

Is Social Media Our New Quitline? A Descriptive Study Assessing
YouTube Coverage of Tobacco Cessation

Aysha Inam Jawed

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Abstract

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Tobacco use and exposure continue to be leading causes of morbidity and mortality worldwide. In the past decade, educational efforts to reduce tobacco use and exposure have extended to social media, including video-sharing platforms. YouTube is one of the most publicly accessed video-sharing platforms. Despite the public health importance of tobacco use and exposure as preventable causes of morbidity and mortality, and the increasing use of social media as a way consumers access health-related information, few studies have explored this topic. This cross-sectional descriptive study was conducted to identify and describe sources, formats, and content of widely viewed YouTube videos on smoking cessation. In July 2022, using a cleared browser, the keywords “stop quit smoking” were used to search in YouTube and identify 100 videos with the highest view count. Collectively, these videos were viewed over 220 million times. The majority (n = 73) were posted by consumers, with a smaller number posted by nongovernmental/organizational sources (n = 23), and only four were posted by governmental agencies. The median length of the 100 videos was 5.1 minutes; interquartile range was 2.8-9.8 minutes. The format used in the highest number of videos was the V-Log (n = 43 videos, over 105 million views). Other popular formats included Talk by Professional (n = 27 videos, over 53 million views) and Testimonial/Story (n = 25 videos, almost 45 million views). Video content included evidence-based and non-evidence-based practices. Evidence-

based strategies aligned with U.S. Public Health Service Tobacco Treatment Guidelines and included seeking support from the health system in tobacco treatment and using Nicotine Replacement Therapy products. Strategies warranting further evaluation but not currently recommended by official governmental agencies included mindfulness and hypnotherapy. One most important finding was that environmental tobacco exposure received scant coverage across the videos. Environmental exposure presents significant risks for acute and chronic diseases for both smokers and nonsmokers, and specific risks for children and pregnant women, and this requires further investigation. Only one study to date has examined the sources, formats, and content of widely viewed YouTube videos on tobacco cessation. Tobacco dependence continues to be a significant risk factor in the onset and progression of a range of harmful illnesses. Education for individuals, families and communities on tobacco cessation can help people achieve cessation. Social media such as YouTube promises to reach large audiences at low cost without requiring high reading literacy. Additional attention is needed to create videos with up-to-date, accurate information that can engage consumers.

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Dedication

To my students over the years,
and my nephew, Elias,
who all form a part of our next generation of
innovators, researchers, and leaders.

CHAPTER 1: INTRODUCTION

Background and Significance

Tobacco use is one of the leading preventable causes of disease, premature death, lost productivity, and healthcare costs. Tobacco use exerts an immense financial burden on the healthcare system in the United States. Costs incurred for treatment from illnesses and lost productivity attributed to tobacco use exceed \$300 billion yearly. Tobacco dependence is a significant risk factor for acute and chronic diseases across both the pediatric and adult patient populations. Tobacco use during pregnancy results in greater than 1,000 infant deaths annually (U.S. Department of Health and Human Services, 2014). More than 16 million adults in the United States have a disease that is caused by smoking (U.S. Department of Health and Human Services, 2014). Smoking-related illnesses cause approximately half a million deaths each year (U.S. Department of Health and Human Services, 2014). Tobacco use is prevalent in certain groups of people, including men, American Indians/Alaska Natives, individuals with behavioral health conditions, LGBTQ+ communities, and marginalized populations with lower socioeconomic status (SES) and education levels (Centers for Disease Control and Prevention [CDC], 2018; Compton, 2018; Cornelius et al., 2020; Garrett et al., 2019; Odani et al., 2017; Prochaska et al., 2017). Tobacco products consumed most frequently by people across the world are inclusive of both traditional (conventional) and electronic nicotine delivery systems.

Among adults, tobacco dependence contributes to the onset and progression of many chronic illnesses, including heart disease, stroke, chronic obstructive pulmonary disease, lung diseases, and many types of cancer (U.S. Department of Health and Human Services, 2014). Environmental tobacco exposure can impact response to cancer treatment, contribute towards

the reoccurrence of cancer or development of new cancers, and affect post-surgical outcomes (Office of the Surgeon General, 2014). In addition, tobacco use through electronic nicotine delivery systems can result in e-cigarette or vaping use-associated lung injury (EVALI) (CDC, 2021), which has increased in prevalence during the present vaping epidemic.

Children who are exposed to tobacco smoke are at increased risk for many adverse health outcomes, including respiratory and ear infections, sudden unexpected infant death, premature death, pneumonia, and asthma exacerbations (U.S. Department of Health and Human Services, 2010). Exposure to tobacco smoke also increases the likelihood that children will initiate smoking using conventional cigarettes or electronic nicotine delivery devices and thereby heightens intergenerational transmission of tobacco use (Mays et al., 2014).

Secondhand smoke exposure elevates risks for adverse health outcomes for both adults and children. Secondhand smoke contains more than 7,000 chemicals; hundreds are toxic and nearly 70 can cause cancer (Huang et al., 2015; U.S. Department of Health and Human Services, 2014). Housing conditions are a major source of secondhand smoke exposure among nonsmokers, given that smoke permeates every room inside a home where there is at least one resident with tobacco dependence, regardless of whether tobacco use occurs inside or outside the home. Furthermore, smoke that travels can also impact heating, ventilation, air, and cooling (HVAC) conditions inside the home and thus impurify or infiltrate the air that individuals (both tobacco users and nonusers) breathe at home. Each year in the United States, among adult non-tobacco users, secondhand smoke causes nearly 34,000 premature deaths from heart disease, more than 7,300 deaths from lung cancer, and more than 8,000 deaths from stroke (U.S. Department of Health and Human Services, 2014).

Many children are exposed to secondhand smoke directly from the mixture of particles or residue generated by tobacco byproducts that stay on the hair, nails, clothes, and even face masks of their parents or caregivers, which adversely impacts their breathing. In addition to secondhand smoke as a risk factor, thirdhand smoke also presents a significant hazard to human health. Thirdhand smoke is defined as residual nicotine and other toxic chemicals which remain on surfaces that have absorbed smoke (Cleveland Clinic, 2021). When secondhand smoke converts into thirdhand smoke and lingers in the surrounding environment at home and inside vehicles, children are also at higher risk of inhaling smoke. Their smaller skin-body composition (bones, fat, and muscle) can certainly impair their breathing and result in a range of respiratory illnesses that include bronchiolitis, respiratory syncytial virus (RSV), pneumonia, and asthma (American Academy of Pediatrics, 2017; U.S. Department of Health and Human Services, 2010). Improving the quality of air that children breathe by reducing environmental tobacco exposure could help them breathe easier and positively impact their brain development, especially as their early years are critical in ultimately shaping their formative years.

Environmental smoke exposure significantly increases the risk of Sudden Infant Death Syndrome (SIDS). From a postnatal perspective, environmental smoke exposure can impact the growth and immune system of infants, given their smaller skin body composition (fat, muscle, and bone proportions). It can also compromise their airways, which can further create life-threatening respiratory complications, especially as they sleep (Anderson et al., 2005; Rayfield & Plugge, 2017). Prematurity and low birth weight attributed to prenatal tobacco exposure also heighten the risk of SIDS (Avşar et al., 2021).

Breastfeeding is consistently recommended as a safe mode of nutrition for infants to ensure that they reap the benefits of ample nutrients found in breastmilk. However, for maternal caregivers who are tobacco-dependent, the nicotine found in their breastmilk can create health complications for infants secondary to exposure. Immediate complications involve difficulties in breathing, which has also been linked to SIDS. Long-term complications from tobacco exposure in breastmilk consumed by infants directly tie to adversely affecting their growth and development, especially for neurological and cognitive outcomes (Napierala et al., 2016). For example, breastmilk containing tobacco byproducts has been linked to speech impairments among children as well as challenges in meeting developmental milestones (e.g., gross-motor skills) (Napierala et al., 2016). Thus, it is crucial to reduce tobacco exposure in breastmilk to improve the quality and safety of infant nutrition.

It is also well known that asthma is a chronic health condition that disproportionately affects minority racial/ethnic groups. Tobacco dependence is a prevalent risk factor for subgroups of several populations and a contributing environmental exposure that triggers asthma exacerbations. High-cost healthcare utilization is substantially greater among these patients secondary to more frequent emergency department visits and hospitalizations (Asthma and Allergy Foundation of America, 2020).

Many educational efforts have helped to heighten knowledge and awareness of tobacco dependence and cessation across the world. The scope of these efforts has substantially varied, and many have had a translational impact. Health communication is at the heart of delivering clear and persuasive messages about quitting tobacco use and can take many forms on both micro and macro levels. Efforts at the local, state, national, and global levels have been made to

promote tobacco reduction and cessation across different patient populations. Examples of these efforts include smokefree policies in homes, vehicles, and buildings; price increases in tobacco products; and health education campaigns that target specific groups at higher risk for adverse health effects. Some of these campaigns have extended into different sources of media, including mass media and social media platforms.

Some efforts to reach a greater number of individuals with tobacco dependence and their support networks, as well as the general lay audience who may be closely affected by tobacco dependence, have involved developing and implementing mass media campaigns. To expand their reach, several mass media campaigns have transitioned from promoting messages via traditional sources of media (e.g., magazines, newspapers) to nontraditional sources (e.g., social media, video games) (National Cancer Institute, 2008). Unfortunately, several campaigns have also been spearheaded by tobacco companies to promote the use of tobacco products via diverse media sources. These campaigns have targeted their efforts towards specific vulnerable populations such as adolescents, marginalized communities with resource limitations, and the LGBTQ+ community (Tan & Bigman, 2020). Hence, it is crucial to heighten health media literacy to help various populations resist these companies' influence to initiate or continue tobacco use.

Policies and regulations at local, state, and federal levels have restricted advertising by tobacco companies across traditional media sources (National Cancer Institute, 2008). However, policies and guidelines currently do not exist to curtail their promotion on virtual media formats. Messaging from tobacco companies continues to pervade social media—which is not surprising, given the lack of oversight or regulation.

Several studies have provided education centered on tobacco reduction and cessation by publishing videos. Given that YouTube is one of the most prevalent social media platforms at this time (Pew Research Center, 2021), this study examined widely viewed YouTube videos related to tobacco cessation. One benefit of YouTube videos is the range of diverse learners who can access information on this medium through narration, closed captioning, and/or visually engaging content at any time anywhere across the globe. Another benefit is how it enables access for people who prefer to learn through video versus print because they cannot or do not want to read.

