); cognitive behavioral therapy; exercising or physical therapy, depression medication, corticosteroid injections or therapies such as acupuncture and massage (CDC, 2017e).

It is estimated that 2 million people in the U.S. have opioid use disorder (Schuchat et al., 2017), but only 1 in 10 Americans with a substance abuse disorder receives treatment (Wen et al., 2017). People that are already suffering with opioid use disorder can be effectively treated and enter long-term recovery through a mixture of medication-assisted treatment (MAT) and psychosocial support. The most successful methods for treating opioid use disorder, involve agonist medications (Sigmon et al., 2013) that decrease withdrawals and cravings (D'Onofrio, 2015) such as methadone, buprenorphine, naltrexone, and their generic forms of FDA approved medications for MAT (Wen et al., 2017).

Weiss et al. (2015) examined outcomes over 42 months in the Prescription Opioid Addiction Treatment Study (POATS), a multi-site clinical trial lasting up to nine months. The study examined different lengths of buprenorphine-naloxone treatment plus standard medical management alone or in addition to individual opioid drug counseling. The first phase, brief treatment, consisted of 653 participants receiving a 4-week taper. After an additional eight weeks, only 7% of participants had successful opioid use outcomes, abstinence or near-abstinence. The second phase, extended treatment, offered 12- week

buprenorphine to participants unsuccessful with brief treatment. Out of 252 participants, 49% showed opioid abstinence in week 12 and ≥ 2 of the 3 previous weeks. They were tapered off the buprenorphine during weeks 13-16 and followed for another 8 weeks. This sample of 306 was then contacted again after 18 months post randomization. Potter et al. (2015) examined long-term outcomes of the POATS. Half of the participants completing the month 42 follow-up reported abstinence from opioids without agonist therapy, and $>75\%$ receiving agonist therapy reported abstinence from other opioids.

Participants with more severe pain at baseline were more likely to be opioid-dependent at follow-up. It may be that the severity rather than the simple presence of chronic pain has greater prognostic meaning in this population. Study findings suggest the importance of access to pharmacotherapy in this population (Weiss et al., 2015; Potter et al., 2017).

D'Onofrio et al. (2015) tested the efficacy of three protocols for treatment of opioid dependence: (1) screening and referral, (2) screening, brief intervention and referral; and (3) screening, brief intervention, emergency department initiated buprenorphine/naloxone treatment and referral to primary care with 10-week follow up. The treatment using buprenorphine significantly increased engagement in addiction treatment and decreased use of inpatient addiction settings. Although it was a single site study with a small sample and it needs replication, results suggest that treatment with buprenorphine is more feasible than just referral with or without brief intervention.

The acute effects of opioid overdose such as respiratory arrest can be reversed through the administration of naloxone, which is a U.S. Food and Drug Administration

(FDA) approved medication (Wen et al., 2017). It is safe, effective and non-addictive, and it lacks contraindications except for a rare allergic reaction (Green et al., 2017). It used to be restricted to emergency departments and first responders, but the contemporary epidemic has led to widespread distribution of naloxone (Madras, 2017). In 2014, the FDA approved the first naloxone auto-injector (Evzio), which is a single injection with the fixed-dose intended to allow individuals without medical training to reverse opioid overdose (Gupta, Shah, & Ross, 2016).

In 2016, CDC endorsed a recommendation that clinicians prescribe naloxone to patients taking higher doses of opioids, taking opioids and benzodiazepines, and to patients who overdosed in the past or who had history of substance use (Gupta et al., 2016). Numerous states have implemented efforts that provide various levels of immunity from prosecution for doctors who prescribe naloxone to family members or friends of the patients. Samaritan laws adopted by 42 U.S. states protect bystanders who possess illegal substances when they try to save an individual experiencing an overdose by calling 911 or by administering naloxone (Gupta et al., 2016).

Section 4: YouTube and Disease Prevention and Health Promotion

The over prescription of opioid analgesics goes hand in hand with opioid use disorders and the sweeping number of deadly overdoses. Studies show the unpleasant statistics involving opioid users and their deaths, but substantial emotional costs

associated with this epidemic are often unmentioned in the scientific articles.

Embarrassment, fears, guilt, loss and grief are common to opioid users or to people who care for them. Because of the stigma related to substance abuse, people may need more private places to look for information, interact or share their experiences (Binswanger & Gordon, 2016).

YouTube can potentially provide a venue for prescription opioid users who are ready to seek information about treatment options or relapse prevention from the privacy of their homes. YouTube can also assist caregivers who are unsure of signs and symptoms of prescription opioid misuse or who want to find ways to approach the issue. In addition to valuable information on the epidemic crisis, these videos could integrate the empathy and compassion, while providing information that explains that addiction is a brain disease, not a problem of “bad and weak people, unwilling to lead moral lives and to control their behavior” (Leshner, 1997, p. 45). Spreading this position on such a platform could reach millions of viewers and could help diminish the shame and humiliation of addiction. Sharing information about addiction via YouTube could improve the quality of life and reduce the unnecessary loss of life (Marmot et al., 2012). In contrast, videos can also convey misleading or harmful information. The main rationale for this study is that little is known about what information is and is not being disseminated in widely viewed videos.

The key words “YouTube” AND “drugs” and “YouTube” AND “addiction” were used to search PubMed on September 25th, 2017 and generated 26 results (a search using YouTube and opiate epidemic yielded no studies). After excluding irrelevant articles,

seven articles were selected for review, including both quantitative and qualitative descriptive analyses of YouTube videos regarding drugs and addiction on YouTube. The studies focused on education and prevention potential of the YouTube video site, and assessed the portrayal of drugs, alcohol and tobacco, on YouTube. No studies that specifically addressed opioids or the opiate epidemic were identified.

The search for the relevant journal articles continued in early 2018 searching PubMed and Web of Science databases using the key words “YouTube” AND “addiction;” “YouTube” AND “prescription medication;” “YouTube” AND “medication;” “YouTube” AND “drugs;” or “YouTube” AND “chronic pain.” Five more articles were identified. The literature review also included the dissertation that served as an inspiration to the present study. Thirteen articles and the dissertation were used to support the potential usefulness of YouTube as a means to share increased awareness and interest about the opiate epidemic. A search using YouTube and opiate epidemic, once again, yielded no studies.

To determine whether YouTube could provide a new data source for healthcare professionals, Chary et al. (2014) studied data available on social media about recreational use of over the counter Dextromethorpan (DXM), a substance that is challenging to track otherwise. The primary goal was to determine whether signs and symptoms of drugs could be retrieved from YouTube. Substances as DXM are not perceived to be a drug of abuse, therefore, they are not systematically investigated as illicit drugs. The public health impact of the recreational use of DXM is, therefore, difficult to determine.

Researchers used methods of computational linguistics to excerpt information from YouTube comments, and they recreated many of the clinically termed signs and symptoms of DXM absorption at various doses. They randomly chose 2000 comments from the CouchDB database, removed stop words, and used graph representation of English language, WordNet, to group words into clusters. Using the distance between clusters, they calculated the similarities of two words as the match of the ratio of the shortest path length between two nodes to the width of the graph. The authors found 40 most frequently occurring words in the body of comments. They found what commonly consumed amounts are consequent to what physiological effects. They determined that these results correspond with prior reports on DXM. They were able to determine ranges of dosage for distinct symptoms and occurrence of death. Some limitations included inability to verify YouTube comments, no assessment of physical effects by trained clinicians, and that the dosage estimates might be inaccurate. In addition, there was no way to control for tone of sarcasm in the comments, and YouTube comments were considered in isolation. Despite these limitations, appropriately collected data can complement the weaknesses of more traditional data sources.

The data about the recreational use of DXM obtained through the analysis of social media would be difficult to obtain through other means. This type of analysis offers an example of an opportunity to increase knowledge about substance abuse. In many research situations, users may be reluctant to “admit” characteristics of their use, while anonymous social media could be a good source for spotting symptoms otherwise undetected. Moreover, this inexpensive technique of extricating data may be used for

other topics in social media, which could enable the automatic extraction of healthcare information and complement existing knowledge on substance use.

Hansen et al. (2016) studied the educational potential of YouTube focusing on medication use in pregnancy. In the past 30 years, medication use in pregnancy has increased despite the low availability of data about the safety of many of these drugs. A survey involving 24 countries indicated that over 80% of women use the Internet to inform their decision-making while pregnant (Hansen et al., 2016). A list of the products most commonly used in pregnancy was paired with seven pregnancy-related terms and searched. The authors used a YouTube Application Programming Interface (API) video feed that searches video metadata to detect potential YouTube videos with medication and pregnancy-related content. Three researchers abstracted and categorized the content information from 651 videos with both pregnancy and medication in the title, which resulted in exclusion of 337 videos. Descriptive statistics were used to characterize the information abstracted from remaining 314. Results showed that researchers were able to systematically extract videos related to safety of medication use in pregnancy. They found that the most commonly discussed topics involved birth defects and antidepressant medication. Most importantly, the YouTube videos did not adequately reflect knowledge about the risks of drugs in pregnancy when they were compared with TERIS (Teratogen Information Systems).

A study conducted by Fixsen and Ridge (2017) researched stories of benzodiazepines users regarding withdrawal and recovery that were posted on YouTube and supporting web sites. The researchers used a narrative approach to investigate

metaphors and language posted online by the users. For comparative purposes, they added autobiographical literature. Out of 14,000 videos found on YouTube, 300 of the most popular videos were reviewed. The data were analyzed with attention to phrases and linguistics beyond the ordinary language describing user's experience. The researchers examined samples of patient's writing from every selected site and saved repeated words, phrases and large extracts. Words and expressions associated with withdrawal and recovery were cross-coded according to category headings. Concepts of recurring themes were further discussed. Based on the themes, a second search was conducted. Then the final coding scheme was developed and the researchers manually coded data under themed headings. The validity of the online accounts of withdrawal was compared with autobiographies of benzodiazepine users and clinical texts. Researchers then constructed a picture of distress and recovery during withdrawal through the interpretation of the expressions and metaphors.

They identified seven major themes: hell and isolation, anxiety and depression, alienation, physical distress, anger and remorse, waves and windows, and healing and renewal. As such processes are difficult and isolating, these videos may be not only informative, but be encouraging and supportive for people who turn to online forums and seek reassurance and advice. Internet sites also offer the space to celebrate success. The researchers were only able to analyze a small portion of all the videos and sites using qualitative and interpretative methodology, so the essence of the study was exploratory. However, the researchers believed the information provided by the users can complement

existing professional models and be of considerable value to practitioners, and warrants further exploration.

Lange, Daniel, Homer, Reed, and Clapp (2010) also undertook a study to determine whether YouTube videos offer a potential to observe drug effects in natural settings. The authors studied effects of salvia through observation of publicly posted videos. The plant contains the active agent Salvinorin A, which is a potent hallucinogen. Researchers were trying to fill in the gap created by a lack of published controlled human-laboratory experiments describing salvia's effects. They found over 3000 videos by using the search word "salvia." Every 4th video was selected until 100 videos were obtained. After exclusion of 76 videos that did not include the entire 'trip', a second search was conducted to create a final sample of 34 videos. Three coders conducted observations using an adapted version of the Hallucinogen Rating Scale. Videos were split into 30-second intervals starting with the consumption of salvia. Any observed effect was coded as present in that interval and was rated for severity on a 5-point scale. Dose was calculated by counting the number of hits and the seconds that the smoke was held. Variables were examined three ways: 1) duration of effect, 2) duration of severe effect and 3) observation of severe effects. Analysis was conducted by using T-tests and Pearson correlations. The authors found that observable effects of salvia can be measured (based on dose and administration) and that YouTube videos can be used as a resource for behavioral observation research. As the risks linked with Salvia were generally unknown, YouTube offered insight about some risk domains that were observed. Effects of drugs may be determined by observing the setting and emotional reactions. Drugs

effects may be subtler in laboratory than at home or at a party. YouTube videos thus offer the prospect of observing effects of drugs in the natural setting.

Cavazos-Rehd, Krauss, Sowles, Murphy and Bierut (2017) investigated marijuana consumer's exposure to user-generated online reviews about the drug on YouTube, and its potential to influence their purchase of marijuana. This study improved understanding about how young adult marijuana users view online reviews, which is important due to their potential to shape marijuana purchasing decisions. Cavazos-Rehd et al. (2017) searched YouTube to identify marijuana related videos by key words "weed review," "marijuana review," and "cannabis review." Using the relevance sorting method, they selected the first 40 videos for each of the phrases. After removing duplicates, their sample consisted of 83 videos. Twenty videos were reviewed and used to develop a codebook, with physical and mental health claims, and physical characteristics of marijuana. The research team coded descriptive characteristics of each video, age restrictions, overall recommendations made by reviewer about the respective marijuana-related product, and whether reviewer encouraged follow up social networking for viewers. Two research interns coded videos together, and one senior researcher viewed and coded videos separately. This resulted in moderate to almost perfect inter-rater agreement across all codes. Popularity and engagement of the videos were analyzed using descriptive statistics. Distributions of views, comments, likes and dislikes were positively skewed, therefore, they were described by the median instead of the mean.

The second part of the study contained survey about marijuana product reviews on YouTube. The survey was conducted among members of SurveyMonkey® Audience,

a proprietary online panel of participants drawn from the over 30 million people who take SurveyMonkey surveys. Weights were applied to the survey data so that marginal totals matched that of past-month marijuana users aged 18–34 years in the 2014 National Survey on Drug Use and Health (NSDUH) on age, gender, and race (Cavazos-Rehd et al., 2017, p. 3). The sample contained 742 participants, who were asked whether they searched the information or reviews about marijuana during the past 30 days, and whether they looked for or tried to find information about marijuana. Participants were asked about demographic characteristics (e.g., gender, age, race, completed education level) and state of residence. Descriptive statistics, logistic regression and multivariable logistic regression models were used to analyze the data. The authors found that user-generated reviews are popular on YouTube, and 1/3 of the sample of young marijuana users reported looking for product reviews at least once in the past 30 days. The analysis of the content showed that the marijuana product review videos mostly contained positive discussions about marijuana. A troublesome finding was that most of the reviewers' goals were to get as high as possible, and there were no educational or warning messages on acute effects, impaired cognition, physiological and mental state changes. Understanding risks of marijuana use is critical information for young adults who have largest prevalence of cannabis use. Further, the majority of the persuasive messages involved describing healing properties of marijuana use. One could speculate that the focus on positive messages without the negative effects could increase normalization of use. This is alarming as many of these videos are readily available and can be watched by underage individuals. Demographic data showed that product review videos are viewed more by

individuals with lower levels of education, which could lead to problematic use behaviors. The researchers concluded that prevention efforts should get in gear to compensate persuasive videos toward marijuana use.

Other substances of abuse such as tobacco and alcohol are commonly included in television programming and commercials. The study of Cranwell et al. (2015) was the first to quantify contemporary exposure of tobacco and alcohol in music videos on YouTube. A sample of 110 YouTube videos included records listed in official singles charts in the UK. Coders independently examined and coded visual and lyrical content by 10-second intervals capturing the presence of alcohol or tobacco. Coding categories included implied use, paraphernalia, brand appearance, content, and specifically electronic cigarette content. Repetitive presence in the same category was coded as a single event. If the same appearance crossed into next 10 segments, it was coded as a new event. Data were analyzed using basic descriptive statistics. The authors also included questions on viewing the 32 most popular songs with high tobacco or alcohol content in a national survey of adolescents done by YouGov PLC and the public health non-governmental organization Action on Smoking and Health. They recruited a random sample of 11-18 year olds by email (to them or parents) from a database of people who had agreed to be contacted. The sample comprised 2068 adolescents (1064 boys and 1005 girls), who consented to the survey and then followed a URL link to complete their responses on-line. A randomized order of 32 music videos were presented to participants with the following questions: ‘Which, if any, of the following music videos have you

seen?’ and ‘Which, if any, of the following music videos have you seen more than once?’ (Cranwell et al., 2015, p. 705). All data were analyzed with basic descriptive statistics.

The study revealed that tobacco (83% of videos) and alcohol (41% of videos) are frequently occurring in the content of music videos and are seen by a wide body of young people, especially girls. Even though tobacco branding was passively presented, alcohol brands were widely recognized and used in lyrics by artists. This study was the first to identify emerging use of electronic cigarettes in music videos. The survey showed that girls watched and re-watched these videos more often than boys. The researchers concluded that use of celebrities to endorse alcohol is a particular problem as they promote it via videos directed to youth, and such videos should be restricted and controlled more tightly. YouTube’s policy on age should assure that certain content is not viewed by underage individuals. Teaching critical thinking to young people could be another venue for them to be able to appropriately evaluate the messages depicted by such videos.

Huan, Kornfield and Emery (2016) examined the presence of the e-cigarette videos on YouTube. The researcher first created a list of 70 e –cigarettes key words and then engaged a ContextMiner, YouTube crawling program that retrieved the videos related to e-cigarettes. For each keyword, YouTube crawls were conducted for one year. The following characteristics were downloaded to a database: title, description, tags, associated channel, posting date, name of uploader account, URL, view count, number of comments, number of ratings and average rating. YouTube’s relevance algorithm ranked videos in increasing order of assumed relevance for each search term. YouTube limits the

quantity of videos retrieved by crawls, thus additional crawls were conducted where videos that matched were chosen depending on the posting date. Through the relevance and posting date technique, and after the exclusion of irrelevant videos, the researchers build the sample of 28,089 unique videos related to their topic, which were later coded. Their analysis showed that YouTube is primarily utilized for promotional and marketing purposes (70%). The results also revealed there were over 100 million total views, and a high level of user engagement with e-cigarettes content. They discovered there were not any age restrictions. These videos were linked to vendors, which may increase opportunities for underage purchase. A comparatively small percentage of the videos mentioned health (16%) and safety (10%). Future research efforts should focus on identifying user's experiences, which may help to explain whether e-cigarettes are used for cigarette cessation and so if they contribute to public health efforts. Further research should also examine the content in these videos and how they impact user's attitudes, beliefs, and risk perception regarding e-cigarettes and help inform efforts by policy makers and the public health community.

Paek, Kim and Hove (2010) conducted smoking-related research. The researchers examined the extent to which antismoking messages employ message sensation value (MSV), kinds of message appeals used (threat, social, humor) and whether these characteristics are associated with the viewer responses. The sample of 934 videos was created by searching YouTube with four search words: "no smoking," "antismoking," "smoking prevention," and smoking cessation." The videos were coded by using an existing instrument, and each item was coded as either present (1) or absent (0). The

number of cuts were coded by 0 (0-6 cuts), 1, (7-14) or 2 (more than 15). They also created a MSV index (0 being low and 13 being high) and coded message appeals as either present (1), absent (0), or hard to tell (99). Each of the two trained coders, who were blinded to the research questions, coded half of the sample. The inter-coder reliability, calculated using Perreault and Leigh' s Index, averaged 0.90. Many antismoking videos were available on YouTube; however, pro-smoking videos were even more prevalent. ANCOVA analysis showed that a high level of MSV was linked to high number of viewers, ratings and comments. Threat appeals outnumbered social and humor appeals, and they were more likely to capture YouTube users' attention. This finding reaffirms why campaign literature has focused on this type of message. Further, when high levels of MSV are coupled with humor, this seems to be negatively related to the number of viewers. This combination may result in viewers' disbelief, thereby, undermining the seriousness of antismoking cause. The social messages were less dominant compared to threat appeals or high levels of MSV.

One of the study limitations was the cross-sectional design. The researchers suggested that further research can determine whether antismoking messages can be proven useful in compensating for the large quantity of prosmoking messages on YouTube.

Primack et al. (2016) systematically examined characteristics of YouTube videos that involved alcohol brand appearance for brands popular among youth. Video data were gathered using the YouTube Application Programming Interface. Researchers used eight different brands of alcohol to systematically capture a sample of 137 videos that appeared

in the first 20 hits for each search. The sample was sorted by “relevance” and “view count” to assess most commonly viewed content as well as content most likely to come up. Three experienced researchers individually examined 10 pilot videos and completed “in vivo” coding, which included elaboration on descriptive codes based exclusively on the audiovisual material. After coding, the researchers met to discuss differences. This iterative procedure was sustained for four iterations until a final codebook was determined. In order to preserve the integrity of the final data set, pilot training videos were included in the final sample. Then two trained coders individually reviewed and coded the complete sample of videos. They chose to double code all videos because this was feasible and because it improved the final value of the data. Authors developed 21 codes using available data representing five categories: type, quality, sociodemographic, negative and positive associations with alcohol use. Videos were assessed according to the specific brand, and characteristics were coded by type. They found that the most common videos were advertisements not posted by companies, but uploaded by users. All videos portrayed at least one human, mostly men, and they often incorporated humor.

Not surprisingly, the overall negativity of the videos was very low as the humor underlined the positive aspects of alcohol and downplayed the severe consequences. These YouTube videos were heavily visited and accessible to underage to youth. Even though YouTube has “Age gate” to restrict underage users from viewing inappropriate videos, YouTube channels are still highly accessible to youth. Understanding the portrayal of specific brands of alcohol associated with solid loyalty may provide opportunity for tailored educational interventions.

Primack, Colditz, Pang and Jackson (2015) conducted a study focused on portrayal of alcohol intoxication on YouTube, and what factors associated with alcohol intoxication were connected to higher view counts. By using five search words, “drunk,” “buzzed,” “hammered,” “tipsy” and “trashed,” they included the videos in the first two pages of search. They used two strategies for each key word: a/ sorting by the “relevance” and b/ sorting by the “view count,” which resulted in a pool of 200 videos. After the elimination of duplicates and extraneous videos, the resulting sample contained 70 videos. Two independent researchers coded the entire sample of videos using a codebook from existing research. Cohen’s Kappa coefficients were calculated for inter-rater reliability, and any disagreements were resolved. The codebook contained 6 categories, including video characteristics, social demographics, alcohol depiction, degree of alcohol use, characteristics associated with alcohol and consequences of alcohol (sub-divided into 42 codes). Data analysis were performed using Stata 13.0 and included calculation of percentage of videos in each coded category and measurements of positivity and engagement. Nonparametric methods were used to determine statistical significance. Mann-Whitney U-test was used for binary data and Kruskal – Wallis test was used for variables with more than two categories. The results showed that these videos were viewed about a third of a billion times. About half of the videos depicted females and 90% portrayed males. Almost 90% of videos showed active intoxication and only 7% portrayed alcohol dependence indicating withdrawal or tolerance. Researchers also found that viewer sentiment was most strongly positive. Nearly half of the videos involved a brand name reference. An unexpected finding was that liquor was the most

commonly portrayed type of alcohol. This may be concerning as liquor has high levels of alcohol and thus higher potential for morbidity and mortality, especially among youth.

Research has shown that medical students prefer learning resources found online compared with textbooks and medical journals (Azer, 2014). Azer (2014) examined the quality of education of YouTube videos on pharmacokinetics. Three evaluators searched YouTube for videos on the topic using several key words such as “Pharmacokinetics” or “Drug absorption.” Included videos had to have clear graphs and illustrations, scientifically correct content, clear presentation of the topic and no background noise. Numbers of likes, dislikes, comments, viewers, views/per day and video sharing were assessed as metrics of user engagement. Statistical analysis included computation of relative frequency, means, standard deviations, medians and differences in means were assessed using ANOVA. Out of 48 videos in the sample, 30 videos with the total length of 351 minutes, created by educators, university professors, or private tutoring body, were found to be educationally relevant. The total views of these videos were 12,096 (65.4%). The other 18 videos totaling 295 minutes were not educationally useful, and they were viewed 6,378 times. As data have shown, not all YouTube videos were essentially educative mainly due to the fact that anyone can freely upload a video and there are no reviewers. The likes of the videos by users did not correlate with the scores given by researchers; thus, students have to be aware that not every video with high numbers of likes is scientifically robust. However, well-designed videos could have potential to widen the students’ learning options, help explain material in textbooks, and complement professors’ lectures.

White, Hayes, White and Hodson (2016) investigated the power of the educational videos targeting chronic pain created through the partnership of a public hospital in New South Wales and a not-profit primary care organization. The intent was to challenge unjustified clinical variations in treating chronic pain and to extend the debate on prescribing opioids, three evidence based videos (“Brainman,” “Brainman stops his opioids” and “Brainman chooses”) were developed and distributed via YouTube. Their aim was to explain how the pain works and simplify a comprehensive approach to active treatment. The reasoning behind the videos was to make educational resources and treatment options for chronic pain widely available to people. In the initial phases of their creation, clinicians wrote down the key messages in less than 10 words. Next, through discussion, the key messages were refined. Pain as a lived experience and brain interpretation of a threat was the chosen explanatory model, and active self-management was recommended over passively received medical treatments. A professional artist created the simple cartoons for the videos. Repetition of the key messages and low literacy language were integrated into the videos, which were narrated by a voice artist. The first video was launched in 2011, and the following two were uploaded in 2014; and their launches were publicized. The first video was widely viewed, and attracted attention by several health care organizations and translated to different languages. The second two videos had refined messages and were purposely shorter, both being less than 5 minutes, and were also widely viewed. Utilizing social media, consistent key messages, and free access contributed to their success. The lack of funding didn’t allow a formal evaluation. Several health care organizations provided the links to

Brainman videos on their websites and since it has often been recommended for supporting active self-management as an alternative approach in treatment of chronic pain.

The current study was inspired by work of Baquero (2017), which examined most viewed YouTube videos related to depression. The study used a cross-sectional design. “Depression” was the search term used to find videos, which were sorted by view count, and URLs of the most viewed videos were recorded. Videos were then coded by using an instrument with demonstrated inter-rater and intra-rater reliability. After exclusion of irrelevant videos, the researcher created the sample of 394 most viewed YouTube videos that were collectively viewed 155,349,029 times. The videos were coded with respect to source, speaker, format, purpose, number of views, length, upload year, and content. Descriptive statistics were used to analyze the data and Chi analysis determined differences in the content of videos by source.

Videos uploaded by consumers, internet-based sources, and nongovernmental agencies were the three sources that accounted for approximately 85% of the most frequently viewed videos and garnered 93% of the total views ($n = 144,506,467$). Almost half of the most widely viewed videos were uploaded by consumers ($n = 193, 48.98\%$), and these videos had the highest cumulative view count (74,391,500 views). The results show that the content of the videos mainly included signs and symptoms, promotion of healthful behaviors and protective factors, risk factors and general information about depression. Sleep deprivation was mentioned only in a few videos, but received millions of views. Government agencies have not uploaded or produced videos that were mostly

viewed. The study's results also point out that videos with a celebrity as the main protagonist have large number of views.

Summary

Eight studies and a dissertation represent a small sample of the hundreds of studies indexed by the National Library of Medicine. Nevertheless, some general findings seem relevant to the proposed study. First, while YouTube can reach a large audience and could distribute factual and reliable content, this does not appear to be the case with respect to this topic. Second, YouTube can be used to reach youth with images and messages that are inconsistent with health promotion and disease prevention. Third, when searching on this topic, the user may be at risk for encountering inaccurate, unreliable and possibly harmful information.

Chapter III

METHODS

This chapter describes the methods used in the study. This includes a description of the design, identification of search terms, sampling, inclusion and exclusion criteria, measurements and manual coding specification, pilot study, data collection and statistical analyses.

Design

A cross-sectional study design was used, and observational data was collected at a single conceptual point of time from the YouTube platform. Using a computer with a clean history, a search on YouTube using key words was conducted, and URLs for ~300 most viewed videos were copied and saved in a separate file. All videos were viewed during January and February to complete the manual coding described below. For each video, the following information was coded: source of upload, speaker, format, number of views, length (in minutes), year uploaded, and content.

Identification of Search Terms

Identification of the search terms involved piloting using various key words to determine which phrase yielded the most relevant videos, most views per video (for the top group) and had the highest cumulative views for the top 30, 60 and 100, respectively. Based on this pilot work two key words were identified as the most useful for purposes of this study because they yielded videos that were relevant to the prescription opioid epidemic and yielded videos that were widely viewed.

The first search using combinations of various phrases related to prescription opioid misuse and opioid epidemic was conducted in March 2017. This helped to eliminate phrases that did not yield many videos. These searches were repeated and extended in November and December 2017. Prior to each search, history from the computer used was deleted. The results were filtered by “view count” to identify the ones with the most views. The information, including the number of results, individual views the first 30 videos, number of duplicates, and URLs were entered to an Excel sheet. Unrelated videos and music videos were excluded. Then, search terms yielding low views per each video and low cumulative views were excluded.

The six search terms with the highest cumulative views for the first 30 videos were: “prescription opioids addiction,” “pain pills addiction,” “opiate addiction,” “opiate epidemic,” “opioid epidemic,” and “opioids,” were compared in more detail. The number of views for each video, URL of the video and cumulative view count for the first most viewed 100 videos for each search term were recorded. Any additional irrelevant videos

found in this process were excluded. After excluding duplicates, the cumulative view count for the first 3, 30, 60 and 100 videos as well as the number of views of the 30th, 60th and 100th video for each of the six search terms was calculated and logged. Combinations of the results using two out of the six key words were compared. This analysis resulted in a decision to use the key words, “opioids” and “opiate addiction.”

Sampling

Once the results using those two search terms appeared they were filtered by “view count” and videos with a minimum of 1,500 views were selected. This was completed on a single day in January 2018. The URLs, titles, date uploaded, and view count for each was copied and stored in a separate file. After duplicate videos were eliminated the intent was to code 309 unique videos that resulted from the search.

Inclusion and Exclusion Criteria

To qualify for the inclusion in the study, videos had to be in English and their primary topic had to be on prescription opioids misuse and opioid use disorder. Videos about heroin that involved prescription opioids were included as well. Music videos and videos about heroin not discussing prescription analgesics were excluded.

Measurements and Manual Coding Specification

The instrument used for this study was developed based on an existing instrument for coding YouTube videos (Baquero, 2017). The instrument begins with entry of basic information relevant to each video, including coder, video identification number (which was assigned), date the video was uploaded, date the video was coded, length of video (in minutes), number of views, and title of the video. Following this general information, the instrument comprises four sections (1) source of upload (2) speaker (3) format (4) and content. The variables and values for each of these sections were coded dichotomously (i.e., yes or no) indicating the presence or absence in the respective video. The coding instrument is included in Appendix A.

The source of upload for each video was coded into one of the following categories Consumers; Professional/provider; Government Agencies; Nongovernmental Organizations; Television News/Entertainment; Treatment Center; Celebrity; Internet-Based; or Other. “Consumer videos” included videos posted by (A) person with lived experience, (B) spouse/partner of the person misusing prescription opioids, (C) parent of the person misusing prescription opioids, (D) person without lived experience, but sharing information about prescription opioids based on personally knowing someone, (E) person without lived experience sharing information about prescription opioids.

A consumer video was described as being posted by an individual with no obvious professional credentials in medicine, addiction treatment or higher education and no established organizational affiliation.

A “Professional” was categorized as any videos posted by either an individual with professional credentials or established organizational affiliations: (A) physician/medical doctor, (B) mental health/addiction professional, (C) academic professional/professor, (D) emergency room personnel, (E) Judge/Sheriff/Cop or (F) Other.

“Government organization videos” were recognized by the “tag” (.gov), and they were defined as videos uploaded by a government agency.

“Nongovernmental agency videos” were defined as any video uploaded by a nongovernmental agency. This was apparent from the “tag” (.org) associated with the respective video.

All videos uploaded by a news-based or entertainment based major television network station were considered “Television News/ Entertainment videos.”

“Celebrity” was defined as a video uploaded by a celebrity. Any video uploaded by a treatment center was coded as “Treatment Center.” “Internet-based videos” included any video posted by an internet-based site or YouTube channel.

The speaker category included Consumers, Professionals, Government organizations, Non-governmental organizations, Television news/entertainment, Treatment center, Celebrity, Professional athlete, Other and Multiple.

The categories for coding Format included Documentary, Interview, Talk by Professional, TV Talk Show/Discussion panel, Animation, Still images, News report with anchor, V-blog, Multiple formats or Other formats. “Documentary” was defined any non-fictional video that (A) documented aspects of reality on prescription opioids misuse, or (B) documented information, instructions and education regarding prescription opioids misuse. “Interview” was described as any video with a formal or informal interview between two people. “Talk by professional” was any video that was a recording of a person giving a professional presentation. “Talk show” was defined as any video with a formal or informal talk between more than two people. Videos using cartoons, or whiteboard video animations were considered “Animation.” Any videos with only still images/photographs were categorized as “Still images.” Videos with the intent to deliver news were classified as “News.” Video Blog, “V-Blog” was an online journal or diary. If the video was created with more than one format it was considered “Multiple formats.” “Other” videos were categorized as any video that did not fit into the coding scheme defined above.

The content categories were formulated based on guidelines, recommendations or related advice from the U.S. Centers for Disease Control and Prevention [CDC], the National Institute for Drug Abuse [NIDA] and the Substance Abuse and Mental Health Administration [SAMHSA]. There were 18 content categories (each with sub-topics) that were formulated: Background of the opioid epidemic, Physical signs and symptoms of misuse; Behavioral Signs and Symptoms, Risk factors; Population at Risk, Opioid dependency withdrawal symptoms, Information on opioid use disorder and overdose;

Reversal of prescription opioid overdose; Stigma; Treatment options of opioid use disorder; Alternative options for treatment of chronic pain; Prevention strategies for providers; Prevention strategies for individuals; Prevention strategies for communities; Information on locating the a treatment facility or help; Consequences of an opioid use disorder; and Barriers to preventing discontinuation of the misuse. The specific information coded under each content category is shown in the instrument (see Appendix A).

Demonstration Intra- and Inter-Rater Reliability

The two samples of 30 videos that were not among those most widely viewed were coded prior to the beginning of the coding process. The first set of the 30 videos were coded by the Researcher. The coding of this sample was repeated in 7 days. The second set of 30 videos was coded by the Researcher and by the second rater. All coding categories as well as separate content topics within the coding form were included in this analysis (i.e., source, format, content, etc.). Cohen's Kappa coefficients were calculated for the first set of 30 videos coded by the Researcher. The coefficients were not sufficient so the first round of coding was considered as practice and getting familiar with the instrument. The new sample of 30 videos was selected and the coding was once again completed on two occasions seven days apart. The entire instrument comprised 259 variables and Kappa coefficients were calculated for the variables that had at least one

“Yes = 1” code. The Kappa test could not be calculated on 85 items because there was no variability and all responses were 0. There was perfect agreement for 140 of the variables and the remaining coefficients ranged from 0.89-0.93.

Cohen’s Kappa coefficients were also calculated for the second set of 30 videos individually coded by Researcher and the second rater. The Kappa test could not be calculated for 74 items because there was no variability. Of the remaining items, 132 had a perfect agreement, and the remaining coefficients ranged from 0.8- 0.93. Instances of disagreement were discussed in person and reconciled. This process was useful in determining which codes needed to be changed, removed or added. After consultation with the second rater and the sponsor, 6 items were removed and 8 items were added.