Specific Aims

The main aim of this study is to describe sources, formats, and content of widely viewed YouTube videos on smoking cessation. The specific aims are to:

1. Identify the sources of the most widely viewed videos related to smoking reduction and cessation;
2. describe the most widely viewed videos related to smoking reduction and cessation across varying formats and lengths; and
3. describe the content covered in the most widely viewed videos pertaining to smoking reduction and cessation.

By describing the messages in these videos, the researcher hoped to elucidate greater understanding about the ways YouTube is being utilized to help people quit smoking. This research is intended to contribute to the longer-term goal of achieving population-wide tobacco cessation that can, in turn, reach and impact future generations.

In addition, the goals of this study tie directly to the mission and vision of Healthy People 2030 in achieving tobacco reduction and cessation across diverse populations. The study goals also connect to the goals of the World Health Organization (WHO) in creating the next tobacco-free generation. The present study was intended to inform the development of tobacco cessation campaigns utilizing social media, with the aim of identifying ways to inform the public about the adverse health and environmental consequences of tobacco products. In addition, this study will offer recommendations to develop educational interventions that not only convey up-to-date and accurate information, but also engage their intended audiences and, thus, reach more people and serve as a catalyst for health behavior change.

CHAPTER 2: LITERATURE REVIEW

Overview of Tobacco Use

Tobacco use is one of the leading preventable causes of disease, premature death, lost productivity, and healthcare costs. Tobacco use also exerts immense financial burden on the healthcare system. In the United States, costs incurred for care and treatment from illnesses (nearly \$170 billion) as well as lost productivity (greater than \$156 billion) exceed \$300 billion yearly (Federal Trade Commission, 2019a, 2019b; U.S. Department of Health and Human Services, 2014). The tobacco epidemic has expanded as a public health crisis across the world (American Cancer Society, 2017; World Health Organization [WHO], 2017). In 2015, nearly 1.1 billion people—a substantial proportion of the entire world population—had either previously used tobacco or currently used tobacco (WHO, 2017). Also more recently, more than 8 million people across the world die from tobacco use yearly (WHO, 2021). Approximately 480,000 Americans die from tobacco-related illness every year, while 16 million Americans suffer disease that was likely precipitated by tobacco use (U.S. Department of Health and Human Services, 2014).

Tobacco use is a significant risk factor for acute and chronic diseases in both the adult and pediatric populations; these diseases include respiratory illnesses, cancer, heart disease, stroke, and chronic obstructive pulmonary disease (U.S. Department of Health and Human Services, 2014). Nearly 58 million Americans are exposed to secondhand smoke each year. Furthermore, tobacco use is a leading cause of environmental smoke exposure among children that increases their risk for adverse health outcomes, including respiratory and ear infections, sudden unexpected infant death, premature death, and asthma exacerbations (Bek et al., 1999;

Cunningham et al., 1996; DiFranza & Lew, 1996; Howrylak et al., 2014; Millett et al., 2013; Rosen et al., 2012; Sweeney et al., 2020; U.S. Department of Health and Human Services, 2006; Winickoff et al., 2001).

Disparities in tobacco use are prevalent and can be attributed to myriad factors such as social determinants, marketing strategies by the tobacco industry, and poorly constructed tobacco control policies (Centers for Disease Control and Prevention [CDC], 2015).

Furthermore, regional differences also impact tobacco disparities because smoking is more prevalent among people with lower socioeconomic status (SES) who are living in poverty and have limited education. People with lower SES have reported that their social networks more likely include individuals who smoke. Furthermore, individuals in poverty have described that smoking is normalized across their community and occurs in their homes; this substantially increases their risk to environmental smoke exposure (Interact for Health, 2018).

There are also racial disparities in tobacco use and health outcomes as more African American tobacco users are likely to die from smoking-related diseases than Caucasian tobacco users (CDC, 2018). Tobacco companies have persistently centered on the African American community as a target for their marketing efforts in two key ways. One way is disseminating advertisements in predominantly Black neighborhoods across the United States. The second is integrating tobacco promotion into African American culture by instilling messages about tobacco products (especially menthol cigarettes) at events/gatherings that bring African Americans together (e.g., jazz and hip-hop festivals) (Truth Initiative, 2020). Furthermore, more advertisements for tobacco products have been placed in lay publications for African Americans (e.g., magazines, retail advertisements in Black neighborhoods) through potential sponsorships

and partnerships that the tobacco industry has formed with companies, organizations, and institutions reaching out to and engaging primarily African American audiences.

Other populations for which tobacco use has higher incidence and prevalence rates are the LGBTQ community, people with mental health and substance use disorders, and communities in the South and Midwest, with higher frequency in rural regions (CDC, 2015). The tobacco industry is involved in sponsoring events that bring the LGBTQ community together (e.g., Pride events) and reaching across LGBTQ nightclubs and bars (Truth Initiative, 2021). In addition, the tobacco industry has financially supported AIDS research and developed partnerships with gay rights organizations (e.g., the Gay and Lesbian Alliance Against Defamation [GLAAD]) (Apollonio & Malone, 2005; Offen et al., 2008). Tobacco advertisements are routinely featured in publications with more LGBTQ readership, especially tobacco products manufactured by Philip Morris (Truth Initiative, 2021).

Mental illness is related to heavier smoking, increased nicotine dependence, more withdrawal symptoms during quit attempts, and overall decreased quit rates (Bowden et al., 2011; Gierisch et al., 2012; McClave et al., 2010; Prochaska et al., 2004; Sung et al., 2011). It is also important to note that individuals with lower socioeconomic status and mental illness are at increased risk of smoking, compared to individuals above the poverty level (CDC, 2013). Across psychiatric conditions, smoking prevalence is nearly five times greater among patients with schizophrenia, bipolar disorder, post-traumatic stress disorder (PTSD), and substance use disorders (Fu et al., 2007). In addition, depression is twice as likely to be prevalent in smokers compared to nonsmokers and further four times greater in heavy smokers compared to lighter to moderate smokers (Klungsoyr et al., 2006). Further, frequency of smoking increases among

patients with more psychiatric disorders, ranging from 18% among patients with no mental illness to nearly 61% among patients with three or more psychiatric disorders (Eriksen et al., 2015). However, regardless of increased tobacco dependence along with the complexities of navigating their mental illness, this patient population has comparatively higher motivation to quit than the general population (Acton et al., 2001; Nahvi et al., 2006; Prochaska et al., 2004; Prochaska et al., 2006). One study found that among hospitalized smokers with mental illness, 65% were interested in quitting smoking (Siru et al., 2009).

Treatment for substance use disorders may not necessarily account for tobacco user disorders or tobacco dependence. Furthermore, an integral part of tobacco treatment is addressing nicotine dependence as a point of intervention, which is routinely not an integral component in support patients with substance use disorders (e.g., involving alcohol, illicit substances, prescription medications, etc.). Of note, most adults with substance use disorders are also smokers (Columbia University Mailman School of Public Health; Weinberger et al., 2017). Smoking is associated with a greater risk of relapse among patients with substance use disorders (Weinberger et al., 2017).

Rural communities have reported a higher degree of tobacco use compared to city and suburban regions, given the rich and long history and culture of tobacco use with tobacco farming (Interact for Health, 2018). In fact, tobacco crops are an ongoing source of income across rural regions and, in turn, an integral part of the rural financial landscape (American Lung Association, 2012). Moreover, tobacco control policies are consistently more visible and pervasive in urban regions than rural regions, since there is significantly lower population density across rural regions (Doogan et al., 2017). Interestingly, because smokeless tobacco has

increased in prevalence as part of the rural culture, it has become more challenging to address the harmful effects of tobacco, especially given resource and geographical limitations in accessing healthcare services as primary or secondary measures of prevention (Matthews et al., 2017).

In addition, the tobacco industry continues to evolve as many new tobacco products have emerged on the market in recent years—most notably, ENDS products that include e-cigarettes, JUUL, vape pens, pods, and other kinds of vape products. E-cigarettes have become the most widely used tobacco product among middle and high school students in the United States; more than 2 million teenagers use e-cigarettes (Park-Lee et al., 2021). These products raise implications on whether the tobacco industry will target the adolescent population as a primary priority group over time.

In an effort to reduce the incidence of future diseases and premature mortality, public health efforts have focused more heavily on achieving tobacco reduction and cessation in the current generation to predict the creation of the next tobacco-free generation. These efforts have included creating quit lines, providing individual and group counseling across healthcare and community settings, advocating across community, state, national, and global levels, and disseminating anti-tobacco mass media campaigns to heighten knowledge and awareness of the adverse impact of tobacco use and dependence (Burns & Levinson, 2010; Cummings et al., 1989; Durkin et al., 2011; Huang et al., 2015; Murukutla et al., 2012; Stewart et al., 2011; Vallone et al., 2011; van den Putte, 2011; Zhu et al., 1996). Several clinical efforts are more centered on individuals to motivate smokers to quit based on each person's unique and diverse circumstances. However, mass media campaigns are more in line with promoting system-level

changes by imparting key messages via a wide range of strategies that ultimately promote tobacco reduction and cessation to the larger global lay audience who are tobacco-dependent along with individuals in their familial, social, and professional networks.

Theoretical Frameworks for Tobacco Cessation Interventions

Tobacco cessation (smoking and vaping cessation) is a health behavior that can be addressed through the Social Cognitive Theory (SCT), Transtheoretical Model (TTM) (Stages of Change), 5A Model, and Motivational Interviewing. All of these models are individual-level theories and have their unique strengths and limitations.

Social Cognitive Theory

The Social Cognitive Theory (SCT) provides a framework to implement tobacco cessation interventions based on observational and vicarious learning experiences in combination with exposures in both in-person and virtual social environments. The SCT posits that individuals who are actively making decisions about their behaviors are influenced by the dynamic interplay of personal (intrinsic and extrinsic) factors, behavioral trends and patterns, and environmental events (Bandura, 1986). In turn, sources of media (e.g., mass media, social media) are pivotal settings in disseminating information that can influence behavior among more people through observational learning. These sources of media are often utilized to reach target populations across mass media campaigns to heighten knowledge, awareness, and advocacy on a wide range of sociopolitical, environmental, and health-related issues at local, state, national, and global levels.