In the category “Information on opioid use disorder and overdose” one additional sub-topic item was added: Harm Reduction strategies. In the category “Alternative options for treatment of chronic pain” (C12) one sub-topic item was added: Alternative options for chronic pain do not work. In the category “Consequences of opioid use disorder” (C17) four sub-topics items were added: Neonatal withdrawal syndrome; If they knew the consequences they would never have started start taking pills; Pills destroy lives; and the only relationship that mattered was relationship with the pills. Also, two additional items were added to the Speaker category: Professional Athlete and Multiple speakers.

Data Collection

The Researcher selected and coded all of the videos. Using a clean history, the videos were selected using the two key terms specified above on January 18th, 2018. Once the key terms were entered and filtered using the “view count” YouTube filter, the URLs from each search term were copied into a separate file to be visited for coding at the later time. Because the two search terms were used, the results were reviewed to detect any overlapping videos. The URLs that did overlap were marked as duplicates and only one URL for the video was kept for coding. As there were over 290,000 results for the search term “opioids” and over 47,000 results for the search term “opiate addiction” the arbitrary cut point was set to 1500 views or more. All videos were then coded during the months of February and early March 2018. To help prevent systematic bias in the order in which the videos were coded, the Researcher coded the top 10 videos and then the bottom 10 videos within each group alternating groups. The Researcher then proceeded in this way until all the videos were coded.

The whole video segment was used as unit of analysis. First, the video assigned ID, title, date of upload, date of coding, length in minutes, and number of views was entered. Second, the “source” was identified. Third, the speaker was determined after appearing in the narrative or visual format several times during the clip. If there were many speakers occurring once throughout the segment, the speaker was coded as “Multiple.” Fourth, the format of the video was coded. Lastly, all categories and sub-topics of content were coded according to whether or not each was mentioned. All

categories in the instrument were coded dichotomously, one for presence and zero for absence. A paper form was completed for all videos and the data were then entered into an Excel file. All entries were then verified to ensure accurate data transformation.

Statistical analysis

The Statistical Package for the Social Sciences (SPSS) was used to conduct all quantitative data analysis.

To address the first Aim, to examine the videos with respect to source, speaker, format, race/ ethnicity of person with lived experience, number of views, length, date uploaded, descriptive statistics, including frequencies and percentages were calculated. For each category (and sub-topic) the number and percentage of videos that mentioned that item was calculated along with the view count and cumulative view percent.

A similar analysis was presented for each of the main content categories (in a separate table) and for sub-categories (Aim 2). The number of videos uploaded by year was portrayed in a line graph, with year on the horizontal axis and number of videos on the vertical axis.

Aim 3 involved examining differences in content covered by source. While there were nine source categories, this analysis focused on only two sources, “Television news/Entertainment and Internet-based,” because these two sources accounted for over

80% of the total cumulative views. Differences in the extent to which particular content was covered was examined using Chi square analysis.

Aim 4 will required classifying videos according to number of views. Using view count as a classification variable, the videos were grouped into tertiles and a difference in the extent to which particular content was covered was examined using Chi square analysis. Given the large number of tests conducted, analysis for these Aims 3 and 4 were considered exploratory in nature.

This study was submitted to Institutional Review Board (IRB) at Teachers College, Columbia University and deemed exempt.

Chapter IV

RESULTS

YouTube was searched using two key terms, “opiate addiction” and “opioids,” on January 18th, 2018. The results for the search term “opiate addiction” were sorted by number of views, and the URL, title, and number of views were saved in the Excel spreadsheet. The arbitrary cut point for inclusion of a video was a minimum of 1,500 views. The same process was then repeated with the second key term “opioids.” This procedure generated the sample of 371 videos (n = 150 searching with the key term “opiate addiction;” n = 221 using key term “opioids”).

Videos were then screened for the inclusion criteria. A total of 62 videos was excluded for various reasons, including not English language (n = 4), discussed only heroin (n = 21), involved music videos (n = 2), became unavailable because account was closed (n = 5), covered pharmacology education (n = 4); were irrelevant (n = 2) or were duplicates (n = 24). The remaining 309 (“opiate addiction,” n = 128; “opioids,” n = 181) videos comprised the final sample. The videos varied in their view count from high of 9,427, 956 to a low of 1,512. Collectively, these 309 videos were viewed 44,693,887 times.

Specific Aim 1

The first Aim of the Study was to examine the most widely viewed YouTube videos on the topic of prescription opiate addiction with respect to source, speaker, format, number of views, length, date uploaded.

The most videos were uploaded in 2017 (N = 148, 47.89%), followed by 2016 (65, 21.04%), and 2015 (N = 20, 6.47%) (Figure 1). Videos uploaded in year 2017 (16,435,828 views) and in 2016 (17,362,761 views) shared 33,798,589 views, representing 76% of the total views in the study sample. The sample included ten videos with more than million views, which were uploaded in 2017 (n = 6), 2016 (n = 3), and 2014 (n=1).

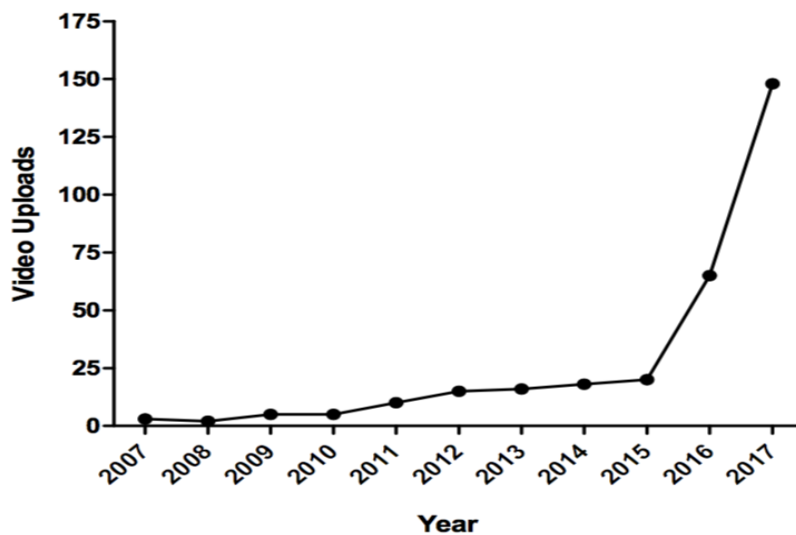


Figure 1. Videos Uploads per Year

The 309 videos varied in their length, with the longest video being 2 hours and 21 minutes to the shortest video being 15 seconds. The median duration of videos was 6 minutes and 5 seconds long. The duration of seven out of ten videos with over one million views was under 10 minutes long (see Appendix B).

Table 1 shows frequencies and percentages, total view count, and cumulative view count percent for the videos categorized by source of upload, speaker, and format. The greatest number of most viewed videos was uploaded by an Internet Based source ($n = 89$, 28.8%) and Television news/Entertainment ($n = 83$, 26.86%). Videos uploaded from these two sources garnered the over 80% of the total cumulative views, 53.57% for videos uploaded by Television news/Entertainment (23,943,577 views) and 28.6% for videos uploaded by an Internet Based source (12,784,373 views), thus while there was an almost equal proportion of videos from these two sources, compared with videos uploaded by an Internet Based source, those uploaded by Television news/Entertainment had almost twice as many cumulative views. Only nine videos were uploaded by Professionals (garnering less than 1% of the total cumulative views, $n = 169,934$) and only 11 videos were uploaded by Government agencies (garnering less than 1 % of total cumulative views, $n = 343,983$).

The main protagonist, or main speaker, of most videos were Consumers ($n = 83$, 26.86%) and garnered 30.35% of cumulative views. Within this category, a person with lived experience was most frequent (58, 18.77%), followed by people without lived experience but sharing information about opioid misuse and opioid use disorder (21, 6.8%). The second most frequent main protagonist was Professionals, which accounted

for 71 videos (22.98%). In this category, the Physician/Medical Doctor (n = 35, 11.33%) was the most frequent. However, videos with the Professional as a main speaker gathered only 3.24 % of cumulative views. Government agency speakers occurred in 10 videos but only amassed 0.25% of cumulative views.

None of the videos featured Celebrity or Professional Athlete as a main protagonist to provide information about the topic. While a representative of the Television news/Entertainment (11.97%) category was the main speaker only in 37 videos, these videos garnered 16,857,689 (37.72%) cumulative views, which was the most out of all Speaker categories.

With respect to the format of the videos, there was 51 documentaries (representing almost 17% of the total number of videos), however videos with this format garnered 31% of the total cumulative views (13,821,848). While views in the format of a talk show/discussion panel represented only about eight percent of all videos (n = 25), these videos garnered over 25% of the total cumulative views (11,342,859). About one in five videos used a format of a news report with anchor, and these videos garnered 17% of the total cumulative views (7,756,843). More than 10% of the videos had a “talk by professional” format, but these videos garnered less than 2% of the total cumulative views (635,988).

Table 1. Frequency, Percent, View Count, and Cumulative View Percent by Source, Speaker, and Format of 309 YouTube Videos About the Opiate Epidemic, 2018

Upload Source	N (%)	View Count	Cumulative View (%)
U1. Consumer	46 (14.89%)	2,014,771	4.51%
U1A. Person with lived experience	24 (7.77%)	1,194,119	2.67%
U1B. Spouse of the person misusing opioids	0	0	0%
U1C. Parent of the person misusing opioids	0	0	0%
U1D Person w/o lived experience knowing personally someone who misuses opioids	2 (0.65%)	302,303	0.68%
U1E Person w/o lived experience sharing information	20 (6.47%)	518,349	1.16%
U2. Professional videos	9 (2.91%)	169,934	0.38%
U2A. Physician / Medical Doctor	9 (2.91%)	169,934	0.38%
U2B. Mental Health/ Addiction Professional	0	0	0%
U2C. Academic Professional/Professor	0	0	0%
U2D. Emergency Room Personnel	0	0	0%
U2E. Judge/ Sheriff/ Cop	0	0	0%
U3. Government videos?	11 (3.56%)	343,983	0.77%
U4. Nongovernmental organization	37 (11.97%)	1,816,333	4.06%
U5. Television news/ Entertainment	83 (26.86%)	23,943,577	53.57%
U6. Treatment Center	18 (5.83%)	1,754,051	3.92%
U7. Celebrity	0	0	0%
U8. Internet Based	89 (28.8%)	12,784,373	28.60%
U9. Other:	16 (5.18%)	1,866,865	4.18%
Speaker	N (%)	View Count	Cumulative View (%)
S1. Consumers	83 (26.86%)	13,566,304	30.35%

Table 1 continued

Upload Source	N (%)	View Count	Cumulative View (%)
S1A. Person with lived experience	58 (18.77%)	9,287,178	20.78%
S1B. Spouse of the person misusing opioids	1 (0.32%)	2,900	0.0065%
S1C. Parent of the person misusing opioids	2 (0.65%)	17,704	0.04%
S1D. Person w/o lived experience knowing personally someone who misuses opioids	1 (0.32%)	22,819	0.05%
S1E. Person w/o lived experience sharing information	21 (6.8%)	4,235,703	9.48%
S2. Professional videos	71 (22.98%)	1,449,178	3.24%
S2A. Physician / Medical Doctor	35 (11.33%)	894,262	2%
S2B. Mental Health/ Addiction Professional	18 (5.83%)	304,006	0.68%
S2C. Academic Professional/Professor	3 (0.98%)	36,146	0.08%
S2D. Emergency Room Personnel	1 (0.32%)	3,078	0.007%
S2E. Judge/ Sheriff/ Cop	0	0	0%
S2F. Other?	14 (4.53%)	211,686	0.47%
S3. Government organization	10 (0.32%)	111,607	0.25%
S4. Nongovernmental organization	7 (2.27%)	40,982	0.09%
S5. Television news/ entertainment	37 (11.97%)	16,857,698	37.72%
S6. Treatment Center	2 (0.65%)	12,108	0.03%
S7. Celebrity	0	0	0%
S8. Professional Athlete	0	0	0%
S9. Other	38 (12.3%)	1,911,513	4.27%
S10. Multiple	61(19.74%)	10,744,497	24%
Format	N (%)	View Count	Cumulative View (%)
F1. Documentary	51 (16.5%)	13,821,848	30.93%
F2. Interview	12 (3.88 %)	1,175,218	2.63 %

Table 1 continued

Upload Source	N (%)	View Count	Cumulative View (%)
F3. Talk by professional	31(10.03%)	635,988	1.42%
F4. Talk show/ Discussion Panel	25 (8.09%)	11,342,859	25.38%
F5. Animation?	16 (5.18%)	2,714,970	6.07 %
F6. Still images?	4 (1.29%)	114,171	0.26 %
F7. News report with anchor	61(19.74%)	7,756,843	17.35 %
F8. V-Blog	23 (7.44%)	1,168,157	2.61%
F9. Multiple formats	44(14.24%)	1,635,435	3.66 %
F10. Other?	42(13.59%)	4,328,39	9.68%

Specific Aim 2

The second Aim of the Study was to examine the most widely viewed YouTube videos on the topics of prescription opiate addiction with respect to content, including background information about the opioid epidemic, signs and symptoms of prescription opioid misuse; risk factors; first use; populations at risk for misuse; opioid dependency withdrawal symptoms; information on opioid use disorder and overdose and its reversal; stigma; treatment of opioid use disorder; alternative options for treatment of chronic pain; prevention strategies for individuals, providers and communities; information on locating treatment or help; consequences; and barriers preventing discontinuation of prescription opioid misuse.

Five of the 18 content topics coded for the Study were included in the majority of the videos: “Background of the opioid epidemic” (n = 157), “Risk factors for prescription opioid misuse” (n = 241), “Information on opioid use and overdose” (n = 250),

“Treatment for opioid use disorder” (n = 156), and “Consequences of opioid use disorder” (n = 221) (Table 2). The videos addressing the latter four topics also had the greatest proportion of cumulative views. In terms of proportion of total cumulative views, nine of the 18 content categories garnered one-half or more of the total cumulative views (these categories were not mutually exclusive).

The topic that was most likely to be covered and to garner the greatest number of total cumulative views was “Information on opioid use disorder and overdose,” which was evident in 89.79% of all the videos (n = 250), garnering (40,128,591 views). The second most covered topic was the “Risk factors for prescription opioid misuse,” which was covered in 241 videos. While almost 78% of the videos addressed this topic, they garnered only 66.53% of the cumulative views. In contrast, “Consequences of opioid use” was addressed in approximately 72% of the videos, but these videos garnered almost 82% of the total cumulative views.

The topics least likely to be covered in the videos were “Alternative options for treatment of chronic pain” and “Prevention strategies for individuals.” The former was covered in only 41 (13.27%) of the videos, but garnered over 30% of the cumulative views. The latter was covered in only 46 (14.89%) of the videos and garnered only 7.14% of cumulative views. Other topics that were covered in less than one of four videos included “Population at risk to misuse prescription opioids,” “Reversal of opioid overdose,” “Prevention strategies for providers,” and “Information for locating treatment help.”

Table 2. Frequency, Percent, View Count, and Cumulative View Percent by Selected Content Categories in 309 YouTube Videos About the Opiate Epidemic, 2018

Content	N (%)	View Count	Cumulative View %
C1. Background of the opioid epidemic	157 (50.81%)	22,400,065	50.12 %
C2. Physical signs and symptoms of the misuse	140 (45.31%)	27,649,648	61.86 %
C3. Behavioral signs and symptoms of the misuse	140 (45.31%)	26,305,929	58.86 %
C4. Risk factors for prescription opioid misuse	241 (77.99%)	29,733,506	66.53 %
C5. First use of prescription opioids	113 (36.57%)	19,633,124	43.93 %
C6. Population at risk to misuse prescription opioids	66 (21.36%)	19,683,530	44.04 %
C7. Opioid dependency withdrawal syndrome	141 (45.63%)	13,413,030	30.01 %
C8. Information on opioid use and overdose	250 (80.91%)	40,128,591	89.79 %
C9. Reversal of opioid overdose	69 (22.33%)	17,075,773	38.21 %
C10. Stigma	84 (27.1%)	10,908,808	24.41%
C11. Treatment for opioid use disorder	156 (50.49%)	28,784,656	64.40 %
C12. Alternative options for treatment of chronic pain	41 (13.27%)	13,472,598	30.14 %
C13. Prevention strategies for providers	63 (20.39%)	14,136,710	31.63%
C14. Prevention strategies for individuals	46 (14.89%)	3,190,032	7.14%
C15. Prevention strategies for communities	104 (33.67%)	23,435,686	52.44%
C16. Information for locating the treatment or help	70 (22.65%)	7,017,374	15.7%
C17. Consequences of opioid use disorder	221 (71.52%)	36,550,711	81.78%
C18. Barriers preventing discontinuation of misuse/ getting to treatment	96 (31.07%)	22,774,799	50.95%

Some topics that were not covered by the majority of videos garnered a comparatively large amount of cumulative views. For example, while about 45% of the videos covered the topics of physical and behavioral signs and symptoms of misuse, these videos garnered approximately 60% of cumulative views. Likewise, while only about one in five videos covered the topics of “Population at risk to misuse prescription opioids” and “Reversal of opioid overdose,” these videos garnered over 44% and just fewer than 40% of cumulative views, respectively. “Prevention strategies for providers” was covered in about one in five videos, but garnered over 30% of cumulative views. The topic of “Stigma” was covered in 84 (27.18%) of the videos and garnered almost 25% of the total cumulative views. The text below outlines examples of the content covered under each main category in greater detail.

Approximately one-half of the videos covered information about “Background of opioid epidemic” (Table 3). “Overprescribing by physicians” was addressed in almost one-third of the videos and attracted over 40% of the total cumulative views. All of the other sub-categories were covered in less than one of five videos. While there were only 57 videos that addressed marketing practices of pharmaceutical industry, these videos garnered over one-third of the total cumulative views. Slightly more than 15% (n = 47) mentioned content related to the notion that since they were “Prescribed by doctors so non-addictive/safe to use” and these videos attracted almost 30% of the total cumulative views. Another topic for which the cumulative views was much larger than the number of videos in which it was addressed was the “Fifth vital sign/Under treatment of pain.”

Table 3. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to Background of Opioid Epidemic in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative View Count (%)
C1. Background of opioid epidemic	157 (50.81%)	22,400,065	50.12%
C1A. Overprescribing by physicians	97 (31.39 %)	18,546,303	41.50%
C1B. Pharma Industry Practices	57 (18.45 %)	14,972,837	33.50%
C1C. Pill mills	42 (13.59%)	4,839,308	10.83%
C1D. Cooperation of FDA and Pharma industry	34 (11%)	2,315,969	5.18%
C1E. Fifth vital sign/Under treatment of pain	31 (10.03%)	11,478,286	25.68%
C1F. Prescribed by doctors so non-addictive/safe to use	47 (15.21%)	12,885,288	29.83%
C1G. High cost of pills on black market	43 (13.92%)	3,333,430	7.46%
C1H. Low cost of heroin in comparing to prescription opioids on black market	48 (15.53%)	5,038,243	11.27%

There were only 31 videos (10.03%) that addressed this topic, but these videos garnered over 25% of the total cumulative views.

The topic of “Physical signs and symptoms of prescription opioid misuse” was addressed in 45% of the videos (n = 140) and attracted almost 62% of the total cumulative views (Table 4). None of the subtopics was widely covered within this category. But in some cases, the percent of cumulative views was much greater than the frequency of videos covering a particular topic.

Table 4. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to Physical Signs and Symptoms of Prescription Opioid Misuse in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative View Count (%)
C2. Physical signs and symptoms of prescription opioid misuse	140(45.31%)	27,649,648	61.86%
C2A. Nodding	32 (10.36%)	18,350,114	41.06%
C2B. Constipation	23 (7.44%)	10,248,244	22.93%
C2C. Euphoria	69 (22.33%)	17,612,461	39.41%
C2D. Tolerance	60 (19.42%)	5,055,489	11.31%
C2E. Dependence/Taking pills to feel “normal”	60 (19.42%)	8,421,615	18.84 %
C2F. Small pupils	10 (3.24%)	1,422,608	3.18%
C2G. Sedation	35 (11.33%)	5,321,848	11.91%
C2H. Itching	7 (2.27 %)	3,292,421	7.37 %
C2I. Respiratory depression/ slow breathing	33 (10.68%)	1,416,503	3.17 %
C2J. Weight loss	11 (3.56%)	382,969	0.86%
C2K. Hyperalgesia (increased sensitivity to pain)	15 (4.85%)	445,931	0.99%
C2L. Hard to recognize the symptoms	11 (3.56%)	890,648	1.99%

For example, while only 32 videos (10.36%) depicted “Nodding” these videos garnered over 40% of the total cumulative views. The topic of “Dependence/Taking pills to feel ‘normal’” was mentioned in approximately 20% of the videos and attracted a similar proportion of total cumulative views.

There were 140 videos that mentioned “Behavioral signs and symptoms of misuse” and these videos attracted almost 60% of the total cumulative views (Table 5). With the exception of “Use without a prescription,” none of the subtopics was covered in

Table 5. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to Behavioral Signs and Symptoms of Misuse in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative View Count (%)
C3. Behavioral signs and symptoms of misuse	140(45.31%)	26,305,929	58.85 %
C3A. Social withdrawal	20 (6.47%)	1,118,398	2. 5%
C3B. Mood swings	6 (1.94%)	321,546	0.72%
C3C. Disinterest in previously liked activities	20 (6.47%)	589,759	1.32%
C3D. Increased irritability	16 (5.18%)	800,428	1.79%
C3E. Use without the prescription	69 (22.33%)	5,123,550	11.46%
C3F. Use differently than prescribed	25 (8.09%)	2,004,001	4.48%
C3G. Overlapping prescriptions (doctor shopping)	27 (8.74%)	1,265,412	2.83%
C3H. Snorting or injecting crushed pills	45 (14.56%)	8,843,596	19.79%
C3I. Lying	25 (8.09%)	4,154,816	9.3%
U3J. Manipulating	21 (6.8%)	16,186,522	36.22%
U3K. Sleeping in unusual times	4 (1.29%)	502,643	1.12%
U3K. Leaving the house in unusual times	2 (0.65%)	118,502	0.27%
U3M. Stealing and pawning	35 (11.33%)	7,769,097	17.38%
U3N. Family members fighting about pills	2 (0.65%)	458,639	1.03%

more than 20% of the videos. While “Use without a prescription” was covered in 69 videos (22.33%), these videos attracted under 12% of the total cumulative views.

In contrast, there were only 21 videos (6.8%) addressing the topic of “Manipulating,” but these videos garnered over 36% of the total cumulative views.

“Risk factors for prescription opioid misuse” was a popular topic occurring in almost 78% of the videos, which attracted ~ 66% of the total cumulative views (Table 6). Of the 13 sub-categories under this content, the most popular in terms of coverage among the videos and percent of total cumulative views was “Legal prescription for chronic

Table 6. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to Risk Factors for Prescription Opioid Misuse in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative View Count (%)
C4. Risk factors for prescription opioid misuse	241(77.99%)	29,733,506	66.53 %
C4A. Legal prescription for acute pain from musculoskeletal injury/sport injury/ accident	142(45.95%)	9,654,779	21.6 %
C4B. Legal prescription after dental work	17 (5.5%)	3,944,065	8.82%
C4C. Legal prescription post-surgery	34 (11%)	11,748,457	26.29%
C4D. Legal prescription for chronic pain	165 (53.4%)	16,248,843	36.36%
C4E. Mental Illness	24 (7.77%)	3,373,749	7.55%
C4F. History of substance abuse	27 (8.74%)	1335868	2.89%
C4G. Low Income	19 (6.15%)	2,188,266	4.9%
C4H. Living in rural areas	47 (15.21%)	16,113,099	36.05%
C4I. Daily high doses of prescribed medication	55 (17.8%)	3,778,590	8.45%
C4J. Overlapping opioids and benzodiazepine prescription	17 (5.5%)	243,307	0.54%
C4K. Attending pharm parties	3 (0.98%)	55,079	0.12%
C4L. Using opioid prescriptions as a self-care for women	3 (0.97%)	27,024	0.06%
C4M. Boredom	5 (1.62%)	11,261,221	25.2%
C4N. Preadolescent sexual abuse	1 (0.32%)	2,692	0.006%

Table 6 continued

Content	N (%)	View Count	Cumulative View Count (%)
C4O. Inability to sleep	5 (1.62%)	165,047	0.37%
C4P. Using to relax/ relieve anxiety	22 (7.12%)	1,914,661	4.28%
C4R. Using to get high	61 (19.74%)	9,521,109	21.3%
C4S. Doctors can't say no to patient/ Doctors unaware of addictive properties	27 (8.74%)	16,620,708	37.19%

pain,” which was covered in 165 videos (53.4%), but these videos garnered only approximately 36% of the total cumulative views. “Legal prescription for acute pain from musculoskeletal injury/sport injury/ accident” was addressed in almost half of the videos, but these garnered only ~22% of the total cumulative views. The large majority of the videos did not cover any of the other topics. In two cases, the percent of total cumulative views was much greater than the number and percent of the videos addressing the respective topic. The first was “Legal prescription-post surgery,” covered in 34 (11%) of the videos but garnering over 26% of total cumulative views, and “Living in rural areas,” covered in 47 (15.21%) videos, but attracting over 36% of total cumulative views. The topic of “Boredom” was mentioned only in 5 videos, but accounted for 25.2% cumulative views. None of the other topics were widely covered.

The main topic concerning “First use of prescription pain analgesics” was addressed in almost 37% of the videos (n = 113) and attracted almost 44% of total cumulative views (Table 7). “Legal prescription for acute pain from musculoskeletal injury/sport injury/ accident” was the most widely covered subcategory, but was only

addressed in 52 (16.83%) videos. These videos did attract over 35% of the cumulative views. None of the other topics in this category was widely covered, but some attracted a disproportionately high percent of cumulative views. The most extreme example was “Taken from a home medicine cabinet,” which was covered in only 17 (5.5%) videos, but attracted almost 25% of the total cumulative views. Other examples are “Legal prescription post-surgery” and “Legal prescription for chronic pain.” In both of these cases, the topic was covered in approximately 10% of the videos, but attracted >25% of the cumulative views.

Table 7. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to First Use of Prescription Pain Analgesics in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative View Count (%)
C5. First use of prescription pain analgesics	113(36.57)	19,633,124	43.93%
C5A. Legal prescription for acute pain from musculoskeletal injury/ sports injury/ accident	52 (16.83%)	15,796,482	35.34%
C5B. Legal prescription after dental work	8 (2.59%)	11,329,656	25.35%
C5C. Legal prescription post- surgery	28 (9.06%)	1,185,290	26.52%
C5D. Legal prescription for chronic pain	34 (11%)	12,620,862	28.24%
C5E. From a friend	29 (9.39%)	2,753,388	6.16%
C5F. From a family member	13 (4.21%)	270,573	0.61%
C5G. Taken from a home medicine cabinet	17 (5.5%)	10,508,459	23.51%
C5H. At the party	8 (2.59%)	403,058	0.9%

The topic “Population at risk for prescription opioid misuse” was only covered in 66 videos, but these videos attracted 44% of the cumulative views (Table 8).

“Adolescents” were the risk group most likely to be delineated. While this group was mentioned as being at risk in 41 videos (13.3%), these attracted over 37% of cumulative views. Similar discrepancies were observed for “Men,” “Adults 19-25 years old” and “Elderly.” Opioid dependency withdrawal symptoms” were covered in almost half of the videos, but these videos attracted on ~ 30% of cumulative views (Table 9). The topic of “Pain” was addressed in almost 25% of the videos (n = 77), but these videos only attracted ~12% of the cumulative views. None of the other sub-topics in this category was widely covered or widely viewed.

Table 8. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to Populations at Risk for Prescription Opioid Misuse in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative View Count (%)
C6. Populations at risk for prescription opioid misuse	66 (21.36%)	19,683,530	44%
C6A. Women	11(3.56%)	11,192,277	25.04%
C6B. White middle age women	4 (1.29%)	76,981	0.17%
C6C. Native American	3 (0.009%)	669,822	1.5%
C6D. Native Alaskan women	5 (1.62%)	366,832	0.82%
C6E. Adolescents	41 (13.37%)	16,727,148	37.43%
C6F. Men	2 (0.006%)	9,437,702	21.12%
C6G. Adults 19-25 years old	18 (5.8%)	13,842,607	30.98%
C6H. Elderly	14 (4.5%)	11,430,505	25.58%

Table 9. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to Opioid Dependency Withdrawal Symptoms in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative View Count (%)
C7. Opioid dependency withdrawal symptoms	141(45.63%)	13,413,030	30.01%
C7A. Cravings	59 (19.09 %)	3,436,057	7.69%
C7B. Nausea and vomiting	33 (10.68%)	2163743	4.84%
C7C. Cold and hot flashes	19 (6.15%)	1,598,993	3.58%
C7D. Anxiety	32 (10.36%)	4,389,133	9.82%
C7E. Insomnia	8 (2.59%)	2,493,054	5.58%
C7F. Muscle crams	15 (4.85%)	684,763	1.53%
C7G. Diarrhea	17 (5.5%)	698,660	1.56%
C7H. Perspiration	17 (5.5%)	1,179,165	2.64%
C7I. Lachrymation (watering of eyes)	8 (2.59%)	722,923	1.62%
C7J. Rhinorrhea (watering of the nose)	15 (4.85%)	1,012,997	2.27%
C7K. Restlessness	24 (7.77%)	1,698,514	3.8%
C7L. Kicking Movement	7 (2.27%)	738,557	1.65%
C7M. Pain	77 (24.92%)	5,331,586	11.93%

As mentioned above, “Information on opioid use disorder and overdose” was the most widely covered topic in terms of both frequency of videos and cumulative views (Table 10). The most widely covered and viewed topics in this category included “It is killing thousands of people each year,” “Diversion-Selling and buying pills on the black market,” Shift to heroin,” and “Relapse.” All of these topics were covered in at least 20% of the videos. The “Shift to heroin” was the most widely covered sub-topic that attracted the greatest number of views (covered in 140 videos, >45%, which garnered almost 73% of cumulative views).

Table 10. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to Information on Opioid Use Disorder and Overdose in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative View Count (%)
C8. Information on opioid use disorder and overdose	250(80.91%)	40,128,591	89.79%
C8A. Anyone can get addicted	56 (18.12%)	6,098,531	13.65%
C8B. It is a disease	61 (19.74%)	4,229,461	9.46%
C8C. It is killing thousands of people each year	87 (28.16%)	16,110,878	36.95%
C8D. High jacked brain	23 (7.44%)	1,242,489	2.78%
C8E. Opioids are not the first line for treating chronic pain	29 (9.39%)	1,843,267	4.12%
C8F. Taking too many opioids can cause breathing depression leading to death	38 (12.3%)	4,109,217	9.19%
C8G. Addiction involves behavior change- compulsion, continuity and consequences	24 (7.77%)	5,013,185	11.22%
C8H. Opioid use disorder is treatable	49 (15.86%)	2,981,908	6.67%
C8I. Taking opioids with other drugs increase the chance for overdose	29 (9.39%)	3,062,792	6.85%
C8J. Diversion- Selling and buying pills at the black market	76 (24.6%)	10,962,901	24.53%
C8K. Shift to heroin	140(45.31)	32,562,134	72.86%
C8L. Shift to fentanyl	60 (19.42%)	9,268,972	20.74%
C8M. Shift to other drugs:	20 (6.47%)	1,403,250	3.14%
C8N. Relapse	62 (20.1%)	10,558,972	23.63%
C8O. Higher risk for overdose for people coming out of treatment or prison	12 (3.88%)	618,996	1.38%
C8P. Harm Reduction Strategies	19 (6.15%)	2,103,607	4.71%

“Reversal of opioid overdose” was covered in 69 videos (22.33%), but attracted almost 40% of cumulative views (Table 11). Information about Naloxone (Narcan) was the most widely covered subtopic in terms of inclusion in the videos (17.8%) and cumulative views (35.68%). “Very high use of Narcan by emergency personnel” was

only mentioned in 22 videos (7.12%), but these videos garnered almost 30% of the cumulative views. None of the other subtopics were widely covered or viewed.

Table 11. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to Reversal of Opioid Overdose in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative View Count (%)
C9. Reversal of opioid overdose	69 (22.33%)	17,075,773	38.21%
C9A. Information about naloxone (Narcan)	55 (17.8%)	15,944,559	35.68%
C9B. Training on how to use Naloxone	5 (1.62%)	817,121	1.8%
C9C. Good Samaritan Law	4 (1.29%)	1,667,128	3.73%
C9D. Very high use of Narcan by emergency personnel	22 (7.12%)	13,042,958	29.18%
C9E. Addicts combative when come out of overdose	1 (0.32%)	34,914	0.08%
C9F. Getting people to the treatment after overdose	7 (2.27%)	1,329,148	2.97%

“Stigma” was covered in little less than one-third of the videos and attracted approximately 25% of the cumulative views (Table 12). None of the subtopics were widely covered or widely viewed. “Battling stigma,” “Lack of compassion/empathy,” and “Need for a cultural shift on how to view the addiction/addicts” were the most widely covered and viewed subtopics, but in all cases, these were included in less than 15% of the videos and garnered less than 15% of the total cumulative views.

Table 12. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to Stigma in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative View Count (%)
C10. Stigma	84 (27.18%)	10,908,808	24.41%
C10A. A person being humiliated to talk about their problems	15 (4.85%)	3,272,334	7.32%
C10B. A person being afraid to talk about their problems	5 (1.62%)	1,267,034	2.83%
C10C. Battling stigma (asking to normalize addiction/opioid drug disorder as a disease)	43 (13.92%)	3,400,189	7.6%
C10D. Lack of compassion/ empathy	38 (12.3%)	6,195,218	13.86%
C10E. Need of cultural shift on how to view the addiction/ addicts	36 (11.65%)	3,801,673	8.5%

Just over fifty percent of all videos mentioned “Treatment for opioid disorder” and these videos attracted almost 65% of the cumulative views (Table 13). None of the sub-topics in this category was widely covered or widely viewed. “Medication assisted therapy with Buprenorphine (Suboxone)” was mentioned in almost 20% of the videos, but these videos only attracted slightly more than 5% of the cumulative views. In contrast, “Inpatient/Rehab” was also mentioned in ~ 20% of the videos, but these videos garnered over 43% of the cumulative views.

“Alternative options for treatment of chronic pain” was a content category that was mentioned in only 41 videos (13.27%), yet these videos garnered over 30% of the total cumulative views (Table 14). None of the sub-topics in this category were covered in more than 6% of the videos. While “Other therapies such as acupuncture and massage”

were addressed in only 13 videos (<5%), these videos attracted over one quarter of the total cumulative views.