In contemporary times, social media platforms present a window of opportunity not only to extend the social marketing of health-related campaigns, but also (as part of an

educational toolkit) to learn about the pertinent aspects of a health issue to mitigate it at both individual and systems levels. In 2021, YouTube was declared the most frequently utilized social media platform (Pew Research Center, 2021). Thus, YouTube could be an optimal setting to promote health behavior change—in this instance, change in tobacco use—potentially by targeting constructs of the SCT. For example, messages on YouTube and other social media platforms that present the health benefits of quitting are aligned with presenting outcome expectancies from the SCT as the basis of changing health behavior (Glanz et al., 2002; McAlister et al., 2008). At times, idols/influencers (e.g., celebrities, athletes) who model or promote cessation may heighten motivation to quit among individuals with tobacco dependence, given that they may feel more affected by these positive, impactful influencers. Furthermore, strategies to help with quitting that form the content of videos or posts could be in line with the modeling and observational learning constructs of the SCT to initiate and practice health behavior change in real time as the basis of sustaining this change over time (Glanz et al., 2002; McAlister et al., 2008). Strategies in videos that focus on coping with urges to smoke are inextricably linked to the SCT construct of facilitating emotional coping responses among tobacco users as part of seeking self-help for tobacco reduction or abstinence. Moreover, disseminating resources across videos that commercially produce advertisements from agencies and organizations forms the heart of the facilitation construct of the SCT to cascade information (Glanz et al., 2002; McAlister et al., 2008). Self-help-related content of videos and posts could be linked to the SCT construct of self-regulation, given that the content can help the tobacco user seize full control of navigating the process to quit through myriad accessible resources (McAlister et al., 2008). Overall, the goal of utilizing the SCT as a backdrop

for tobacco cessation interventions implemented in media settings is to heighten self-efficacy among tobacco users across the global in order to initiate quitting. Many of these constructs were included in the coding instrument developed for this study.

Transtheoretical Model (Stages of Change)

The Transtheoretical Model (Stages of Change) emerged from a comparative analysis of leading theories of psychotherapy and behavior change when Prochaska and his colleagues examined self-changers and smokers engaged in treatment and identified 10 processes of change that predicted successful quitting. From initial studies of smoking, the Transtheoretical Model was rapidly expanded to include applications and investigations to a broad range of health behaviors and psychopathology.

The model uses stages of change to integrate processes and principles of change across major theories of intervention—hence, the name Transtheoretical. It consists of the following stages: Precontemplation, Contemplation, Preparation, Action, Termination, and Maintenance. An individual can gravitate through the stages in this model in a loopwise or curvilinear way and can return to any of the stages at any time. Each stage involves meeting the needs, concerns, values, and goals of each individual, based on his or her unique circumstances. The amount of time spent in each stage can vary for each individual. The TTM is evidence-based and has demonstrated success in tobacco cessation across a wide range of patient populations. As a result, a higher proportion of individuals have heightened Contemplation to reduce or cease tobacco use, which consequently increases their readiness to transition to the Preparation and Action stages (Aveyard et al., 1999; Aveyard et al., 2006; Curry et al., 1995; Dijkstra et al., 1999; Dijkstra et al., 2006; Erol et al., 2018; Hall et al., 2006; Hollis et al., 2005; Koyun & Eroglu, 2016;

O'Neill et al., 2000; Pallonen et al., 1998; Prochaska et al., 1993; Prochaska et al., 2001a, 2001b; Strecher & Kreuter, 1994; Sussman et al., 1999; Sussman et al., 2006; Velicer et al., 1999).

In the Precontemplation stage, the individual does not think about changing a health behavior. In fact, the individual will likely not recognize that the behavior is problematic in any way. Hence, a tobacco user will likely not recognize his or her tobacco use as a problem.

In the Contemplation stage, the individual does recognize the risks of his or her health behavior and will likely be ambivalent about making any changes to the behavior. Hence, a tobacco user could stay in this stage for an undefined duration of time—from a few weeks to several years.

In the Preparation stage, the individual mentally engages to initiate change. The tobacco user will assess potential ways to anticipate cravings and urges, has potentially even set a quit date, and feels confident about reaching this decision to quit based on accepting that the risks of continuing to smoke or vape outweigh the benefits. The individual is expected to stay in this stage for about a month.

In the Action stage, the individual begins the process of making the health behavior change. Hence, the individual is taking measures to quit and could potentially begin with reducing frequency of tobacco use as part of the process of making a quit attempt.

In the Termination stage, the individual has officially demonstrated success with following through on changing the health behavior. Hence, the individual has successfully quit tobacco use.

In the Maintenance stage, the individual continues to sustain the health behavior change over a longer duration of time. Hence, the individual could demonstrate ongoing

success with tobacco cessation somewhere at the minimum of 3 to 6 months and potentially even longer.

The TTM is not without its limitations. The stages are arbitrary and may not necessarily account for how an individual moves from one stage to the next. Furthermore, an individual's intentions to quit smoking or vaping are fluid and may not necessarily involve deep planning. For example, some people can quit successfully without any advance thinking or planning. Also, the TTM is heavily focused on cognition and does not account for the principles of Behaviorism. More specifically, an individual may require rewards, punishments, and reinforcements along the way in the quest to navigate quitting; however, the TTM does not account for any behavioral techniques. It is possible that an individual may make behavior changes without awareness, and this, then, aligns with Behaviorism and is not supported by the TTM. In addition, the TTM does not account for subconscious processes that may impact an individual's attempt to quit. There is also always a possibility that an individual who is not thinking about changing behavior (Precontemplation) could still respond to intervention, but the TTM does not take this possibility into consideration. As mentioned above, the Precontemplation stage in TTM essentially proposes that the individual is not even thinking about making a behavioral change in behavior and so would not be in a place to consider reduction or cessation at all.

The 5A Model

The 5A model presents a framework for delivering a tobacco cessation intervention based on the recommended clinical practice guidelines for treating tobacco use and dependence (U.S. Public Health Service Tobacco Treatment Guidelines, 2008). Because the guidelines have not changed since 2008, the 5A Model has remained a prominent evidence-

based approach in supporting patients in tobacco reduction and cessation efforts across clinical practice settings, particularly in healthcare (Jawed & Jassal, 2021; Neil et al., 2020; Shishani et al., 2019). The 5As are the following: Ask, Advise, Assess, Assist, and Arrange.

The model itself presents a brief goal-directed approach that efficiently addresses tobacco use with patients. A clinician can follow these five constructs in a sequential way to, first, assess readiness to quit among their patients and, subsequently, support their patients in addressing the interplay of factors surrounding their tobacco use and setting realistic goals to quit. Of note, the approach does involve interactions between the patient and a clinician (e.g., doctor, nurse, social worker, etc.). It is not a self-help intervention. However, delivering the intervention can be achieved in one session—realistically, in one healthcare encounter during an inpatient consult or outpatient clinic visit.

The first construct, **Ask**, involves systematically identifying the individual who screens positive for tobacco dependence. It is crucial for clinicians to ask about tobacco use in a non-threatening, neutral way that elicits open honest responses from the individual.

The second construct that follows is **Advise**, which involves delineating how risks related to continued tobacco use outweigh the benefits. It also provides anticipatory guidance and informational appeals combined with supportive counseling to support the individual in uncovering the immense benefit that comes from quitting tobacco use. Interventions in this phase could involve administering the Fagerstrom measure to assess for the individual's degree of nicotine dependence. Subsequently reviewing these results with the individual can provide recommendations on Nicotine Replacement Therapy (NRT) medications and mindfulness-based stress-reduction strategies to promote tobacco reduction and cessation. Advice could center

around the health consequences of tobacco use as well as personalized features pertaining to the individual's unique stressors and challenges that could impact their perceptions, self-efficacy, and intrinsic motivation to quit. Part of the advice could also explore prior quit attempts that an individual could have made and offer supportive guidance on how a statistically increased number of quit attempts can predict the likelihood of achieving cessation in the future (Beard et al., 2019).

The next construct is **Assess** and involves the clinician determining the individual's readiness to make a wholehearted quit attempt based on information uncovered during the **Advise** phase. The Assess phase is similar to the assessing stage of change in the TTM in that it moves the individual to the Preparation and Action phases of the TTM.

The fourth construct is **Assist**, which essentially involves the collaboration of the individual and clinician to form a personalized and flexible quit plan, contingent on whether the individual is ready to attempt quitting. In this phase, the individual and clinician discuss potential stressors and triggers that may hinder progress in the quit attempt and problem-solve to propose feasible strategies with which individual could mitigate these stressors and triggers. Tapping into the individual's intrinsic and extrinsic resources is another strategy for the individual and clinician to support the individual with trying to quit. Identifying ways to promote a smoke-free/vape-free home and vehicle are additional components that could be integrated into the plan to reduce tobacco exposure. It is crucial to note that smoke-free/vape-free homes and vehicles can be directly linked to quitting. Creating tobacco-free environments across natural habitats already begins to limit tobacco exposure smoke-free/vape-free rules, changes in clothing, and handwashing routines are enacted and implemented. It also follows that these

environments can result in health behavior change in tobacco use reduction, given more limited opportunities and spaces for it. The clinician can also work with the individual to provide pharmacotherapy based on the degree of nicotine dependence, if indicated.

The final construct of the 5A model is **Arrange**. This ultimate component of the quit plan involves mobilizing community resources to support the individual's ongoing efforts to quit. These resources could include the local or state quitline; referral and linkage to a nearby tobacco treatment center; individual or group counseling; support groups; and follow-up with the individual's primary, subspecialty, or OB provider on their progression with tobacco reduction and cessation. Ongoing follow-up can help reduce the risk that the individual will fall through the cracks as they attempt to quit and ensure that the individual feels well-supported in this quest.