Table 13. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to Treatment Options for Opioid Disorder in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative View Count (%)
C11. Treatment options for opioid disorder	156(50.49%)	28,784,656	64.4%
C11A. Medication assisted therapy with Buprenorphine (Suboxone)	57 (18.45%)	2,382,272	5.3%
C11B. Medication assisted therapy with Naltrexone (Revia, Vivitrol)	23 (7.44%)	1,182,770	2.65%
C11C. Medication assisted therapy with Methadone	50 (16.18%)	5,588,030	12.5%
C11D. Negative reviews on Methadone therapy	3 (0.97%)	190,449	0.43%
C11E. Counseling and behavior therapies	26 (8.41%)	1,471,825	3.29%
C11F. Inpatient/ Rehab	64 (20.71%)	19,422,987	43.46%
C11G. Other:	54 (17.48%)	5,085,785	11.38%

Table 14. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to Alternative Options for Treatment of Chronic Pain in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative View Count (%)
C12. Alternative options for treatment of chronic pain	41 (13.27%)	13,472,598	30.14%
C12A. Acetaminophen (Tylenol) or ibuprofen (Advil)	9 (2.91%)	177,176	0.4%
C12B. Cognitive behavioral therapy	5 (1.62%)	91,946	0.21%
C12C. Physical therapy	17 (5.5%)	9,637,243	21.56%

Table 14 continued

Content	N (%)	View Count	Cumulative View Count (%)
C12D. Medications for depression or for seizures	7 (2.27%)	463,516	1.04%
C12E. Interventional therapies (injections)	1 (0.32%)	2,600	0.008%
C12 F. Exercise and weight loss	13 (4.21%)	949,491	2.12%
C12 G. Other therapies such as acupuncture and massage	13 (4.21%)	11,333,514	25.36%
C12H. Alternative options for chronic pain do not work	5 (1.62%)	455,818	1.02%

“Prevention strategies for providers” was addressed in more than 20% of the videos (n = 63) and garnered over 30% of the cumulative views (Table 15). None of the sub-topics in this category was covered in more than 10% of the videos. However, the 30 videos addressing the topic of “Improve prescribing practices by using CDC guidelines” attracted almost 25% of the cumulative views, and the 27 videos addressing the topic “Consider benefits and harms when prescribing opioid therapy for individual patients” attracted approximately 25% of the cumulative views.

“Prevention strategies for individuals” were mentioned in only 46 videos (14.89%) and attracted less than 8% of the cumulative views (Table 16). None of the sub-topics in this category was mentioned in more than 5% of the videos or garnered more than 5% of the cumulative views. These data show that this topic is rarely covered.

Table 15. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to Prevention Strategies for Providers in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative View Count (%)
C13. Prevention strategies for providers	63 (20.39%)	14,136,710	31.63%
C13A. Interactive web-based training regarding addiction or other training	12 (3.88%)	494,296	1.11%
C13B. Improve prescribing by using CDC guidelines	30 (9.71%)	10,784,805	24.13%
C13C. Maximize use of PDMP (Prescription drug monitoring program)	24 (7.77%)	1,828,258	4.09%
C13D. Educate patients on adverse effects, storage and disposal	7 (2.27%)	116,376	0.26%
C13E. Provide the treatment or recommend the treatment	9 (2.91%)	39,971	0.09%
C13F. Consider benefits and harms when prescribing opioids therapy for individual patients	27 (8.74%)	12,166,798	27.22%

In contrast, “Prevention strategies for communities” were mentioned in over one-third of the videos (n = 104) and attracted over 50% of the cumulative views (Table 17). None of the five sub-topics in this category were mentioned in more than 20% of the videos. Yet the 21 videos (6.8%) mentioning “Increased access to Naloxone” garnered 25.71% of cumulative views and the 55 videos (17.8%) mentioning “System and legal changes” garnered over 35% of the cumulative views. “Decriminalization of addicts” was observed in 12.94% of the videos, but attracted only 7.8% cumulative views.

“Information on locating treatment or help” was mentioned in 70 videos (22.65%) that attracted just over 15% of cumulative views (Table 18).

Table 16. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to Prevention Strategies for Individuals in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative View Count (%)
C14. Prevention Strategies for individuals	46 (14.89%)	3,190,032	7.14%
C14A. Never take opioids in greater amounts or more than prescribed	9 (2.91%)	62,778	0.14%
C14B. Store and dispose medication properly	10 (3.24%)	1,248,761	2.79%
C14C. Work with your doctor	9 (2.91%)	113,602	0.25%
C14D. Do not take opioids with alcohol	10 (3.24%)	72,782	0.16%
C14E. Do not take opioids with benzodiazepines, muscle relaxants, hypnotics	2 (0.65%)	39,569	0.089%
C14F. Know your options for chronic pain treatment	4 (1.29%)	470,277	1.05%
C14G. Do not share or sell your medication	5 (1.62%)	87,105	0.19%
C14H. Seek help/ do not wait till hitting the bottom	12 (3.88%)	1,072,274	2.4%
C14I. Family group therapy	1 (0.32%)	48,998	0.11%
C14J. Importance of the communication in family	12 (3.88%)	19,40,269	4.34%

Only one video mentioned the SAMHSA Service Locator. The main way videos in this category identified resources was through a “URL for more information embedded within the video” (n = 51).

“Consequences of opioid use disorder” was one of the most widely covered and viewed topics, represented in over 70% of the videos (n = 221) and attracting almost 82% of the total cumulative views (Table 19).

Table 17. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to Prevention Strategies for Communities in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative View Count (%)
C15. Prevention strategies for communities	104(33.66%)	23,435,686	52.44%
C15A. System and legal changes	55 (17.8%)	15,916,853	35.6%
C15B. Prevention education in schools	23 (7.44%)	899,512	2.01%
C15C. Decriminalization of addicts	40 (12.94%)	3,484,159	7.8%
C15D. Prevention to diminish demand	43 (13.96%)	3,376,072	7.55%
C15E. Increased access to naloxone	21 (6.8%)	11,491,514	25.71%

Table 18. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to Information on Locating Treatment or Help in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative View Count (%)
C16. Information on locating treatment or help	70 (22.65%)	7,017,374	15.7%
C16A. National helpline number	2 (0.65%)	106,175	0.24%
C16B.SAMHSA Service Locator	1 (0.32%)	1,006,221	2.25%
C16C. URL for more information under the video	33 (10.68%)	3,071,675	6.87%
C16D. URL for more information embedded the video	51 (16.5%)	4,948,299	11.07%
C16E. Phone number/ address for more information under the video	13 (4.21%)	965,638	2.16%
C16F. Phone number/ address for more information embedded in the video	24 (7.77%)	498,285	0.9%

The most widely covered and viewed sub-topic in this category was “Overdose and death,” mentioned in 175 videos (56.63% and garnering over 60 % all views). In several cases, the percent of cumulative views was much greater than the number (and

percent) of videos addressing the topic. For example, “Loss of job,” “Loss of house,” and “Bankruptcy” was mentioned in approximately 5% to 7% of the videos, but attracted 32%, 24% and 27% of the total views, respectively.

Table 19. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to Consequences of Opioid Use Disorder in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative view count (%)
C17. Consequences of opioid use disorder	221(71.52%)	36,550,711	81.78%
C17A. Loss of job	20 (6.47%)	14,354,299	32.12%
C17B. Loss of house	17 (5.5%)	10,757,903	24.07%
C17C. Bankruptcy	20 (6.47%)	12,014,171	26.88%
C17D. Loss of partner	14 (4.53%)	2,297,260	5.14%
C17E. Loss of children	27 (8.74%)	3,164,559	7.08%
C17F. Imprisonment	44 (14.24%)	5,145,916	11.51%
C17G. Physical Disability	5 (1.62%)	208,812	0.47%
C17H. Overdose and Deaths	175(56.63%)	26,945,331	60.29%
C17I. Adverse effects on families	69 (22.33%)	9,389,587	21%
C17J. Grandparents care taking of children of addicted parents	19 (6.15%)	3,455,334	7.73%
C17K. Neonatal withdrawal syndrome	23 (7.44%)	6,194,922	13.86%
C17L. Increased occurrence of hepatitis	12 (3.88%)	673,671	1.51%
C17M. If they know the consequences they would not start taking pills	13 (4.21%)	1,979,452	4.43%
C17N. Pills destroy lives	54 (17.48%)	15,932,552	35.65%
C17O. The only relationship that mattered was relationship with the pills	41 (13.27%)	13,668,967	30.58%

Table 20. Frequency, Percent, View Count, and Cumulative View Percent by Selected Sub-topics Related to Barriers Preventing Discontinuation of Misuse/Starting Addiction Treatment in 309 YouTube Videos, 2018

Content	N (%)	View Count	Cumulative View Count (%)
C18. Barriers preventing discontinuation of misuse/ starting addiction treatment	96 (31.1%)	22,774,799	50.96%
C18A. Stress	9 (2.91%)	284,750	0.64%
C18B. Social isolation of caretaking work	0	0	0
C18C. Unemployment	9 (2.91%)	257,421	0.58%
C18D. Mean to cope with emotional pain and traumatic experiences	33 (10.68%)	6,688,639	14.97%
C18E. Only mean to cope with the physical pain	16 (5.18%)	2,771,739	6.2%
C18F. Inaccessibility to alternative chronic pain treatments	4 (1.29%)	9,448,449	21.14%
C18G. Women targeted by pharma and physicians	1 (0.32%)	2,825	6.0063
C18H. Lack of specified treatments for women, pregnant	5 (1.62%)	91,405	0.20
C18I. Lack of family- centered programs/ centers	1 (0.32%)	19,050	0.04%
C18J. Shortage of treatment centers	28 (9.06%)	3,562,017	7.97%
C18K. Lack of affordable health care	20 (6.47%)	86,0813	1.93%
C18L. Inaccessibility of expensive substance abuse treatment	19 (6.15%)	10,290,072	23.02%
C18M. Low utilization of existing treatment centers	1 (0.32%)	19,050	0.04%
C18N. Lack of transportation to centers	6 (1.94%)	536,888	1.2%
C18O. Childcare issues	2 (0.65%)	13,548	0.03%
C18P. Insurance issues	13 (4.21%)	10,289,000	23.02%
C18R. Potential loss of child custody	3 (0.97%)	111,355	0.25%
C18S. Incarceration	31 (10.03%)	2,867,659	6.42%

Many “Barriers preventing discontinuation of misuse/starting addiction treatment” were examined. Overall, over 30% of the videos addressed this topic (n = 96) attracting over one-half of the cumulative views (Table 20). None of the sub-topics

examined was widely covered in the sample of videos. But some sub-topics had a comparatively large percent of cumulative views relative to the number of videos in which they were mentioned such as “Inaccessibility to alternative chronic pain treatments” (n = 4, 21.14% of total views), “Inaccessibility of expensive substance abuse treatments” (n = 19, 23.02% of total views), and “Insurance issues” (n = 13, 23.02% of total views).

Specific Aim 3

Given the wide distribution of upload sources, Aim 3 was delimited in scope to the two sources that attracted the majority of views. Videos uploaded by Internet Based Sources and Television News/Entertainment sources attracted over 80% of the total cumulative views. With only one exception, there were no statistically significant differences in the proportion of videos uploaded by these two sources with respect to the selected content categories that was covered. The one exception was that compared with videos uploaded by Television News/Entertainment sources, a significantly greater proportion of videos those uploaded by Internet Based covered the topic concerning physical signs and symptoms of prescription opioid misuse (33.73% versus 53.93%, Chi Square = 7.104, p = .008).

Table 21. Frequency and Percent of Videos Covering Selected Content Uploaded by Internet Based Sources Versus Television News/Entertainment Sources in 172 YouTube Videos About the Opiate Epidemic, 2018

CONTENT COVERED	U8 INTERNET BASE (n = 89)	U5 TELEVISION NEWS (n = 83)	Chi Square	p value
C1. Background of the opioid epidemic (n = 102)	54 (60.67%)	48 (57.83%)	0.144	0.705
C2. Physical signs and symptoms of prescription opioid misuse (n = 76)	48 (53.93%)	28 (33.73%)	7.104	0.008
C3. Behavioral signs and symptoms (n = 68)	41 (46.07%)	27 (32.53%)	3.292	0.070
C4. Risk factors for prescription opioid misuse (n = 128)	65 (73.03%)	63 (75.9%)	0.186	0.666
C5. First use of the prescription analgesics (n = 56)	30 (33.71%)	26 (31.33%)	0.1111	0.739
C6. Population at risk for prescription opioid misuse (n = 32)	14 (15.7%)	18 (21.69%)	1.0006	0.316
C7. Opioid dependency withdrawal symptoms (n = 61)	35 (39.33%)	26 (31.33%)	1.201	0.273
C8. Information on opioid use and overdose (n = 141)	74 (83.15%)	67 (80.72%)	0.171	0.680
C9. Reversal of the opioid overdose (n = 43)	23 (25.84%)	20 (24.1%)	0.070	0.792
C10. Stigma (n = 40)	23 (25.84%)	17 (20.48%)	0.692	0.406
C11. Treatment for opioid use disorder (n = 71)	39 (43.82%)	32 (38.55%)	0.491	0.483
C12. Alternative options for chronic pain (n = 16)	8 (8.99%)	8 (9.64%)	0.021	0.883
C13. Prevention strategies for providers (n = 33)	13 (14.61%)	20 (24.1%)	2.494	0.114
C14. Prevention strategies for individual (n = 20)	12 (13.48%)	8 (9.64%)	0.618	0.432
C15. Prevention strategies for communities (n = 68)	32 (35.96%)	36 (43.37%)	0.989	0.32
C16. Information on locating help (n = 18)	12 (13.48%)	6 (7.23%)	1.793	0.181
C17. Consequences of opioid use disorder (n = 128)	65 (73.03%)	63 (75.9%)	0.186	0.666
C18. Barriers preventing discontinuation of the misuse/start of the treatment (n = 94)	25 (28.09%)	25 (30.12%)	0.086	0.769

Specific Aim 4

In an effort to examine if the videos attracting the most views differed with respect to the content that was covered the videos were classified according to tertiles of views and differences on the frequency of videos covering specific content was examined. Of the 18 topics examined, there were no statistically significant differences for 13. Hence there were differences for five of the topics. The greatest differences were observed for two content categories, physical signs and symptoms of misuse and stigma. In both cases, videos in the lowest tertile of views were less likely to cover the content, but there were no linear trends.

A total of 34 of the 103 videos in the lowest tertile covered physical signs and symptoms, while 52 and 54 of the 103 videos in the middle and highest tertile covered this topic, respectively (Chi square = 9.508, $p = 009$). A total of 25 of the 103 videos in the lowest tertile covered the topic of stigma, while 39 of the 103 videos in the highest tertile covered this topic (Chi square = 9.515, $p = 009$). The three other significant differences ($p < .05$) were for the topics concerning first use of prescription opioids, populations at risk to misuse prescription opioids, and prevention strategies for communities. In all cases, compared with videos in the lowest tertile, those in the highest tertile were more likely to cover the respective topic. The latter tests should be interpreted with caution given the large number of tests conducted.

Table 22. Frequency of Videos Covering Selected Content About the Opiate Epidemic by Tertiles of Number of Views, 2018

Content	Highest Views N = 103	Middle number of Views N = 103	Least views N = 103	Chi Square	P value
C1. Background of the opioid epidemic (n = 157)	57	52	48	1.58	0.454
C2. Physical signs and symptoms of the misuse (n = 140)	54	52	34	9.508	0.009
C3. Behavioral signs and symptoms of the misuse (n = 140)	52	46	42	1.985	0.371
C4. Risk factors for prescription opioid misuse (n = 241)	72	85	84	5.921	0.052
C5. First use of prescription opioids (n = 113)	47	30	36	6.222	0.045
C6. Population at risk to misuse prescription opioids (n = 66)	31	17	18	7.052	0.029
C7. Opioid dependency withdrawal syndrome (n = 141)	51	50	40	2.896	0.235
C8. Information on opioid use and overdose (n = 250)	87	82	81	1.299	0.522
C9. Reversal of opioid overdose (n = 69)	29	20	20	3.023	0.221
C10. Stigma (n = 84)	39	20	25	9.515	0.009
C11. Treatment for opioid use disorder (n = 156)	56	55	45	2.874	0.238
C12. Alternative options for treatment of chronic pain (n = 41)	13	11	17	1.575	0.455
C13. Prevention strategies for providers (n = 63)	21	16	26	2.991	0.224
C14. Prevention strategies for individuals (n = 46)	15	12	19	1.89	0.389
C15. Prevention strategies for communities (n = 104)	45	32	27	7.508	0.023
C16. Information for locating the treatment or help (n = 70)	23	21	26	0.702	0.704
C17. Consequences of opioid use disorder (n = 221)	82	70	69	4.898	0.083
C18. Barriers preventing discontinuation of misuse/ getting to treatment (n = 96)	39	29	28	3.355	0.187

Chapter V

DISCUSSION

Since developing the proposal for this research, the magnitude and severity of the opiate crisis has been recognized to a greater degree. Recently reported data indicate that, in 2016, over 11 million people misused prescription opioids (U.S. Department of Health and Human Services [HHS], 2018), 116 people died each day from overdoses caused by opioids (HHS, 2018), 46 people die each day from overdoses caused by prescription opioids (CDC, 2017i), over 2 million people had an opioid disorder (HHS, 2018), almost 1 million people used heroin, and over 2 million people started using prescription opioids (HHS, 2018). The economic costs were estimated to be over 500 billion (White House, 2017). These data reflect the extent and severity of the epidemic and the need to find solutions to reduce the harm caused to individuals, families, communities and the nation. One element of a more comprehensive national strategy is increasing awareness among the public and specific stakeholders, such as citizens, health care providers, and policy makers, about the problem. It is here that the Internet in general and YouTube in particular can be very helpful.

YouTube is an important resource for a variety of reasons. One of the main reasons is its widespread reach. With over a billion users, this is a unique media channel

for reaching very large audiences of people. This Study revealed that the videos in the sample were viewed over 44 million times. Second, the video format does not require a high level of reading literacy and many adults in the U.S. have been shown to have low levels of reading literacy (National Center for Educational Statistics, 2003).

Third, YouTube can be accessed through various technologies that are widely available, including mobile phones. Forth, videos can be tailored to specific audiences in terms of speakers, language, cultural factors, among other factors. Fifth, the video format enables communication about complex topics because videos can be replayed and demonstrations can be observed. Sixth, it is possible to provide links to additional resources, such as where to find treatment or other kinds of assistance.

YouTube has been used extensively as a tool for marketing and advertising. Increasingly, YouTube is being used for health education and public health research (Paek et al., 2010). A search about YouTube shows that the number of publications is growing rapidly. For example, several studies that investigated YouTube videos relevant to present study were found. Examples of the topics included alcohol intoxication (Primack et al., 2016), alcohol brand preferences (Primack et al., 2015), presence of alcohol and tobacco in music videos (Cranwell et al., 2015), e-cigarettes (Huan et al., 2016), anti-smoking videos (Paek et al., 2010), effects of medication use (Chary et al., 2014; Hansen et al., 2016; Fixsen and Ridge, 2016), portrayals of marijuana use (Cavazos-Rehd et al., 2017), effects and use of Salvia plant (Lange et al., 2010), depression (Baquero, 2018), learning resources for pharmacokinetics (Azer, 2014), and educational videos targeting chronic pain (White et al., 2016).

Despite its undeniable popularity, no published studies describing the characteristics and content of YouTube's videos regarding opioid misuse, opioid use disorder or the opioid epidemic were found. Recognizing the significance of this urgent public health crisis, this study was intended to be a first step in filling this gap in current knowledge by identifying and analyzing the most viewed videos on this topic with respect to their sources, speakers, formats, number of views, length, year uploaded, and content.

Main Conclusions

The videos in this study were viewed almost 45 million times. This shows that YouTube is an important media channel for communicating with the public about the opioid epidemic. As such, if agencies responsible for reducing the harmful consequences of the opiate epidemic do not find ways to produce YouTube videos that attract widespread viewership, an important opportunity for communicating with the public will be lost.

Upload Source and Speaker

The two main sources of the most widely viewed YouTube videos regarding opioid misuse, opioid use disorder and overdose were Internet Based and Television news/ Entertainment. Together, these two sources accounted for the majority of videos

and over 80% of the cumulative views. Compared with Internet-based videos, those uploaded by Television news/Entertainment had almost twice as many cumulative views (28.60% versus 53.57%). Several very widely viewed videos in these categories contributed to this result. These results show the power of the news/entertainment format to reach a very large audience.

This finding is consistent with research on YouTube coverage of vaccines in which by far the most widely viewed video was based on a segment of the Jimmy Kimmel show (Basch, Basch, Zybert, & Reeves, 2017a). In contrast to studies on topics such as diabetic retinopathy (Basch et al., 2016), vaccines (Basch et al., 2017a), and Zika virus (Basch et al., 2017b), which reported that a comparatively large proportion of widely viewed videos were uploaded by consumers, in this study only ~ 15% of the sample garnering less than 5% of the total cumulative views were uploaded by consumers.

While “Consumers” may not have been one of the main sources uploading videos, they were often the main speaker (in over 25% of videos that garnered over 30% of total cumulative views). A person with lived experience was generally the main speaker of the Consumer category. There were an almost equal percentage of videos in which consumers and health professionals were the main speaker (26.86% and 22.98%, respectively). But the videos portraying consumers as the main speakers garnered almost 10 times as many cumulative views as those in which professionals were the main speakers only (3.24% versus 30.35%).

These findings suggest that one of the best ways to reach consumers will be by having the messages delivered by those in the news or entertainment industry or consumers themselves. Many viewers may have selected videos in which the speaker is someone with whom they can identify. In contrast, as mentioned above, while health professionals were the main speaker in almost 25% of the videos, these videos garnered only 3.24% of the total cumulative views. This suggests that, if a goal is to attract viewers, those conceptualizing and designing videos should not use health professionals to deliver the message.

Government organizations funded with public tax dollars are responsible for health promotion and disease prevention in general and with respect to mitigating harm caused by the opiate epidemic in particular. The results of this study revealed that governmental organizations uploaded 11 videos (< 4%) in the study sample, collectively garnering 343,983 views (less than 1% of the total cumulative views). In the 10 videos in which a government official was the main speaker, these videos attracted only one-quarter of 1 % of the total cumulative views. A conclusion from this study is, therefore, that these organizations have not found ways to reach a large audience with their messages.

Studies of YouTube on other topics have similarly found that only a small number of the most widely viewed YouTube videos were uploaded by governmental agencies (Baquero 2017; Basch et al., 2017a; Hansen, 2016; Yiannakoulis, Tooby, & Sturrock, 2017). This is unfortunate since a major responsibility of such agencies is to educate the public about various public health topics in ways that help inform decision making,

prevent disease and promote health (Healthy People, 2018). In contrast, there are also examples of when governmental agencies have been able to produce YouTube videos that are widely viewed (Pandey, Patni, Singh, Sood, & Singh, 2010). To the extent that governmental agencies hope to reach large audiences with their messages, it would behoove them to invest resources to improve understanding about ways to produce videos that will be widely viewed.

Collectively, these findings combined with the qualitative descriptions of the most widely viewed videos suggest that viewers are attracted to a narrative interlaced with a real-life story presented by a person with lived experience or a television news/entertainment personality. In contrast, while videos with presentations by professionals were included in the sample, they received a very small proportion of the total cumulative views. The invitation to the inner worlds of consumers with the lived experience describing stories of their first use and the consequences they lived through seems to capture the deep essence of despair that this disorder carries and seems to attract viewers. The messages and language used by consumers may contain important information for researchers and professionals as well as other consumers (Fixsen & Ridge, 2017).

Format

There was no dominant format among the widely viewed videos in the sample. The two formats that garnered the greatest proportion of total cumulative views were

“Documentary” (~31% of total cumulative views) and “Talk show/Discussion panel” (~25% of total cumulative views). In both cases, the percentage of total cumulative views was much greater than the percentage of videos. Thus, documentaries and talk shows/discussion panels were the most popular in terms of frequency of occurrence, and together these formats attracted over 50% of the cumulative views. The “News report” was another popular format, attracting upwards of 8 million views (> 17% of total cumulative views). The “Talk show/Discussion panel” was the format of only ~ 8% of the videos, but videos in this format attracted over 25% of the cumulative views. These three formats warrant consideration by those developing videos to reach a large audience. However, drawing conclusions from these findings is problematic since the results can be greatly skewed by the popularity of a small number of videos.

Content

Many of the topics coded in this study were covered in a large proportion of the videos. For example, the following topics were mentioned in over 50% of the videos and garnered over 50% of the cumulative views: “Background of the opioid epidemic,” “Risk factors for prescription opioid misuse,” “Treatment for opioid use disorder,” and “Consequences of opioid use disorder.” The most widely covered topic was “Information on opioid use and overdose,” which was addressed in over 80% of the videos and garnered the greatest number of cumulative views (> 40 million, almost 90% of the total cumulative views). One of the reasons why these topics may be widely viewed is their

sensational value and disturbing visual effects that were presented. A high level of sensational value, has been defined as the “degree to which formal and content audio-visual features of a televised message elicit sensory, affective and arousal responses” (Paek et al., 2010, p. 1089), and has been associated with the larger amount of views.

The opioid epidemic portrays a case study in how there was a lost opportunity by the U.S. Public Health Service to use YouTube to help control the epidemic before it reached the current level of urgency. But this did not happen. In contrast, for many years, messages to physicians conveyed that prescription opioids were a safe and effective way to treat pain and would not lead to addiction. It does not seem coincidental that many media channels receive a large proportion of their income from the pharmaceutical industry. The recent law suit against Purdue Pharma cost the company 640 million dollars, but this is a very small amount considering the two to three billion they earned annually through the sale of Oxycodone.

Some of the stories in the videos included the Drug Enforcement Agency’s efforts to close the pill mills that were sending the physically dependent individuals to the black market for heroin. Once addicted to prescription opioids, which were either no longer available or too costly, heroin became a much more readily available and cheaper option. Individuals or family members in the videos repeatedly described use of prescription opioids for pain due to injury, accident or chronic pain, and how high doses of such medicine contributed to the epidemic in small American towns.

The shift to heroin is frequently covered in the videos and attracted a large number of cumulative views, but some of the deadly alternatives were not well covered.

Emerging literature suggests that illicitly manufactured fentanyl doubled the number of overdose deaths from 2015 to 2016 (Bouvier, Elston, Hadland, Green, & Marshall, 2017; CDC, 2017f; Prekupec, Mansky, & Baumann, 2017). Fentanyl can be 50-100 times more potent than heroin but appeared less frequently in the videos and attracted much less attention as measured by cumulative views. This illustrates a topic that needs greater attention.

Other topics that were not widely covered or viewed included stigma, prevention strategies for individuals, and information for locating help. Stigma is an important issue in combatting this epidemic because many people see this epidemic and the people affected as having a weak moral character versus suffering from a medical problem. This may reduce individuals' willingness to seek information and assistance. Anonymity of online sites, therefore, provides an excellent alternative since such sites can be accessed without embarrassment. Online media channels can help reduce stigma, and can help people realize that they are not alone by portraying the many others that suffer from the same condition. These media channels also offer the space for the creation of support groups that are not limited by geographical constraints (Fixsen & Ridge, 2017).

“Alternative options for treatment of chronic pain” would seem to be an important topic for those seeking ways to control pain other than opioids. Yet this topic was mentioned in less than 15% of the videos. The fact that these 41 videos attracted over 30% of the cumulative views suggest that it is a topic of interest to consumers and warrants greater attention.

Of all the topics examined, “Prevention strategies for individuals” had the lowest number of cumulative views (7.14%). “Information for locating treatment or help” was also one of the least popular topics, addressed in less than one-quarter of the videos and garnering only 15.7% of the cumulative views. Indeed, the SAMSHA Service locator was mentioned in only one of the 309 videos. These results suggest that additional work is needed to disseminate information about prevention.

“Treatment options for opioid disorder” was mentioned in more than 50% of all videos and attracted almost 65% of the cumulative views. But some of the evidence-based approaches, namely “Medication assisted therapy with Buprenorphine,” were mentioned in less than 20% of the videos and garnered only 5.3% of the cumulative views. “Inpatient/ rehabilitation” was also mentioned in about 20% of the videos, but these videos garnered almost 45% of the cumulative views, suggesting consumers’ interest in this treatment modality.

Most of the videos did not include harmful information however some did offer advice that was not based on recommendations of authoritative health agencies. Marijuana was often mentioned under “other” in the category “Treatment options for opioid use disorder.” These videos were collectively viewed 322,891 times. There is research suggesting an association between legalization of cannabis and short-term decreases of opioid related deaths (Livingston, Barnett, Delcher, & Waagenar, 2017), but CDC has not recommended this approach to treatment. Another example is a substance referred to as Kratom, which was recommended in several videos as a way to treat withdrawal symptoms. The U.S. Drug Enforcement Administration banned this

substance. Nevertheless, the videos mentioning this had 206,768 collective views. The videos suggesting treatment with Kratom provided recipes and involved drinking tea made from Kratom, which could give false assurance of the safety of this substance. These examples illustrate that while YouTube videos have promise for educating consumers and helping them make informed decisions, given that the video content is not curated, there is potential for disseminating inaccurate information resulting in dangerous consequences. This finding of dangerous remedies depicted on YouTube has been reported previously in relation to other health topics (Basch, Basch, Hillyer & Reeves, 2015).

Limitations

The findings and conclusions from this study must be interpreted considering the limitations of the design. At least four main limitations affecting the study include (1) cross-sectional design (2) scope of information provided by YouTube, including inability to distinguish number of views from number of viewers, location of viewers, or whether videos were fully viewed (3) having a single coder determine which videos were included and excluded from the sample and then complete the coding and (4) issues related to the sample. Each is outlined briefly below.

The study design was cross-sectional. All videos were extracted at one conceptual point in time. This limitation is particularly important in the context of a descriptive study

involving YouTube videos since the number of videos is changing constantly along with the views assigned to existing videos. This study, therefore, provides only a snapshot about the questions addressed and needs verification through replication. Given that, to date, no published studies on this topic were identified, this descriptive work is a meaningful first step in understanding the characteristics of the most widely viewed videos.

Only certain kinds of information were available about the videos. Information that can be extracted from YouTube does not enable distinguishing between the number of views and number of viewers. The outcome variable was intended to provide an estimate of the population reach of each video, ideally reflecting the number of people that watched each video. It's clear that this may provide a biased estimate. This is a problem inherent in all studies about YouTube. While it is likely that some of the videos have been viewed more than once, it seems reasonable to conclude that the number of views provides at least a crude measure of reach. Also, the location of the viewers was not identified but it seems reasonable to assume that most were from the U.S. There is no way to determine if the videos were fully viewed or the attentiveness of the viewer.

The study design relied heavily on a single coder to determine which videos were included and excluded from the sample and then to complete the coding for videos selected into the sample. Steps that were intended to mitigate this concern were having the Researcher watch many videos prior to beginning the study and conducting a pilot study to demonstrate the intra- and inter-rater reliability of the coding. Additional research to verify the findings is needed.

There are several issues related to the sample in the study. The sample of videos in the study was small. This was intentional since the intent was to only include videos with a large number of views. The cut-point of 1,500 views was arbitrary and if a different cut-point was used the results may have been different. The small sample size precluded some kinds of analysis since there would not be sufficient statistical power, and may have skewed the results. Since there were some videos with a disproportionately large number of views, these videos disproportionately influenced the findings. Also, there is potential bias in the sample since only two keywords were used when extracting the sample and different videos would have been identified using different keywords. Despite the intent to capture the most viewed videos on opioid misuse, opioid use disorder, and opioid epidemic, it is possible that some YouTube videos with a high cumulative number of views were not detected. Prior to conducting the study, pilot work was conducted to examine the sample of videos resulting from using different keywords and the two-selected yielded the greatest number of non-overlapping videos with the greatest number of views.

Collectively, these study limitations are likely to have influenced the findings. In some cases, they indicate ways that future studies may build on this work. In other cases, they indicate inherent limitations of research on YouTube.

Implications for Policy

Health care providers who prescribe medication for pain should be required to demonstrate a minimal level of understanding about the opiate epidemic and their role in preventing harm. Rigorous training in regard to acute and chronic pain management would require that providers incorporate compassion, ability to sensitively communicate the options of alternative treatment modalities, lifestyle changes, limits of biomedical therapies, and the risk and reality of addiction. The priority assigned to educating future physicians about chronic pain appears to be low and training in medical school about addiction is minimal (Webster, 2017). In the current study, videos related to “Prevention strategies for provider” was covered in one of five videos and received over 14 million views (over 30% of cumulative views). This suggests that such videos can be an important element of a more comprehensive approach to professional preparation of providers addressing pain management. These kinds of videos can address providers’ role in creating the opioid epidemic improve understanding about the appropriate role of prescription opioids in pain management, and steps that can prevent long-term harm caused by prescription opioids. CDC (2017d) provides an online training series for providers addressing guidelines for prescribing opioids. Given the magnitude, severity and urgency of the opiate epidemic, such training should become required for all primary doctors who treat patient suffering from pain.

Health care providers should be required to screen patients for risk factors prior to prescribing medications containing opiates. Studies indicate that people who misuse prescription opioids are rarely drug naive (Cicero et al., 2017). Several screening instruments already exist that can help providers detect potential for misuse and make

appropriate decisions about prescribing opioids. Before opioids are prescribed, patient's history of substance use, including alcoholism, nicotine, stimulants, benzodiazepines or other substances, should be known (Cicero et al., 2017). In addition, patient's history of the mental disorders should be known as this can substantially increase risks for prescription opioid misuse and overdose (CDC, 2017h). Lack of time and too many patients often prevent providers from conducting such screening, and this must be addressed through reimbursement policies.

With the stricter guidelines for opioid prescribing, some patients who can benefit from opioid therapy may be left untreated. With screening, drug monitoring, and continuing education, health care providers can improve the odds for conducting careful evaluations of the benefits and risks for individual patients. The pendulum is returning back to opiophobia, where physicians are reluctant to prescribe opioids at all (Webster, 2017), which is unfortunate for patients who can truly benefit from this highly effective class of drugs. The difference between addiction, that involves compulsion and continued use despite harmful consequences, as opposed to physical dependence should be clear to all physicians in both pre-service and in-service roles. This will help ensure that physicians do not to 'cut off' the patients that are doing well on their opioid treatment program.

The current school of thought that chronic pain treatment should emphasize rehabilitation rather than symptom relief (Webster, 2017) is often not supported by insurance coverage. The health insurances readily pay for pharmaceutical treatment, but holistic options that actually represent the first line of care for chronic pain are not

reimbursed (McIver, 2017). If there is honest interest in diminishing opioid use for chronic pain, significant changes in coverage for alternative treatments would be an important element of a more comprehensive approach.