Motivational Interviewing

Motivational interviewing is a directive, patient- or client-centered clinical modality that seeks to empower the patient to facilitate and maintain health behavior change. It has been integrated either as the backdrop or adjunct to delivering tobacco cessation interventions across various settings (Audrain-McGovern et al., 2011; Battaglia et al., 2016; Bani-Yaghoub et al., 2018; Catley et al., 2016; Faustino-Silva et al., 2018; Louwagie et al., 2014; Okasha et al., 2017). One clinical component in motivational interviewing involves active discussions between the clinician and the patient to explore patient ambivalence, with initiating steps to quit tobacco use as the basis of resolving intrinsic barriers associated with attempting to quit (Rollnick & Miller, 1995). Another clinical technique in motivational interviewing also centers on heightening the patient's intrinsic motivation to contemplate quitting by bolstering self-efficacy

in achieving cessation goals. Lastly, motivational interviewing involves additional clinical techniques that focus on reflective listening, with the clinician functioning as a sounding board to help the patient identify ways to overcome fears, roll with resistance, build decisional balance by weighing the benefits of quitting versus the health risks, and address roadblocks (e.g., triggers and stressors) that could emerge in the quest to quit (Rollnick et al., 2008).

Health Communication Messages in Promoting Tobacco Cessation

The Institute of Medicine, National Cancer Institute, and the U.S. Surgeon General have all recommended development and implementation of a national media campaign as part of a comprehensive approach to end the worldwide tobacco epidemic. The Tips from Former Smokers was a national tobacco education campaign spearheaded by the CDC (2022) that featured compelling stories in video format shared by smokers and nonsmokers from different ages and stages in life who were facing long-term health effects (e.g., disease and disability) resulting from smoking and secondhand smoke exposure. Their stories were presented across mass media and print advertisements as part of the campaign. The experiences shared by these individuals are meant to provide support to others as either a primary, secondary, or tertiary preventive measure. Smokers were the primary audience of this campaign. Secondary audiences included nonsmokers at risk of exposure to secondhand smoke, family and social networks of smokers, and healthcare providers involved in the care and treatment of patients who were smokers.

The Tips campaign was developed from a comprehensive review of research conducted across multiple states in the United States and other countries. Furthermore, the design of the Tips campaign involved an extensive process of campaign development and testing through

evidence-based practice and engagement with specific audiences that the campaign sought to connect with the most. Through research and testing, campaign developers learned from smokers that observing and learning firsthand from people what it is like to live with the consequences of smoking and its impact on their daily functioning and families helps motivate them to contemplate quitting seriously as they experience hands-on vicarious learning via narratives.

The primary goal of this campaign was to heighten awareness of the adverse impact of smoking through these real-life, humanistic, and person-centered stories as a way to reach and engage people to contemplate reducing or ceasing tobacco use in an active way. Additional goals of this campaign included promoting smoke-free environments and providing a supportive call to action by increasing access to resources that encourage smokers to quit. The disseminated messages emphasized how the adverse impact from secondhand smoke exposure could potentially be as harmful as firsthand smoke. The campaign's primary messages center on the following: (a) the immediate and long-term damage caused by smoking; (b) increased prevalence of smoking-related illness (more than 16 million Americans live with a smoking-related disease); and (c) recommendations to quit smoking while one still can.

The advertisements through the Tips campaign focused on smokers who have developed a number of health conditions secondary to tobacco use, including cancer (lung, throat, head and neck, colorectal), heart disease, stroke, asthma, diabetes, HIV, chronic obstructive pulmonary disease, vision loss and blindness, and mental health conditions (depression and anxiety), among others. Furthermore, advertisements also featured smokers who have experienced other health problems such as complications from surgery and

pregnancy. One video featured a woman with oral cancer who described developing skin grafts on her arms and neck and having half of her jaw removed. In another video, a man described his immense struggle with excessive cigarette use and how he ultimately quit after his voice box was removed secondary to developing throat cancer. The emphasis in yet another video was the statistic that for each American who has died from smoking, at least 30 people live with a serious smoking-related illness for the rest of their lives. In addition, messages promoted health benefits of quitting at any age and stage in life, especially to reduce the risk of death and disease for the greater good.

From 2012 to 2018, the CDC estimated that more than 16.4 million people who smoke have attempted to quit, and nearly one million people have successfully quit as a direct result of persuasive and compelling messages presented by the Tips campaign (Murphy et al., 2020). Many studies have illustrated that hard-hitting media campaigns are successful in helping people to quit smoking. Furthermore, results from these studies suggested that tobacco education media campaigns involving psychological appeals that combine emotion, fear, and information in conjunction with graphic images of the health effects from smoking can increase the rate of quitline calls and website visits. Smokers who have seen one or more advertisements from the Tips campaign reported stronger intentions to quit within the following 30 days. Furthermore, smokers who have viewed one or more of these advertisements multiple times reported even higher intentions to quit (Davis et al., 2017). From a financial standpoint, the Tips campaign is also cost-effective; one economic analysis of the campaign revealed that for every \$2,000 spent on advertisements, one life is saved (Xu et al., 2014).

“Every Try Counts” was a tobacco cessation campaign spearheaded by the Food and Drug Administration (FDA, 2022) which sought to complement existing and effective cessation-based messaging by the Tips campaign. The primary audience for “Every Try Counts” consisted of smokers between 25-54 years of age who had unsuccessful experiences with attempting to quit. This campaign also centered on the evidence-based finding across many studies that the more attempts a smoker makes to quit, the likelihood of quitting in the future is substantially higher. Hence, this campaign presented supportive and positive messages, with the main goal of motivating smokers and increasing their self-efficacy as they navigated their quest to quit each time. The campaign used print, digital, radio, and billboard advertisements to disseminate cessation-based messages. The content of the messages focused on both the health benefits of quitting as well as the adverse health effects from smoking. Messages were primarily posted across in-store displays at gas stations and convenience stores where pro-tobacco advertisements are often posted. One goal of these pro-tobacco advertisements is to trigger and compound the smokers’ urges, leading them to purchase cigarettes. As a result, the “Every Try Counts” campaign focused on helping smokers pause and reflect on whether to purchase another pack of cigarettes if they were surrounded by positive messaging focused on the detrimental effects of smoking—almost a literal standing in the crossroads for the smoker.

In 2017, as e-cigarette usage increased substantially among youth, the FDA also launched the “Real Cost” campaign to heighten knowledge and awareness of the harmful effects of electronic nicotine delivery systems (ENDS products) (FDA, 2020). The campaign involved disseminating key educational messages about the risks of addiction and health consequences from using these products. Messages were delivered across diverse media

channels: television and online videos, social media platforms, posters across U.S. high schools specifically for adolescents, and the campaign's website. A wealth of educational resources was also posted on the website for caregivers, educators, and community leaders across the country to help youth with trying to quit e-cigarette use. The campaign extended its efforts to flatten smokeless tobacco use specifically in rural regions for male youth between the ages of 12 to 17 years. The central message here was that smokeless is not interchangeable with harmless when it comes to tobacco use. Primary interventions through the campaign's extension included heightening knowledge and awareness of the health consequences of smokeless tobacco use among youth in these hard-to-reach or more remote regions with resource limitations. Messages were delivered across social media platforms (local TV channels and radio stations) as well as prominent outdoor advertisements.

In an effort to tackle the vaping epidemic among youth, the American Lung Association (2020) launched a youth vaping awareness campaign titled "Get Your Head Out of the Cloud." The Association also partnered with the Ad Council to provide information about the dangers of vaping to heighten the knowledge and awareness of youth caregivers (American Lung Association, 2020). The goal of this campaign was to equip caregivers with educational resources about the harmful impact of vaping to children in order to empower them to address vaping with their children as their proxies.

Of note, other campaigns were not centered entirely on tobacco cessation but rather focused on reducing tobacco use as a risk factor. Examples of such campaigns include the March of Dimes, Back-to-Sleep, and Cribs for Kids that sought to reduce the risk of infant mortality. Overall, many of these campaigns contained key messages in the form of tips or

strategies to help quit tobacco use. As previously mentioned, these messages were disseminated as advertisements published by the campaigns across diverse media sources (newspapers, magazines, billboards, etc.), social media platforms, and hands-on promotion and advocacy by campaign leaders.

Tobacco Misinformation in the Mass Media

Unfortunately, the tobacco industry has also successfully utilized sources of mass media to promote tobacco products and has begun transitioning from traditional, restricted forms of advertising to newer or nontraditional sources of media, particularly social media (National Cancer Institute, 2008). Monitoring the tobacco industry's increasing shift to these new or nontraditional media, such as the Internet, videogames, and Podcasts is crucial today to address the tobacco epidemic. Strategies that the tobacco industry has utilized involve marketing practices with an emphasis on the brand names of their products or labeling their products in a healthy (e.g., as natural or organic) or harm-reduction way.

The tobacco industry has also promoted its products through public relations campaigns, part of which has also extended into social media as a growing platform to persuade a larger lay audience to initiate or continue tobacco use. Social media offer massive opportunities for the tobacco industry to disseminate misinformation. Such messages downplay and deny any harm to health and addiction from the use of combustible cigarettes (Tan & Bigman, 2020). These messages have also challenged and questioned the credibility of longstanding scientific evidence on the dangers of smoking as well as exposure to secondhand smoke (Tan & Bigman, 2020).

Another unfortunate outcome of deceptive messages through collaborative efforts between marketing campaigns and community sponsorships to promote tobacco products is the continuation of racial health disparities, given that these campaigns target disenfranchised and marginalized populations with resource limitations more than affluent communities (Tan & Bigman, 2020). Examples of targeted communities include African American communities, LGBTQ communities, and the homeless, all of whom are at higher risk of sustaining adverse health consequences from either initiating or maintaining tobacco use (Tan & Bigman, 2020). Another tactic that tobacco companies utilize in targeting communities with resource limitations is outdoor advertising of price discounts for tobacco products (National Cancer Institute, 2008).

Tobacco companies have also utilized sources of mass media to introduce alternative tobacco products in the form of electronic nicotine delivery devices (e.g., e-cigarettes, vape pens, heated tobacco products, and smokeless tobacco) as a perceived harm reduction strategy; unfortunately, this practice has only complicated fact with fiction and contributed to the existing body of misinformation (Tan & Bigman, 2020). For example, manufacturers, retailers, and social media influencers affiliated with tobacco companies have openly claimed through their marketing efforts that e-cigarettes only contain water vapor to support their statement that these products are harmless. However, this misinformation is not supported by scientific evidence and continues to reach a wide lay audience via streaming across multimedia sources. Further, this cascade of misinformation downplays the risks of e-cigarette use, which evidence confirms is as harmful, if not even more so, than traditional tobacco product use (e.g., cigarettes and cigars) in developing EVALI and addiction. Giving that vaping has become an

epidemic over the past 10 years, continuing the trend of misinformation to promote this use relies on a paucity of knowledge on the long-term sequelae of vaping, especially the unknown impact on human health of different chemicals found in vape products.

Dissemination of misinformation about electronic nicotine delivery devices thus has contributed to the significant rise in vaping as an ever-growing, visible public health crisis, which will only worsen as the audience is persuaded to distrust science—a goal of tobacco companies. Changes in the behavior of current smokers that involve switching from smoking cigarettes or cigars to e-cigarettes is substantial and rising as well, and attributed in part to misinformation shared by tobacco companies. Given that minority populations in resource-limited settings are often the targets of these campaigns alongside adolescents, misinformation about vape products clearly contributes to health-related disparities in tobacco use and subsequent adverse health outcomes based on race.

Advertisements promoted by tobacco companies promote several prevalent themes and patterns centering on the following: (a) provide satisfaction (e.g., taste, freshness, mildness, etc.); (b) alleviate anxieties about the dangers of smoking by downplaying, minimizing, or distorting them; and (c) create associations between smoking and desirable outcomes (independence, social success, sexual attraction, thinness, freedom, confidence, etc.). As previously mentioned, the tobacco industry targets specific groups of people who value these themes: namely women, preteens, adolescents, young adults, minority groups, religious groups, blue-collar working class, and the LGBTQ community (National Cancer Institute, 2008). Traditionally, cigarette smoking has been consistently visible across movies and is estimated to be part of 75% or more of contemporary box-office hits; nearly one-third of

these movies displaying specifically identifiable cigarette brands (National Cancer Institute, 2008). Studies have displayed that exposure to smoking in movies has been associated with the initiation of smoking among preteens and adolescents (National Cancer Institute, 2008). Of note, movies are now required to put a disclaimer on the film (oftentimes in small lettering during intermission, while smoking is occurring, or in credits) that the movie does not endorse smoking and it can be bad for health (Yadav & Glanz, 2021). Advertisements for tobacco products seek to reach adolescents through emotional and psychological appeals that connect tobacco use with their own desire for independence and popularity. These advertisements consistently display tobacco users as healthy, energetic, and successful (American Academy of Pediatrics, 2015).

It is crucial to begin characterizing the incidence and prevalence of misinformation on tobacco products across media platforms as the basis to improve the health literacy of the lay audience. This is an important element of interventions intended to heighten the public's knowledge and awareness of smoking and help them resist harmful social pressures.

Policies and Legislation to Promote Tobacco-Free Communities

Smoke-free policies are an evidence-based intervention to reduce the incidence of tobacco use and tobacco-related diseases in the United States. The primary objectives of smoke-free policies are to encourage smokers to quit, increase the number of quit attempts, reduce cigarette intake among smokers, and prevent children from beginning to smoke (Callilnan et al., 2010; International Agency for Research on Cancer [IARC], 2009; Mackay et al., 2010). The CDC (2003, 2014) created the Task Force on Community Preventive Services to spearhead efforts promoting smoke-free legislation and subsequent smoking restrictions to

reduce tobacco use and exposure from cigarette smoking across designated locations. Findings by this task force as well as from the U.S. Surgeon General's report in 2006 revealed a significant reduction in daily cigarette use among workers in settings with a smoking ban or restriction. Several studies conducted over time have also depicted similar findings of an increase in tobacco reduction and cessation in the workplace environment where individuals routinely spend a significant amount of time (Bauer et al., 2005; Borland et al., 1991; Chapman et al., 1999; Evans et al., 1999; Farrelly et al., 1999; Heloma et al., 2001; Longo et al., 2001; Moskowitz et al., 2000; Task Force on Community Preventive Services, 2001). In another study, smoke-free workplaces and homes were associated with significantly lower rates of smoking among adolescents, thereby decreasing the intergenerational transmission of tobacco use to the next generation among families (Farkas et al., 2000).

Currently, 28 states, along with the District of Columbia, Puerto Rico, and the U.S. Virgin Islands, have legislation in place that require all workplaces, restaurants, and bars to be 100% tobacco-free (American Lung Association, 2020). These laws, along with local laws in other states, reduce tobacco exposure among almost 62.3% of the U.S. population. Nearly every state in the U.S. has enacted one or more smoke-free laws pertaining to one or more of the following settings: workplaces, restaurants, bars, and gambling. Across the United States, 22,708 municipalities, representing 82% of the U.S. population, are covered by a 100% smoke-free policy in one of these settings by either state, commonwealth, territorial, or local law (American Nonsmokers' Rights Foundation, 2021). A cumulative total of 3,880 states, commonwealths, territories, cities, and counties have enacted legislation to restrict smoking in one or more outdoor areas. Among these designated locations, 1,907 restrict smoking near entrances,

windows, and ventilation systems in enclosed spaces (American Nonsmokers' Rights Foundation, 2021). Many state, county, and local governments have already implemented smoke-free laws that prohibit smoking in most indoor public spaces.

As of 2021, a total 2,560 colleges and universities are entirely smoke-free campuses (American Nonsmokers' Rights Foundation, 2021). Of this total, 2,122 are also 100% tobacco-free. One study published in the *American Journal of Preventive Medicine* found that having smoke-free housing on campus may protect students from initiating smoking in college. The findings also revealed that the prevalence of smoking among students residing in smoke-free housing (21%) was lower than among students in unrestricted housing (30.6%) (Wechsler & Rigotti, 2001).

Tobacco Treatment Guidelines for Clinicians

The clinical practice guidelines, *Treating Tobacco Use and Dependence* (2008), synthesizes pertinent information from more than 8,700 peer-reviewed articles across time and contains a wealth of updated recommendations for healthcare providers and systems, tobacco users, and policymakers on ways to treat tobacco dependence successfully (U.S. Preventive Services Taskforce, 2021). Interventions that follow these guidelines involve implementing the 5 A Models of treating tobacco dependence, as previously delineated in this review. These clinical practice guidelines can help healthcare providers deliver a brief tobacco treatment intervention that includes discussions on pharmacotherapy and is more personalized to account for the patient's stage of change (Fiore et al., 2008). These guidelines also provide information for specialized populations (e.g., pregnant women and families with young

children) to protect them from environmental tobacco exposure in order to optimize health outcomes for children (Fiore et al., 2008).

Self-Help and Smoking Cessation

There has been a substantial increase in the use of self-help guides to support cessation efforts among individuals with tobacco dependence. To this end, several mobile applications have been developed. State and local quitlines have certainly supported efforts of tobacco users to attempt quitting. In a couple of studies, personalized resources such as tailored text messaging support for generalized populations of tobacco users as well as specialized populations (e.g., pregnant women who want to quit smoking for their babies) were disseminated to support tobacco reduction and cessation efforts (Naughton et al., 2017; Spears et al., 2019). One study demonstrated evidence that materials tailored to individual tobacco users are more effective than nontailored materials (Utap et al., 2019).

Pamphlets from the American Cancer Society and American Lung Association are resources that smokers utilize to try tips and strategies that reduce tobacco use and ultimately quit. Across studies that implemented self-help cessation interventions, self-help materials contained information on topics such as harmfulness of tobacco, benefits of quitting smoking, tips and strategies to initiate quitting, and a contact telephone number for further support in seeking to quit (Meltzer, et al., 2019; Utap et al., 2019). Self-help alone as a cessation intervention was most often offered in the form of printed materials across five different studies, all involving implementation of self-help interventions to quit tobacco use (Cummings et al., 1988; Etter et al., 2002; Etter et al., 2009; Jerome & Behar, 1999; Gwaltney et al., 2009). In one study, content in printed material included quitting instructions as a sequential day-by-

day plan for quitting (Cummings et al., 1988). In another study, content in booklets included instructions on appropriately using Nicotine Replacement Therapy (Etter et al., 2009). A different study involved disseminating comprehensive booklets with compelling reasons to quit tobacco consumption, along with guidance on tobacco reduction and contact information for smoking cessation clinics (Etter et al., 2002). In another comprehensive guide, content covered harm reduction, self-management strategies to facilitate smoking reduction, and relapse prevention techniques focusing on smoking reduction (Jerome, 1999a). Health messages centered on adverse health consequences of smoking as well as sensory experiences were central content across printed material in a study by Gwaltney et al. (2009).

Self-help booklets or manuals comprised the modality of support provided to smokers across five studies (Curry et al., 1988; Farley et al., 2017; Garcia & Becona, 2000; Glasgow, 1978; Jerome, 1992). In each study, these self-help materials were utilized in a comparison group to implement a tobacco reduction intervention to an experimental group receiving behavioral support. The theoretical prediction was that self-help material would not generate the same degree of tobacco reduction or cessation as another strategy could; hence, these materials were disseminated to control groups. Behavioral support strategies included behavioral management interventions to address cravings as well as pharmacotherapy through use of Nicotine Replacement Therapy medications.

The Freedom from Smoking self-help guide has been an invaluable resource in helping tobacco users quit on their own time (American Lung Association, 2020a). The Lung Helpline and the online support community Quit Now: Freedom from Smoking are supportive adjunct resources to this self-help guide. One study assessed the efficacy of the best-selling self-help

book *The Easy Way to Stop Smoking*, written by Allen Car, which centers on achieving smoking cessation among patients with head and neck cancer who were smokers. This study found that intrinsic factors (e.g., motivation to quit) needs to be present beyond recommendations provided in this self-help book (Foshee et al., 2017).

Resources on relaxation music also formed another self-help measure for smokers trying to quit (Livingstone-Banks et al., 2019). Part of self-help efforts to quit involved viewing videos of strategies (e.g., setting a quit date, coming up with alternatives), which included instructions on how to access and use Nicotine Replacement Therapy products. In addition, there has been an uptake in utilizing social media as a health education tool among the lay audience throughout the world. People utilize social media to learn about health issues and behaviors, trigger stressors, risk factors that heighten tobacco use, and strategies to work through them (Hale, 2021). Furthermore, social media platforms can also offer a virtual sense of community to anyone who is learning more about navigating a health issue or changing health behavior on their own. It follows that individuals who are interested in quitting tobacco use could explore one or more social media platforms to heighten their knowledge and awareness of the implications of continued tobacco use and learn more about strategies that could help them quit.