Widely viewed videos covered not only the issue of inaccessibility to alternative chronic pain treatments, but also revealed barriers of inaccessibility of expensive addiction treatment. Policies that help address the cost of addiction treatment, involving both medically assisted treatment (MAT) and inpatient treatment, should be part of a comprehensive response to the current epidemic. The issue of insurance coverage for MAT with Buprenorphine in rural areas is affected by lack of physicians certified to prescribe such medication. Patients that have to travel long distances to receive MAT treatment often places the patient ‘out the network’ and thereby increases cost to the individual to the point where it is unaffordable. Policies supporting the use of telemedicine to rural areas warrant consideration.

Naloxone—a drug that can prevent deaths due to overdose—has been available since 1971. But it has taken until 2014 for the Food and Drug Administration to approve this drug for use in reversal of drug overdose and allow people without medical training to administer this life saving action (Gupta et al., 2016). All U.S. states and D.C. have now passed new laws or modified existing laws that simplify access to an auto injector or nasal spray (McGinty et al., 2018), which increases the chances of immediate overdose reversal. In 2013, more than 80% of Naloxone use was for heroin overdose, but from 2009 to 2015 there were twice as many deaths from prescription opioid overdose. Some barriers to widespread adoption and use of Naloxone may be stigmatization, lack of

familiarity, and cost (Gupta et al., 2016) and lack of insurance coverage. It is essential that in the midst of the opioid crisis, the government should ensure that each community should have easy and affordable access to the medication that can save someone's child, parent, or significant other, and that can help significantly alleviate the opioid related emergency department visits (Kerensky & Walley, 2017). In April 2018, the Surgeon General of the United States advocated for increased availability and use of Naloxone as a way to reduce the harmful consequences of the opiate epidemic (Surgeon General, 2018).

There is a need for legal safe injection sites to prevent spread of infectious diseases such as hepatitis (Soipe et al., 2017) and HIV, as well as prevent or treat overdose. The opioid crisis is occurring at a time when there are many controversial harm reduction strategies that warrant consideration as strategies to reduce morbidity and mortality caused by the epidemic. Al-Tayyib, Koester, and Riggs (2017) suggest that those who were hooked on prescription opioids prior to injecting heroin for the first-time reported heroin as the first and primary drug injected. These people were also more likely to report at least one overdose during past the 12 months. Supervised injection facilities are well utilized in Australia, Canada, and in several countries in Europe, but overlooked or kept underground in U.S (McGinty et al., 2018). Individuals suffering with opioid use disorders could highly benefit from safe use facilities who provide clean needles and have staff that oversees their use and can provide immediate help in case of overdose. These individuals could also benefit from screening and testing for infectious diseases, and from referral to care (Soipe et al., 2017; McGinty et al., 2018). Some other

noteworthy harm reduction strategies such as specialized emergency services, hospitals on the wheels, and heroin-assisted treatment, have yielded reductions in overdose mortality in European countries (Bouvier et al., 2017). Diffusion of the YouTube videos about successes and effectiveness of the harm reduction programs outside the U.S. may increase policymakers' interest in creating laws that legalize evidence-based harm reduction programs.

Even though there has been increasing custody of children by grandparents and a child abandoned by a parent due to an opioid use disorder or overdose death is on the rise, the current policy protecting kinships is non-existent. Widely-viewed videos in this study did not provide information on this critical consequence of the opioid epidemic. Changes in financial support for unexpected caregivers should be established along without the extensive bureaucracy for qualifying to receive the support. As the harmful consequences of opioid epidemic continue to be realized (DuPont, 2017), this neglected issue will become unavoidable.

The category "Barriers preventing discontinuation of the misuse/getting to treatment" garnered over 50% of cumulative views. Among the sub-topics attracting many views within this category were inaccessibility to alternative chronic pain treatments and expensive substance abuse treatment, and insurance issues. Videos covering topics such as shortage of treatment centers, lack of affordable healthcare, lack of transportation to treatment, incarceration or unemployment were much less viewed, but are considered serious road blocks for individuals who are trying to get help. Funding

for the treatment services and treatment centers for those who are already affected by the opioid epidemic are crucial.

The above matters were also indirectly expressed in YouTube videos discussing need for system and legal changes in the category “Prevention strategies for communities.” System and legal changes appeared only in 17.8% of all videos, but garnered 35.6% of views. The needed changes often included ideas of trans-sectoral cooperation where legislators, state and federal governments, physicians, academics, and the public worked together to improve prevention, treatment, and eradication of the opioid epidemic (DuPont, 2017). YouTube videos present a venue that could be part of a more comprehensive campaign aimed at changing policies related to these topics.

Implications for Health Education Practice

YouTube’s popularity, convenience, immense amount of video uploads per minute, and continuous improvement (Azer, 2014) underscores its potential as a meaningful tool for health educators. Successful utilization of this tool to deliver increased awareness and interest about this (and other) health issues has important implications for health education practice.

Video education has many benefits over traditional education as it is more efficient, convenient, and supports individualized learning. Piliéci, Salim, Heffernan, Itani and Khadaroo (2018) have shown that video education was superior to traditional

skill demonstration in providing medical students with knowledge. The results of the present study demonstrate that videos uploaded by professionals were not widely viewed. Health educators need to gain additional training on how to create videos that are widely viewed. This needs to be done through ongoing collaboration with those who create highly viewed videos (White et al., 2016) and who understand how to present content so it becomes attractive to the viewer. In the world of social media, some believe that “content is a king” (White et al., 2016, p. 703), and so it is indispensable for health educators to gain additional tools on how to deliver key messages effectively through video. This has not been one of the skills traditionally emphasized in health education training (National Commission for Health Education Credential, 2018).

The death rate due to opioid overdose among older adolescents, ages 15-19, more than doubled since 1999 (Curtin, Tejada-Vera, & Warner, 2017). The 2015 Monitoring The Future survey revealed a 2.9% prevalence of non-medical opioid use for youth aged 12–13 years and 9.4% for youth aged 16–17 years. This survey also showed that roughly one third of older adolescents (aged 18 years) with non-medical prescription opioid use continued such use in the future (Osborne, Serdarvic, Crooke, Striley, & Cottler, 2017). Since a physician prescribes them, many of adolescents are under the false assumption that prescription opioids are safer than illicit drugs (Foggers & McGuiness, 2014). About 37% of videos in this study did point out that adolescents were a population at risk for the misuse. An important step to reduce adolescents’ risk for opioid addiction is to incorporate education into health education curriculum. No evidence-based curriculum specifically addressing this issue was identified.

Educators must keep up with the most current information in regard to the opiate epidemic. In this study, the shift to heroin is frequently covered and has attracted a large proportion of the cumulative views (72%). Emerging literature, however, suggests that illicitly manufactured fentanyl, deadlier than heroin, increased since 2013 and doubled the number of overdose deaths from 2015 to 2016 (Bouvier et al., 2017; Kerensky & Walley, 2017; Prekupec et al., 2017, CDC, 2017f). Videos in the present study mentioning fentanyl garnered only 20% of cumulative views. To provide effective prevention, educators need to know most recent sources of harm that are connected to the opioid problem.

In addition to prevention in schools, continuing education for health educators and health care providers is needed to help them understand the opiate epidemic and ways education can help prevent its harmful effects (Finnell, Twilman, Breslan, Schultz, & Miller, 2017). Professional preparation programs should enable primary care physicians, emergency department doctors and other experts to effectively deliver education on how to store, dispose, and take opioids. It has been shown that techniques such as Motivational Interviewing can reduce prescription opioid overdose risk behaviors, including opioid misuse or overdose (Bohnert, Cunningham, Greenwald, Thomas, & Chermack, 2016; Coffin et al., 2017). YouTube videos would be an effective method to present role playing between the doctor and patient on appropriate use of motivational interviewing where opioid misuse is suspected.

Due to initially hard-to-recognize symptoms of opioid misuse, there is a need to increase awareness about signs and symptoms of misuse. YouTube seemed to be a place

where consumers or family members of people suffering opioid use disorder shared their first-hand experiences and warnings about signs and symptoms. However, many important signs and symptoms that would help family members to recognize the problem more easily and earlier were not mentioned in most widely viewed videos. These include social withdrawal, mood swings, disinterest in previously liked activities, increased irritability, weight loss, small pupils, overlapping prescriptions with benzodiazepines, unusual sleeping patterns or use of medications differently than prescribed. Given that many people search for information on YouTube, this knowledge could be essential and should be incorporated into future videos.

It is common that many reversed overdoses are not followed by summoning professional help. People witnessing or helping to reverse the overdose are often discouraged from calling for help due to fear of legal penalties (Kerensky & Walley, 2017). Thus, efforts to diminish opioid related overdoses require education on Samaritan laws that protects the person who calls for professional help from criminal charges.

A few of the most widely viewed videos addressed the alarming increase in the number of children witnessing parental use, overdoses, or death. These children may experience difficult situations involving police or emergency personnel in their homes at night or over the weekend so they are unable to participate in the regular school day activities. The principal of one elementary school addressed this problem by taking initiative in getting clean clothes or extra food for these children. While the budget cuts at this school did not allow the presence of the full-time guidance counselor, she asked the adults (coaches or other parents) to volunteer and spend time with these children in the

afternoon playing in the gym or reading. The aim was to provide the children with an adult figure that they could count on in the short term as many lost this sense of security from their parents. It would be progressive if such initiatives would be shaped in other schools in areas that have been greatly affected by the opioid epidemic.

Health educators should become trained in administering Naloxone and become certified to train others. CDC (2016) guidelines recommend considering Naloxone and overdose education for patients or family members of patients with the history of substance abuse, overdose, or with a high opioid dosage (Kerensky & Walley, 2017). Because familiarity with its use may be low (Gupta et al., 2016), health educators should become trained so they can provide further instructions and training to members of their communities

Chronic pain plays a large role in the opioid epidemic. In the present study, the fact that opioids are not the first line of the treatment for chronic pain was rarely mentioned in the most viewed videos. This information is essential as many alternative options of treatment of chronic pain may work better and have fewer risks and side effects (CDC, 2017e). Increasing awareness about alternative options for effectively treating chronic pain is needed. These alternatives include individually tailored physical activity, physical therapy, weight loss, massage, meditation, or acupuncture (CDC, 2017e; Wojcikowsky, Vigar, & Oliver, 2018).

Anonymity of online sites means less embarrassment and more ability to link with the people who suffer the same conditions (Fixsen & Ridge, 2017). Stigma was presented in about 27% of the videos and attracted almost 25% of the cumulative views. Videos

addressing stigma were generally focused on normalizing opioid drug disorder as a disease. Stigma surrounding prescription opioid misuse, opioid use disorder, and overdoses seems inevitable and it can be one of the major reasons why individuals would seek information on YouTube and other Internet sites. Additional efforts are needed to reduce stigma associated with this problem. This will involve shifting beliefs of those who see the root of the problem as a moral issue and a failing of a person's character versus a medical and public health problem that can be treated.

There is a need to improve education about the effectiveness of medication and counseling. The CDC, Substance Abuse and Mental Health Services Administration, Institute of Medicine, and World Health Organization all support medication-assisted treatment of opioid use disorder (Olsen & Sharfstein, 2014). While many widely viewed videos mentioned treatment of opioid use disorder in the form of in-patient treatment, it is interesting that not many offered information on medically assisted treatment with buprenorphine or naltrexone. Similarly, portraying opioid addiction as a treatable medical disease versus a moral weakness was not mentioned frequently. YouTube videos should be the space to disseminate information on treatment that prolongs life, leads to recovery, and lowers the risk of relapse, and thereby addresses these kinds of topics (Olsen & Sharfstein, 2014; D'Onofrio et al. 2015; Weiss et al., 2015; Potter et al., 2017).

A large body of research indicates that people exiting in-patient treatment or returning from incarceration are at heightened risk of overdose (Binswanger & Gordon, 2016; Bukten et al., 2017; DuPont, 2017; Friedmann Wilson, Hoskinson, Poshkus, & Clarke, 2018). Detoxification decreases tolerance to a substance. The result is that

consumption of the same amount of the drug taken prior to incarceration or treatment can be deadly. This important fact received only 1.38 % of the cumulative views of widely viewed videos. Increasing awareness about the danger of overdose after completing treatment/prison time has to be disseminated not only to the people who suffered from opioid use disorder, but to their families as well. Recovery is not easy or fast and families must be aware that addiction is an ongoing health threat for years, even lifetimes (DuPont, 2017).

Implications for Future Research

At the outset of this study (in 2017), about 900 results on PubMed were obtained with the search word “YouTube.” This shows that YouTube related research is in its initial stages. Millions of views of YouTube’s videos offer evidence that YouTube can be an effective tool for sharing health information. This study confirms some previous findings that professionals and governmental agencies have not developed YouTube videos that are among those that are most widely viewed. Further research is, therefore, needed to improve understanding about how to design videos that are acceptable and viewed by the intended target populations.

One way to acquire this kind of information would be qualitative research about the kinds of content and other characteristics of videos that attract a large number of viewers. The investigation of the speaker’s communication strategy is an important

aspect of research. This study revealed that in four of five “Television news/entertainment” videos garnering over million views the protagonist described the problem of the opioid crisis with the use of sarcasm and humor. Paek et al. (2010) also found that among 87 antismoking video clips on YouTube, 21.8% contained some kind of humor. As social media are becoming more and more important for communicating health issues, using humor as a communication strategy warrants consideration (Lee, Slater & Tchernev, 2015). The effective use of language in health campaigns thus needs further investigation so it can be incorporated in health promotion YouTube videos in ways that not only attract viewers, but that are also able to communicate messages effectively.

The present study did not collect any data about how the videos made the viewers feel. Many videos seemed to attain sensational value and included disturbing visual effects, which has been associated attracting views (Paek, Kim, & Hove, 2010). Future studies can build on this research to improve understanding about the kinds of emotional appeals that attract viewers and are effective in communicating useful information and influencing action.

The present study did not include analysis of the comments posted in response to the videos. Investigations of comments posted under the videos might provide insight into the quality, use and potential effects of the videos (Kerber et al., 2012). Such research could document features that are praised versus disliked, which, in turn warrants consideration by those developing videos.

A challenge for YouTube dissemination research is that there are very limited existing studies that have assessed the use and effects of the videos (Kerber et al., 2012). Developing more effective means of evaluating the effect of the knowledge dissemination about the opioid epidemic is needed. Such research could narrow down which types of videos have the best potential to affect viewers' attitudes, beliefs and behaviors.

Information shared on YouTube can be misleading or be presented with the intent to market particular products (Pitcher, Newton, & Amendola, 2017). Pitcher et al. (2017) suggested that viewers are often not drawn to videos of high quality. This may be due, in part, because it might be difficult for consumers to determine the competency of those delivering the message and the accuracy of the message content. In some cases, what constitutes accurate content may be controversial. In the present study, the videos offered predominantly accurate information. However, as mentioned above there was some concern about videos that mentioned using marijuana and Kratom in the context of "Treatment options for opioid use disorder." There does not appear to be any effort by health agencies to monitor the veracity or potentially harmful information being disseminated on YouTube, but such monitoring seems needed.

Research on health-related YouTube videos is at an early stage of development. The first studies indexed in the National Library of Medicine were published in 2007, and the number has been growing since that time. There are various ways of conducting this research and new methods are needed to determine which approaches are most useful for different purposes.

The current study used a cross-sectional design and most of the studies reviewed also used this approach. This is a major limitation since the videos on YouTube and the viewership profiles are changing constantly. Prospective studies are needed to improve understanding about the antecedents to the popularity of videos. This kind of study would enable assessment of the social and political context and how this might affect the trajectory of views.

The dynamic characteristics of YouTube present barriers that complicate the application of the research methods (Paek et al., 2010). In the present study, it's likely that not all of the relevant videos were captured. And, even if they were, new videos are being uploaded every day. The high number of views support that YouTube videos can be an effective tool for the dissemination of health-related information. Researchers need to improve the rigor and standardization of methods in ways that accommodate YouTube's "mobile, fluid and interactive features" (Paek et al., 2010, p. 1098).

Agencies concerned with health promotion and disease prevention are concerned with the quality and accuracy of the information on YouTube (Madathil, Rivera-Rodriguez, Greenstein, & Gramopadhye, 2015). Government agencies, including CDC, uploaded a total of 11 videos in the study's sample and garnered 0.77% of cumulative views. Professionals uploaded 9% and gained 0.38% of cumulative views. Both governmental agencies and professionals have evidence-based information for individuals who are looking for help, but they have to find better ways of sharing this content. Too many people view YouTube each day to be overlooked as a potential tool for health promotion campaigns. Future research on content and characteristics of the

most viewed YouTube videos offers an opportunity to acquire knowledge about how to develop YouTube videos that can both convey useful information and be widely viewed.

Final Thoughts

The millions of views attracted by the videos in the study sample suggests that people are interested in this issue, that they may be looking for help or answers, and that they are turning to YouTube as a source of information. Improving understanding about ways to create videos that convey accurate and up-to-date information and at the same time attract a large number of viewers should be a priority to increase awareness and interest about this urgent crisis.

Because of its popularity, low cost and easy access, YouTube should become a common tool used by governmental agencies and non-governmental organizations to educate consumers. Given that a substantial proportion of Americans have low levels of literacy and are oriented to video communications, YouTube represents an important opportunity for health promotion and disease prevention regarding the opiate epidemic. Training professionals to create high quality videos and cooperation with creative videographers should be a priority.