Smoking Cessation Coverage on the Media

Several mass media campaigns on national, state, and local levels have enhanced knowledge and awareness of the perils of tobacco use along with messages to promote quitting. Outcomes from these campaigns have reduced the prevalence of tobacco users, increased quit rates (CG-Tobacco use), reduced initiation of tobacco use among youth

(CG-Tobacco use, AHA, Mozaffarian et al., 2012), and increased use of cessation services (e.g., the Quitline) (CG-Tobacco use, Murphy-Hoefer et al., 2018; CDC MMWR, Augustson et al., 2012; Duke et al., 2015; Davis et al., 2015; Davis et al., 2018; McAfee et al., 2013). Mass media campaigns that have demonstrated higher efficacy in achieving tobacco cessation and reduction outcomes involve ample funding support from television networks (CG-Tobacco use) and form a part of a comprehensive tobacco control program (Cochrane-Bala, 2017; AHA, Mozaffarian et al., 2012).

There are a couple prominent examples of mass media campaigns on a national level. In the CDC's (2022) Tips from Former Smokers campaign, stories from real people suffering from tobacco-related diseases and disabilities were featured across television networks as well as on social media platforms. The U.S. Food and Drug Administration (FDA, 2022) also promoted messages and education across television networks as part of their mass media campaign that focused on the cosmetic effects of tobacco, adverse impact of addiction, and toxicity of chemicals in tobacco products (US FDA-Real Cost). In the Truth Initiative (2020) campaign, educational messages on the perils of tobacco and strategies to prevent tobacco use among youth were disseminated across social media platforms, text messages, and the website as well as on television networks.

Of note, social media has become a mode of mainstreaming tobacco cessation campaigns, no longer as an adjunct resource but as much, if not more than, on television networks, newspapers, and magazines, given the ease of access with the virtual nature of social media sources. Each of these national campaigns utilized social media to expand the reach of their messages. At a state level, the Massachusetts Tobacco Cessation and Prevention Program

(MTCP, n.d.) utilized a comprehensive approach to reduce tobacco use through messages and information disseminated on social media. In addition, the New York City Department of Health launched an anti-smoking campaign that was promoted across social media platforms in combination with presence on television networks, newspapers, and transportation (subways and the ferry) (NYC Health Smoking Number, 2018). Key messages promoted through the campaign involved encouraging all New Yorkers to quit smoking, regardless of their past efforts at trying to quit. Tips provided through the campaign to smokers consisted of: (a) preparation to quit by creating a list of the reasons to quit and reviewing this list routinely; (b) proactivity in selecting a future quit date; (c) suggestions to seek support and encouragement from family, social, and employer-based networks in quit attempts after informing them about goal to quit smoking; (d) recommendations to stay away from tobacco products to break this habit over time and reduce cravings; and (e) self-awareness to identify cues that trigger cravings as the basis to remove them as barriers to quitting. These tips are in line with recommendations provided by both Smokefree and the CDC to support smokers in their cessation efforts. Unfortunately, these messages do not account for myriad psychosocial complexities, psychiatric comorbidity, and challenges with withdrawal that smokers could experience when trying to quit. Further, these messages do not account for pharmacotherapy as a tip/strategy in quitting tobacco use (Stead et al., 2015; Stead et al., 2016; Ziedonis et al., 2017). Lastly, these messages do not account for barriers that impede the development and identification of alternative strategies to curtail cravings that are unique to each individual smoker based on resource limitations and nonmodifiable stressors.

It is crucial to note that the impact on cessation efforts could diminish after a cessation campaign ends. Utilization of emotional, informational, and psychological appeals has been effective in engaging current and potential tobacco users along with family, social, and professional networks of tobacco users. Examples of emotional messages can include personalized testimonials that detail compelling and descriptive narratives, graphic images, and sound effects along with the visible impact of adverse health effects sustained by current and former smokers (CG-Tobacco, Durkin et al., 2012; AHA, Mozaffarian, 2012). Information-based appeals involve presenting compelling facts about the harmful effects of tobacco use along with statistics on how many people are suffering from health-related complications stemming directly from tobacco use. For example, data have elucidated how tobacco use is a significant risk factor for a range of chronic diseases. Psychological appeals can also involve heightening knowledge and awareness of the aesthetic effects from not engaging in tobacco use (e.g., healthier hair, teeth, nails, etc.) as well as how physical appearance can be affected by tobacco use complemented by visuals. Additional psychological appeals can involve delineating social and academic/professional benefits from either engaging or not engaging in tobacco use.

Social Media as a Source of Health Communication in Tobacco Cessation

Social media is a mode of health communication that can be more readily accessible around the world and, in turn, can reach many more people simultaneously who are exploring ways to make health behavior changes. Thus, social media can be an optimal setting for tobacco cessation interventions on a global level and, subsequently, be a viable solution for mitigating the global tobacco epidemic.

Not only are people utilizing online sources, especially social media, as their primary source for obtaining news, but also social media is also rising as a powerful source of health communication, especially for high-risk health behaviors such as tobacco dependence. From a health perspective, social media content can also function as a health education tool based on the content's publisher. The tobacco industry is now utilizing social media to promote tobacco products. One strength of social media is that it accounts for varying degrees of literacy. In fact, in the case of delivering messages to promote quitting tobacco use, it accounts for all levels of health literacy. Moreover, from a stylistic standpoint, social media offers a flexible, accessible format that is engaging and easy to navigate. This can certainly heighten retention of information and increase time spent by users on social media. However, one drawback of social media is that it is not, in and of itself, a primary source of information; nevertheless, it does have primary credible sources comprised of some of its users and deliverers of content. The lay audience may follow many of these users and, in turn, ultimately seek information from them. Complicating this drawback is the high risk of spreading misinformation on social media if these sources are not primary credible sources. Misinformation can often be disseminated by the tobacco industry that likely has ulterior motives that do not align with goals of tobacco reduction and cessation.

Technology specifically through the internet has become a prevalent mainstream way to disseminate, communicate, and extend health information in the digital age. In fact, social media offers a space to deliver messages that are relevant for diverse populations in various stages of life. Regarding tobacco reduction and cessation, social media can distill pertinent content across different channels of health communication that are already available in print

and electronic formats (e.g., clinical practice guidelines, theoretical frameworks, newspapers, magazines, booklets and leaflets, outdoor advertisements such as posters and billboards, inspirational messages to increase motivation, campaigns, and television advertisements). These diverse contents can be presented in visually engaging and short, easy-to-follow formats that combine words and pictures in order to account for different learning styles. Furthermore, from a patient or client-centered perspective, social media can literally meet the patient or client where they are. This flexibility alone can be a comfort in navigating the quest to quit.

Social Media Impact on Promoting Tobacco Cessation

Quitting tobacco use could potentially present an array of additional stressors and challenges especially for younger populations rather than older ones. For example, younger people may share more concern about how tobacco use could impact their social identity (e.g., relationships, social networks, status) in real time and less concern for their overall state of health in the long term. In fact, the mindset of younger populations is more present-oriented in the here-and-now. This, in turn, could heighten their motivation to seek immediate rewards from behavior change, although this is not generally aligned with achieving tobacco cessation as a health behavior change over time in most instances. Hence, many younger people are not successful with quitting (Fagan et al., 2007).

Younger generations are also less likely to access face-to-face or telephone cessation services (e.g., consultation, support through the quitline). This impairs their ability to seek a range of supportive services that can help them quit successfully. Given their focus on preserving and promoting their social identity, youth are less likely to prioritize their time in seeking healthcare services or trying treatments (e.g., NRT) to help them quit. Regarding their

stage of development, they are more likely to prioritize engaging in endeavors that promote their social identity by building and strengthening relationships with their social networks. In turn, traditional cessation services may be outdated, irrelevant, or unappealing to younger populations.

As a result, finding modern and different channels of communication with which youth can routinely interface (e.g., social media platforms) in order to relay messages centered on the relevance of quitting tobacco use among the younger generations could trigger greater engagement and heighten motivation to quit. Tapping into the accessibility and visibility of social media as an integral part of everyday life and culture could be an innovative and promising strategy to reach a broader audience that includes individuals who are interested in trying to quit, especially those not actively engaged in other forms of treatment (Meacham et al., 2021; Perrin & Anderson, 2018). Also, in the present world, the search for immediate information delivered in bite-sized chunks is more accessible and appealing than an overabundance of information or resources presented across a website. Hence, delivering relevant information to help individuals with tobacco dependence quit through social media newsfeeds, stories, and posts on a routine basis could be more engaging for them at this point in time.

A study by Baskerville et al. (2016) implemented a smoking cessation campaign via social media that was promoted initially through the campaign's website. The campaign targeted smokers between the ages of 19 and 29 (Baskerville et al., 2016). The campaign's website clearly delineated traditional tobacco cessation methods (telephone-based counseling, NRT medications, and inspirational text message support). In addition, messages were sent to

encourage people to share their experiences with quitting by uploading videos on YouTube and reaching out via Facebook to their family and social networks about their efforts. The narrative of the campaign primarily centered on comparing quitting smoking to breaking off a toxic romantic relationship as the basis to engage younger audiences. This was a purposeful strategy since youth are more likely to experience varying degrees of instability in their romantic relationships during this developmental stage. Presenting this analogy was effective and appealed to younger smokers and vapers. A total of 37,325 visitors were tracked for visitations across the website over 2 months. Among these visitors, 339 utilized both Facebook and YouTube to share their stories on quitting, while only 21 of them reached out to the telephone helpline for cessation support. This study affirmed the promise of social media in reaching younger generations who are tobacco-dependent.

Overall, social media provides a forum to obtain support from a virtual community that could potentially extend a tobacco user's social networks and help them learn firsthand about the experiences of current and former tobacco users in their quest to quit. Social media as a resource or support is more informal and significantly more accessible, given its ease of use and flexibility, compared to scheduling consultations with healthcare providers to seek cessation support which may be more regulatory and directive or not immediately accessible (Majmundar et al., 2020). Further, traditional tobacco-dependence treatment may necessitate health insurance coverage which may not always be secured for individuals interested in treatment. Thus, the low to free cost of social media access provides a more immediate channel for self-help in addressing tobacco dependence.

YouTube Coverage of Smoking Cessation

YouTube has substantially increased in prevalence as a video-sharing social media platform across many age groups ranging from children to the elderly. The viewership of YouTube continues to rise yearly, based on global data (Backinger et al., 2011). Videos are often shared from a variety of sources (primary credible sources as well as secondary and lay sources). One of the most captivating features of YouTube is how it integrates a combination of written and/or verbal descriptions along with illustrations to increase appeal and retention among users. It is also a learning tool that can enhance knowledge and awareness of an issue that will consider the needs of visual, auditory, kinesthetic, and reading/writing learners.

As a source of social media, YouTube has also presented as a platform and setting to expand the reach of several mass media campaigns centered on addressing multiple public health issues. Of note, however, is the paucity of research exploring the impact of YouTube on smoking cessation education, promotion, and resource provision. Among the few studies conducted, most of the videos were more than a decade old. As the basis of informing the direction of this present research, it is crucial to extend the current literature on smoking cessation coverage via YouTube by critically assessing content across videos published over the past decade.

Search terms used across studies varied in selection and yielded content. However, the search terms most consistently used were: stop smoking, quit smoking, and smoking cessation. These terms were selected in an effort to identify educationally persuasive messages that promote quitting to a lay audience (Backinger et al., 2011; Elkin & Thomson, 2010; Richardson et al., 2011). It is important to note that a possible reason specific videos were flagged as

relevant in the 50 or 60 videos that surfaced could be the nature of the terms. For instance, it is possible that videos which experts (e.g., agencies and organizations) produced commercially more likely appeared with the words “smoking cessation.” Videos that were homemade or produced by YouTube users who were not part of an entity involved in tobacco cessation more likely emerged in searches based on simplistic layman terms (e.g., variants of quit and smoke). In turn, it is crucial for deliverers of videos to be cognizant of the key terms and descriptors that represent the essence of these videos in order to prioritize them as top relevant videos in future searches.

In another study, search terms were grouped into the following three categories: smoking, quitting/smokefree, and commercial. Smoking terms involved tobacco products and identification of the individual as a smoker. These terms were smoking, cigar, tobacco, smoker, and cigarette. Quitting/smokefree terms involved variations of quitting nicotine use and cessation along with a resource. These terms were quitting smoking, cessation, nicotine, smokefree, and quitline. Commercial terms involved sponsors and an ingredient. These terms were menthol, British American Tobacco, and Philip Morris (Elkin & Thomson, 2011). Videos in one study were sorted by view count and relevance (Backinger et al., 2011).

There are certainly ways to expand a future search category of commercial terms to include American Lung Association, American Cancer Society, American Thoracic Society, National Cancer Institute, World Health Organization, Healthy People 2020/2030, and many more agencies and organizations. Of note, these studies were conducted at least a decade ago. Thus, it is time to conduct a more comprehensive search that will include more videos generated from commercial sources over the past 10 years.

It is crucial to note that the words selected as part of the search strategy were more simplistic, given that Boolean string-type words that often yield countless peer-reviewed articles from academic journals may not be the same words that a general lay audience will use when searching for video content on quitting tobacco use. The researcher removed duplicate videos across studies and predicted that the order of videos would be presented by relevance. One of the inherent assumptions in reviewing videos was that the lay audience who is either interested in quitting smoking or trying to help someone in a network to quit could be viewing videos as part of obtaining self-help or support for their loved ones.

A classification scheme was also created in one study to assess the relevance of each video and clearly identify the source of the video along with its typology (e.g., product advertisement, infomercial, antismoking television advertisement, etc.) (Richardson et al., 2011). In this same study, 10 videos were randomly selected from the rest of the search list obtained to assess whether any videos that followed could be relevant to the participants. In one way, this process helped to identify whether expanding the number of videos viewed to assess relevance of content could be helpful in future studies.

Another study highlighted the fact that there is no tobacco-relevant policy online that can regulate smoking cessation videos posted by primary, secondary, or lay sources (Elkin & Thomson, 2010). Inclusion criteria for one of the videos involved only reviewing videos published in English and not blocked by the National Institutes of Health (NIH) (Backinger et al., 2011). There were variations in how many videos were viewed (e.g., top 50 or 60) (Backinger et al., 2011; Richardson et al., 2011). This ballpark range for top relevant videos was selected across studies based on an established prediction that 95% of people conducting an online

search will likely not review beyond the first three pages of videos. Each page on YouTube searches contains 20 videos (iProspect.com Inc., 2006).

Of note, the deliverers of content across videos were diverse. Several of the videos were commercially produced by organizations such as the American Cancer Society, the state's Department of Health quitline, the government (e.g., Malaysian and Australian), GlaxoSmithKline, and the American Legacy Foundation (Backinger et al., 2011; Richardson et al., 2011). In other instances, videos were personally produced by individuals not considered to be experts or affiliates with any organization involved in promoting tobacco cessation. Informational and emotional (testimonial) appeals were utilized in these homemade videos. Content of information presented a breakdown of adverse health effects of smoking and reasons to quit. Across videos presenting testimonials from smokers, content included personal experiences through narratives about quitting. Additional testimonials included direct guidance on how to quit, which could be a helpful resource for seeking self-help or support for someone else and a personal promise to quit smoking (Richardson et al., 2011). Not all videos shared strategies on trying to quit. One study contained videos that elucidated behavioral strategies to reduce urges to quit smoking, including acupuncture and biorhythms to reduce acidity in the body (Backinger et al., 2011). Hypnosis emerged in videos across two of the studies as a smoking cessation technique (Backinger et al., 2011; Richardson et al., 2011).

Graphic videos were also published on YouTube that outlined the dangers of smoking; these were originally produced by major public health agencies but were posted by individual users and thus hard to identify as part of a multimedia tobacco cessation campaign. In addition, some videos did not follow evidence-based best practice guidelines (e.g., Treating Tobacco Use

and Dependence, 5As) (Richardson et al., 2011). Therefore, videos that did not follow prescribed guidelines from local and state health departments along with national and global organizations warrant further assessment to uncover whether any of them may spark engagement and motivation to quit among tobacco users or individuals interested in helping others to quit.

YouTube Coverage of Vaping Cessation

Social media has also extended coverage of e-cigarette use and vaping. Smokers and vapers have shared their experiences with use across social media platforms. Unfortunately, e-cigarette companies have also routinely utilized YouTube to promote tobacco products, especially with respect to e-cigarettes through pro-vaping content (Cranwell et al., 2015; Luo et al., 2014; Xie et al., 2021). YouTube has also provided coverage of messages to promote vaping cessation. Utilization of YouTube in delivering this content has involved delivering key messages that emphasize the perils of vaping, especially within the past decade that has seen the growth of the vaping epidemic.

To date, only one study has assessed the scope of vaping cessation on YouTube. In this study (Xie et al., 2021), the search strategy involved utilizing e-cigarette as the sole key word to identify relevant videos. Top search videos were prioritized for selection based on view count, which could suggest a higher degree of user engagement (Xie et al., 2021). Metadata for each video were also downloaded as part of this study and included the following components: video duration time (in seconds), age limit, number of views, number of likes, and posted date. Based on the posted date for each video, number of posted days for each video was also computed.

User engagement was also compared among different video categories. The number of views and likes to the number of posted days for each video on YouTube were calculated.

The coding of each video involved enlisting two reviewers who viewed each YouTube video pertaining to e-cigarettes that emerged from the search. Each reviewer summarized the content of each video. Pro-vaping videos were coded into one or more of the following categories: (a) user demonstration (how to use e-cigarettes and vaping tricks); (b) harm reduction through comparison with smoking that emphasized e-cigarettes as healthier and safer alternatives to cigarettes; (c) overview of e-cigarettes and available flavors; (d) emphasis on mitigating health risks; (e) product sales that included branding and discounts; and (f) promoting cost-saving messages from e-cigarette usage. Content across vaping-warning videos were coded into one or more of the following categories: (a) e-cigarette regulation; (b) comparison with smoking as the basis for arguing against messages that promote vaping as healthier or safer alternatives to smoking; (c) potential health risks that could stem from vaping; (d) explosion hazards from electronic devices that could result in unforeseeable accidents; and (e) focus on youth addiction from early initiation of e-cigarette use as vaping could potentially emerge as a gateway substance for precipitating nicotine addiction. Data were analyzed using the R statistical analysis software. A two-sample t-test was conducted to assess for differences in user engagement measures.

The findings from this study revealed a dramatic surge in vaping-warning videos on YouTube over the past couple of years that also correlated with the increasing visibility of EVALI across the United States (King et al., 2020; Xie et al., 2021). Vaping-warning videos pertaining to the potential health risks of e-cigarette use had the highest view counts and, in turn, the

greatest user engagement. This finding particularly suggested that utilizing YouTube as a way to reach and engage lay audiences about adverse health effects stemming from e-cigarette use could potentially help protect the health of both vapers and nonvapers. Another key finding from this study was that pro-vaping videos elucidated greater user engagement than vaping-warning videos. In fact, many pro-vaping videos with increased user engagement involved the endorsement of e-cigarettes as a harm reduction strategy, compared with smoking and demonstration of safe vape product usage to reduce risk of explosive accidents.

In a different study, 178 videos were analyzed for warning statements surrounding e-cigarette use (Jones et al., 2021). Warning statements included the following content: FDA-mandated wording about products containing nicotine and the harm that could result from nicotine exposure, messages on health effects, safety/toxic exposure concerns, and addiction/tobacco information stemming from nicotine. Ultimately, 64 videos were identified that contained warning statements; 31.3% of these videos had warnings pertaining to health effects, while 14.1% consisted of warning content related to safety/toxic exposure risks. Another 14.1% of videos included FDA-mandated warning statements. Lastly, 40.6% of videos included messages pertaining to addiction/tobacco.

CHAPTER 3: METHODS

This chapter describes the methods that were implemented in this study. Each of the following topics are described: study design, video search strategy and sampling, eligibility criteria, measurements and coding specifications, demonstration of intra- and inter-rater reliability, statistical analysis, and limitations.