When initiating this study, I was convinced that opioids should not be prescribed to anyone but those suffering from cancer or in hospice care. I realize now that they can be an effective treatment strategy for some patients. Recognizing the difference between

physical dependency and addiction as well as careful screening when prescribing opioids is essential. Depending on circumstances of their use, prescription opiates can benefit or destroy lives.

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Appendix A Coding Manual

DESCRIPTIVE ANALYSIS A OF THE MOST VIEWED YOUTUBE VIDEOS RELATED TO OPIOID EPIDEMIC

Andrea Randolph-Krisova, Principal Investigator
Teachers College, Columbia University

Coder number: __ Date Coded: __/__/__

Video Number: ___ Length of Video: _____

Number of views: __, __, __, __, __, __, __, __

Title of Video:

UPLOADED BY	
U1. Consumers	1=Yes 0=No
U1A. Person with lived experience	1=Yes 0=No
U1B. Spouse of the person misusing prescription opioids	1=Yes 0=No
U1C. Parent of the person misusing prescription opioids	1=Yes 0=No
U1D. Person without lived experience but sharing information based on knowing someone personally with prescription opioid misuse?	1=Yes 0=No
U1E. Person without lived experience sharing information about prescription opioid misuse	1=Yes 0=No
U2. Professional videos	1=Yes 0=No
U2A. Physician / Medical Doctor	1=Yes 0=No
U2B. Mental health/ Addiction professional	1=Yes 0=No
U2C. Academic Professional/Professor	1=Yes 0=No

Coding manual (continued)

UPLOADED BY	
U2D. Emergency room personnel	1=Yes 0=No
U2E. Judge/ Sheriff/ Cop	1= Yes 0=No
U2F. Other:	1= Yes 0=No
U3. Government agency videos	1=Yes 0=No
U4. Nongovernmental organization	1=Yes 0=No
U5. Television news/ entertainment	1=Yes 0=No
U6. Treatment center	1=Yes 0=No
U7. Celebrity	1=Yes 0=No
U8. Internet Based	1=Yes 0=No
U9. Other:	1=Yes 0=No
SPEAKER	
S1. Consumers	1=Yes 0=No
S1A. Person with lived experience	1=Yes 0=No
S1B. Spouse of the person misusing prescription opioids	1=Yes 0=No
S1C. Parent of the person misusing prescription opioids	1=Yes 0=No
S1D. Person without lived experience but sharing information based on knowing someone personally with prescription opioid misuse	1= Yes 0=No
S1E. Person without lived experience sharing information about prescription opioid misuse	1= Yes 0=No
S2. Professional videos	1=Yes 0=No
S2A. Physician / Medical Doctor	1=Yes 0=No
S2B. Mental Health/ Addiction professional	1=Yes 0=No
S2C. Academic Professional/Professor	1=Yes 0=No
S2D. Emergency Room Personnel	1=Yes 0=No
S2E. Judge/ Sheriff/ Cop	1=Yes 0=No
S2F. Other	1=Yes 0=No
S3. Government agency videos	1=Yes 0=No
S4. Nongovernmental organization	1=Yes 0=No
S5. Television news/ entertainment	1=Yes 0=No
S6. Treatment center	1=Yes 0=No
S7. Celebrity	1=Yes 0=No
S8. Professional Athlete:	1=Yes 0=No
S9. Other	1=Yes 0=No

Coding manual (continued)

FORMAT	
F1. Documentary	1=Yes 0=No
F2. Interview (one person and interviewer)	1=Yes 0=No
F3. Talk by professional	1=Yes 0=No
F4. Talk show/ Discussion Panel with the host (several people)	1=Yes 0=No
F5. Animation	1=Yes 0=No
F6. Still Images	1=Yes 0=No
F7. News report with anchor	1=Yes 0=No
F8. V-Blog	1= Yes 0=No
F9. Multiple Formats:	1=Yes 0=No
F10. Other:	1=Yes 0=No
CONTENT	
C1. Background of the opioid epidemic	1=Yes 0=No
C1A. Overprescribing by physicians	1=Yes 0=No
C1B. Pharma industry practices (marketing, opioid samples, trips for doctors, visits)	1=Yes 0=No
C1C. Pill mill clinics (dirty doctors and pharmacies)	1=Yes 0=No
C1D. Cooperation of FDA and Pharmaceutical companies	1=Yes 0=No
C1E. Pain fifth vital sign- under-treatment of pain	1=Yes 0=No
C1F. Prescribed by the doctor so it is safe to take/ non-addictive	1=Yes 0=No
C1G. High cost of pills on black market	1=Yes 0=No
C1H. Low cost of heroin in comparing to prescription pills on black market	1= Yes 0=No
C2. Physical signs and symptoms of misuse	1=Yes 0=No
C2A. Nodding	1=Yes 0=No
C2B. Sleepiness/ drowsiness	1=Yes 0=No
C2C. Euphoria	1=Yes 0=No
C2D. Tolerance	1=Yes 0=No
C2E. Dependence / Taking pills to feel “normal”	1=Yes 0=No
C2F. Small pupils	1=Yes 0=No
C2G. Sedation	1=Yes 0=No
C2H. Itching	1=Yes 0=No
C2I. Respiratory depression / slow breathing	1=Yes 0=No
C2J. Weight loss	1=Yes 0=No
C2K. Hyperalgesia (increased sensitivity to pain)	1= Yes 0=No

Coding manual (continued)

CONTENT	
C2L. Hard to recognize the signs and symptoms	1=Yes 0=No
C3. Behavioral signs and symptoms of misuse	1=Yes 0=No
C3A. Social withdrawal	1=Yes 0=No
C3B. Mood swings	1=Yes 0=No
C3C. Disinterest in previously liked activities	1=Yes 0=No
C3D. Increased irritability	1=Yes 0=No
C3E. Use without the prescription	1=Yes 0=No
C3F. Use differently (in higher doses or more frequently) as prescribed	1=Yes 0=No
C3G. Overlapping prescriptions (doctor shopping)	1=Yes 0=No
C3H. Snorting or injecting pills	1=Yes 0=No
C3I. Lying	1=Yes 0=No
C3J. Manipulating	1=Yes 0=No
C3K. Sleeping in unusual times	1=Yes 0=No
C3L. Leaving the house in unusual times	1=Yes 0=No
C3M. Stealing and pawning	1=Yes 0=No
C3N. Family members arguing about pills	1=Yes 0=No
C4. Risk factors for prescription opioid misuse	1=Yes 0=No
C4 A. Legal prescription for acute pain from Musculoskeletal injury/ Sports Injury/ Accident	1 =Yes 0=No
C4 B. Legal prescription for dental problems	1=Yes 0=No
C4 C. Legal prescription after surgery	1=Yes 0=No
C4 D. Legal prescription for chronic pain	1=Yes 0=No
C4 E. Mental illness	1=Yes 0=No
C4 F. History of substance abuse	1=Yes 0=No
C4 G. Low income	1=Yes 0=No
C4 H. Living in rural area	1=Yes 0=No
C4 I. Daily high doses of prescribed medication	1=Yes 0=No
C4 J. Overlapping pain reliever and benzodiazepine prescription	1=Yes 0=No
C4 K. Attending pharm parties	1=Yes 0=No
C4L. Using pain prescription medicine as a self-care by women	1=Yes 0=No
C4M. Boredom	1=Yes 0=No
C4N. Preadolescents sexual- abuse	1=Yes 0=No
C4O. Inability to sleep	1=Yes 0=No

Coding manual (continued)

CONTENT	
C4P. To relax/ relieve anxiety	1=Yes 0=No
C4R. To get high	1=Yes 0=No
C4S. Doctors can't say no to prescribe/ Doctors unaware of addictive properties	1=Yes 0=No
C5. First use of prescription pain analgesics of video	1=Yes 0=No
C5A. Legal prescription for acute pain from Musculoskeletal injury/ Sports Injury/ Accident	1=Yes 0=No
C5B. Legal prescription for Dental problems	1=Yes 0=No
C5C. Legal prescription after Surgery	1=Yes 0=No
C5D. Legal prescription for Chronic pain	1=Yes 0=No
C5E. From a friend	1=Yes 0=No
C5F. From a family member	1= Yes 0=No
C5G. Taken from a home medicine cabinet	1= Yes 0=No
C5H. At the party	1=Yes 0= No
C6. Population at risk of prescription opioids misuse	1=Yes 0=No
C6A. Women	1=Yes 0=No
C6B. White middle- aged women	1=Yes 0=No
C6C. Native American women	1= Yes 0=No
C6D. Alaskan Native women	1= Yes 0=No
C6E. Adolescents	1=Yes 0= No
C6F. Men	1= Yes 0=No
C6G. Adults 19-25 years old	1=Yes 0= No
C6H. Elderly	1= Yes 0=No
C7. Opioid dependency withdrawal symptoms	1=Yes 0= No
C7A. Craving	1=Yes 0=No
C7B. Nausea and vomiting	1= Yes 0=No
C7C. Cold and hot flashes	1= Yes 0=No
C7D. Anxiety	1=Yes 0= No
C7E. Insomnia	1= Yes 0=No
C7F. Muscle cramps	1=Yes 0= No
C7G. Diarrhea	1= Yes 0=No
C7H. Perspiration	1= Yes 0=No
C7I. Lachrymation (watering of eyes)	1=Yes 0= No
C7J. Rhinorrhea (watering of the nose)	1= Yes 0=No

Coding manual (continued)

CONTENT	
C7K. Restlessness	1= Yes 0=No
C7L. Kicking movement	1=Yes 0=No
C7M. Pain	1=Yes 0=No
C8 Information on opioid use disorder and overdose	1=Yes 0= No
C8A. Anyone can get addicted	1= Yes 0=No
C8B. It is a Disease	1=Yes 0= No
C8C. It is killing thousands of people each year/	1= Yes 0=No
C8D. High jacked brain	1=Yes 0= No
C8E. Opioids are not the first line for treating chronic pain	1=Yes 0=No
C8F. Taking too many opioids can cause breathing depression leading to death	1= Yes 0=No
C8G. Addiction involves behavior change- compulsion, continuity and consequences	1= Yes 0=No
C8H. Opioid use disorder is treatable	1=Yes 0= No
C8I. Taking opioids with other drugs increase the chance for overdose	1= Yes 0=No
C8J. Diversion- Selling or buying pills at the black market	1=Yes 0= No
C8K. Shift to heroin	1= Yes 0=No
C8L. Shift to fentanyl	1= Yes 0=No
C8M. Shift to other drugs:	1=Yes 0= No
C8N. Relapse	1= Yes 0=No
C8O. Higher risk for overdose for people coming out of treatment or prisoners	1= Yes 0=No
C8P. Harm Reduction strategies	1= Yes 0=No
C9. Reversal of opioid overdose	1=Yes 0=No
C9A. Information about Naloxone	1=Yes 0=No
C9B. Training on how to use Naloxone	1=Yes 0=No
C9C. Good Samaritan Law	1=Yes 0=No
C9D. Very high use of Narcan by emergency personnel	1=Yes 0=No
C9E. Addicts combative when come out of overdose	1=Yes 0=No
C9F. Getting people to the treatment after overdose	1=Yes 0=No
C10. Stigma	1=Yes 0=No
C10A. A person being humiliated to talk about their problems	1=Yes 0=No
C10B. A person being afraid to talk about their problems	1=Yes 0=No
C10C. Battling stigma (asking to normalize addiction/ opioid drug disorder as a disease)	1=Yes 0=No

Coding manual (continued)

CONTENT	
C10D. Lack of compassion/ empathy	1=Yes 0=No
C10E. Need of cultural shift on how to view the addiction/ addicts	1=Yes 0=No
C11. Treatment options for opioid use disorder	1=Yes 0=No
C11A. Medication assisted therapy with Buprenorphine (Suboxone)	1=Yes 0=No
C11B. Medication assisted therapy with Naltrexone (Revia, Vivitrol)	1=Yes 0=No
C11C. Medication assisted therapy with Methadone	1=Yes 0=No
C11D. Negative reviews on Methadone therapy	1=Yes 0=No
C11E. Counseling and behavioral therapies	1=Yes 0=No
C11F. Inpatient / Rehab	1=Yes 0=No
C11G. Other:	1=Yes 0=No
C12. Alternative options for treatment of chronic pain	1=No 0=No
C12A. Acetaminophen (Tylenol [®]) or ibuprofen (Advil [®])	1=Yes 0=No
C12B. Cognitive behavioral therapy	1=Yes 0=No
C12C. Physical therapy	1=Yes 0=No
C12D. Medications for depression or for seizures	1=Yes 0=No
C12E. Interventional therapies (injections)	1=Yes 0=No
C12F. Exercise and weight loss	1=Yes 0=No
C12G. Other therapies such as acupuncture and massage	1=Yes 0=No
C12H. Alternative options for chronic pain do not work	1=Yes 0=No
C13. Prevention Strategies for providers	1=Yes 0=No
C13A. Interactive web- based training regarding addiction or other training	1=Yes 0=No
C13B. Improve prescribing by using CDC guidelines	1=Yes 0=No
C13C. Maximize use of PDMP(Prescription drug monitoring program)	1=Yes 0=No
C13D. Educate patients on adverse effects, storage and disposal	1=Yes 0=No
C13E. Provide the treatment or recommend the treatment	1=Yes 0=No
C13F. Consider benefits and harms when prescribing opioids therapy for individual patient	1=Yes 0=No
C14. Prevention Strategies for individuals	1=No 0=No
C14A. Never take opioids in greater amounts or more often than prescribed	1=Yes 0=No
C14B. Store and dispose medication properly	1=Yes 0=No
C14C. Work with your doctor	1=Yes 0=No

Coding manual (continued)

CONTENT	
C14D. Do not take opioids with alcohol	1=Yes 0=No
C14E. Do not take opioids with benzodiazepines, muscle relaxants, hypnotics	1=Yes 0=No
C14F. Know your options for chronic pain treatment	1=Yes 0=No
C14G. Do not share or sell your medication	1=Yes 0=No
C14H. Seek help/ do not wait till hitting the bottom	1=Yes 0=No
C14I. Family group therapy	1=Yes 0=No
C14J. Importance of the communication in family	1=Yes 0=No
C15. Prevention Strategies for communities	1=Yes 0=No
C15A. System and legal changes	1=Yes 0=No
C15B. Prevention education in schools	1=Yes 0=No
C15C. Decriminalization of addicts	1=Yes 0=No
C15D. Prevention to diminish demand	1=Yes 0=No
C15E. Increased access to Naloxone	1=Yes 0=No
C16. Information on locating the treatment or help	1=Yes 0=No
C16A. National helpline number	1=Yes 0=No
C16B. SAMHSA Services Locator	1=Yes 0=No
C16C. URL for more information under the video	1=Yes 0=No
C16D. URL for more information embedded in the video	1=Yes 0=No
C16E. Phone number/ address for more information under the video	1=Yes 0=No
C16F. Phone number/ address for more information embedded in the video	1= Yes 0=No
C17. Consequences of opioid use disorder	1=Yes 0=No
C17A. Loss of job	1=Yes 0=No
C17B. Loss of house	1=Yes 0=No
C17C. Bankruptcy	1=Yes 0=No
C17D. Loss of partner/ marriage	1=Yes 0=No
C17 E. Loss of children	1=Yes 0=No
C17 F. Imprisonment	1=Yes 0=No
C17G. Physical Disability	1=Yes 0=No
C17H. Overdose or Death	1=Yes 0=No
C17 I. Adverse effects on families	1=Yes 0=No
C17 J. Grandparents care taking of children of addicted parents	1= Yes 0=No
C17K. Neonatal withdrawal syndrome	1= Yes 0=No

Coding manual (continued)

CONTENT	
C17L. Increased occurrence of hepatitis	1=Yes 0=No
C17M. If they knew the consequences they would never start taking pills	1=Yes 0=No
C17N. Pills destroy lives	1=Yes 0=No
C17O. The only relationship that was mattered was relationship with the pills	1=Yes 0=No
C18. Barriers preventing discontinuation of the misuse/ or start addiction treatment	1=Yes 0=No
C18A. Stress	1=Yes 0=No
C18B. Social isolation of caretaking work	1=Yes 0=No
C18C. Unemployment	1=Yes 0=No
C18D. Mean to cope with emotional pain and traumatic experiences	1=Yes 0=No
C18E. Only mean to cope with the physical pain	1=Yes 0=No
C18F. Inaccessibility to alternative chronic pain treatments	1=Yes 0=No
C18G. Women targeted by pharma and physicians	1=Yes 0=No
C18H. Lack of specified treatments for women, pregnant	1=Yes 0=No
C18I. Lack of family- centered programs/ centers	1=Yes 0=No
C18J. Shortage of treatment centers	1=Yes 0=No
C18K. Lack of affordable health care	1=Yes 0=No
C18L. Inaccessibility of expensive substance abuse treatment	1=Yes 0=No
C18M. Low utilization of existing treatment centers	1=Yes 0=No
C18N. Lack of transportation to centers	1=Yes 0=No
C18O. Childcare issues	1=Yes 0=No
C18P. Insurance issues	1=Yes 0=No
C18R. Potential loss of child custody	1=Yes 0=No
C18S. Incarceration	1=Yes 0=No

Notes about the video:

Appendix B

Videos with over million views, length (in minutes) and year of upload

Number of Views	Length in minutes	Year of Upload
9,427,956	19:22	2016
3,572,788	3:13	2014
3,001,508	5:37	2016
2,454,654	4:08	2017
1,640,178	1:52	2017