Study Design

The research design was cross-sectional and involved collecting observational data at one conceptual point in time from the YouTube social media platform. In July 2022, the browser history on the researcher's personal computer was cleared. Next, with a clean history on the computer, the researcher conducted a search on YouTube using a specific string of key words. The key words that formed the search strategy were "stop quit smoking." The results were sorted by view count, and the URLs for the 100 most widely viewed videos were copied and saved in a separate file. The researcher then created a codebook based on a review of literature and guidelines from authoritative agencies such as the U.S. Public Health Service and the World Health Organization (WHO). The researcher viewed and coded all videos during July and August 2022. Inter- and intra-rater reliability of the coding was demonstrated. The following information was coded for each video: (a) source of upload, (b) format, (c) number of views, (d) length (in minutes), (e) year of upload, and (f) content. Prior to beginning this study, Teachers College Institutional Review Board (IRB) reviewed the protocol and deemed it exempt.

Video Search Strategy and Sampling

The researcher reviewed the small number of studies that explored the utilization of YouTube as a source of health communication to promote smoking cessation; this review was

helpful in developing a well-informed search strategy. Informed by this review, the search strategy in the present study was intended to capture videos related to both smoking reduction and cessation. After reviewing the literature, the researcher conducted a pilot study to solidify the search terms for the present study. The first search (conducted in February 2022) used combinations of various phrases pertaining to smoking cessation. This search helped to eliminate phrases that did not yield many videos. These searches were subsequently repeated and extended in March, April, and May 2022. Prior to each search, the researcher cleared the browser history on the computer and on YouTube. After each search, results were filtered by view count. The number of views captured by the first 30 videos was used as an indicator of which search terms yielded a set of widely viewed videos. In each search, unrelated videos such as music videos were excluded. Search terms yielding low views per video and low cumulative views were similarly excluded.

The researcher sought to create a search strategy that consumers (smokers and nonsmokers) could potentially utilize in finding ways to quit smoking. For this reason, the terms selected by the researcher across the pilot searches as well as for the final search strategy were simple, layman terms pertaining to quitting. Piloting various key words (smokefree, quit smoking, stop smoking) was helpful in determining which phrase(s) yielded the most relevant videos, highest view counts across videos, and greatest cumulative views for the top 30, 60, and 100 videos, respectively.

Of note, the researcher thoroughly reviewed the videos that emerged from the search terms “stop smoking” and “quit smoking.” Multiple different videos were covered by each one. This was a surprising finding in light of the fact that both “stop” and “quit” are utilized as

layman terms in the tobacco cessation landscape. The researcher then formulated a permutation that combined both search terms into “stop quit smoking” and ran the search. This search strategy yielded the totality of videos across the aforementioned search strategies. It followed that the combination of “stop quit smoking” was ultimately selected. Furthermore, this strategy reflected the essence of this study and ultimately yielded the most widely viewed videos that were directly relevant to smoking cessation.

After clearing the browser history, the researcher searched YouTube using those keywords (“stop quit smoking”). The resulting videos were filtered by view count. Then, the URLs from the top 100 videos were copied into a separate file to revisit for coding at a later time. Overlapping URLs were deleted and replaced. Only one URL for each video was kept for coding.

Eligibility Criteria

One inclusion criterion was that the videos be in English. Videos that did not have English narration or written content were excluded from analysis. A second criterion was that the video center on smoking cessation. The researcher viewed the full video, which constituted the unit of analysis. Music videos not centered on smoking cessation were excluded. No requirements were specified based on length of time.

Measurements and Coding Specifications

The format of the instrument used for this study was developed based on an existing instrument for coding YouTube videos on a different topic (Baquaro, 2017). The instrument included the following basic information: 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 comprised the following three sections: (a) source of upload, (b) format, and (c) content. Content included many variables (discussed below), all of which were coded dichotomously (i.e., either yes or no) to indicate presence or absence in the respective video (Appendix A).

As part of creating the coding scheme for this instrument, the researcher first reviewed the literature on a variety of topics, including descriptive epidemiology of tobacco use and dependence across diverse patient populations; tobacco reduction and cessation efforts across many settings and levels; and national and global healthcare organizations, healthcare systems, social media platforms, community engagement, social marketing campaigns, and governmental enactment of policies and legislation. Based on the findings from this review, the researcher designed a codebook. In consultation with the dissertation committee, the researcher refined the codebook using an iterative process. She sought consultation from her sponsor to resolve any coding discrepancies, generate additional constructs and codes, and refine coding response options as warranted. The main variables are summarized below.

The source of upload for each video was coded into one of the following three categories: organizational, consumer, and governmental sources. Examples of organizational/nongovernmental sources were the World Health Organization (WHO), United Nations Sustainable Development Goals, American Lung Association, American Cancer Society, American Thoracic Society, American Heart Association, healthcare systems/institutions, and treatment centers. These sources typically had an “.org” extension. Consumer sources were uploaded by sources not originating from any level of government and not associated with any nonprofit or for-profit organization or institution. Consumer sources were uploaded by an

individual who was not affiliated with a professional organization or governmental agency and did not have any professional credentials. Governmental sources included content posted by the federal government, state/local government, state/city/county health department, and policies/legislation/regulations. Specific examples included content from the Centers for Disease Control and Prevention (CDC), the U.S. Department of Health and Human Services, and Healthy People 2030. These sources had a “.gov” extension. A small number of videos that did not fit into these source categories were classified as “Other Sources.”

The categories for coding Format included Documentary; Interview; Demonstration/Experiment; Talk by Professional; TV Talk Show/Discussion panel; Animation; Still images; News report with anchor; V-blog; Advertisement; Testimonial/Story; Multiple formats; and “Other formats.” “Documentary” was defined as any nonfictional video that (a) documented aspects of reality on tobacco use; or (b) documented information, instructions, and education regarding tobacco use. “Interview” was described as any video with a formal or an informal interview between two people. “Demonstration/Experiment” consisted of any video modeling a demonstration or experiment. “Talk by professional” comprised any video that was a recording of a person giving a professional presentation. “Talk show” was defined as any video with a formal or an informal talk between more than two people portrayed in a talk show format. Videos using cartoons or whiteboard video animations were classified as “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”) means a person has a video channel and posts videos depicting elements of their lives or whatever they choose to share. “Advertisement” involves dissemination of information in a marketing format to

promote a product or recommendation. “Testimonial/Story” involves a narrative provided by an individual. If the video was created with more than one format, it fell into the category of “Multiple formats.” Finally, “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 anticipatory guidance from the U.S. Department of Health and Human Services (2014), CDC (2021), WHO (2021), and Healthy People 2030 (2021). A total of 11 content categories was created in this codebook: (a) aesthetic effects; (b) health effects; (c) environmental tobacco exposure; (d) stressors/triggers that encompass intrinsic psychological factors; (e) tips, strategies, and resources to quit; (f) outcomes; (g) ingredients in tobacco products; (h) kinds of tobacco products; (i) health benefits of quitting; (j) social/environmental benefits of quitting; and (k) open-ended comments on misinformation or disinformation conveyed in the video. Conceptualization of the codebook involved developing these content categories to account for the depth and breadth of targets for intervention from smoking cessation efforts.

Aesthetic effects of smoking contained several subtopics. These included effects of tobacco on: skin, hair, voice, wrinkles, nails, teeth, smell, taste, breath, stains, face masks, clothes, and furniture (e.g., carpeting, walls, bedding, couches/sofas, etc.) that can be ruined by smoke exposure.

Health effects involved a very wide range of different signs and symptoms, acute and chronic illness, mortality, reproductive effects, high-cost healthcare utilization, and use of durable medical equipment. Furthermore, special populations and their needs were also considered by integrating reproductive effects prenatally (e.g., impact on fetus, increasing risk

of SIDs) as well as impact on infants postnatally (e.g., low birthweight, smaller skin-body composition with respect to muscles, bones, and fat). These specific signs and symptoms were: difficulty breathing/wheezing, secretions, hoarseness, chest tightness, overweight, obesity, and high blood pressure. Examples of healthcare utilization were: emergency room visits, urgent care visits, hospitalizations, primary and subspecialty care, and obstetrics and gynecology for consideration of special populations in the codebook. Utilization of durable medical equipment was included, given that it tied directly into increased healthcare costs. Examples of durable medical equipment were oxygen/breathing tube, inhaler, controller medication, as-needed (PRN) or rescuer medication, tracheostomy tube, ventilator, oscillator, feeding tube, continuous positive airway pressure (CPAP), and bilevel positive airway pressure (BiPAP). The following acute and chronic illnesses were also included in this category: chronic obstructive pulmonary disease (COPD), cardiovascular disease (CVD), lung cancer, throat cancer, thyroid cancer, esophageal cancer, head and neck cancer, lung transplant, asthma, addiction, pneumonia, ear infection, bronchiolitis, diabetes, eating disorders, and death.

The health effects category also included problems experienced by special populations (pregnant women and infants), reproductive effects, and health impacts on children. Women with tobacco dependence elevate the risks for a complicated pregnancy and adverse effects that could harm the fetus prenatally and thus create health complications for the baby postnatally. Pregnant women as well as women in postpartum could be interested in finding ways to quit tobacco use to protect their babies. Specifically for infants, tobacco exposure could compromise their airway and, in turn, obstruct their sleep, heightening their risk for Sudden Infant Death Syndrome (SIDS) and Sudden Unexpected Infant Death (SUID)—both leading

causes of infant mortality. In addition, breastfeeding was also integrated into the instrument, given that breastmilk containing tobacco byproducts could expose an infant to a range of health complications that can challenge them to breathe and affect their growth and development. Infants exposed to tobacco via breastmilk may have compromised neurological and cognitive outcomes during childhood that could last a lifetime. Hence, growth and development were also covered by the instrument.

Environmental tobacco exposure is a major risk factor for smokers and nonsmokers. Three categories included under this topic were: firsthand smoke, secondhand smoke, and thirdhand smoke.

The instrument included a construct pertaining to stressors and triggers to account for as many as possible that heighten tobacco use and dependence. A comprehensive breakdown of these stressors and triggers involved accounting for many extrinsic factors as well as a couple of intrinsic factors, as follows: stressful job, food insecurity, homelessness/eviction, limited support in either or both family and social networks, childcare challenges, financial stressors attributed to unemployment, single-parent income, other factors, longevity of COVID-19, quarantine/social isolation, mood and anxiety disorders, grief/loss, and poor coping skills.

Based on the review of the literature, strategies to quit smoking involved both intrinsic and extrinsic resources (e.g., generation of action plans, motivation, and supportive services). The researcher created one comprehensive category (tips, strategies, and resources) to account for the diverse range of individual and community-based resources (e.g., pharmacotherapy, quitline, tobacco treatment clinic or center); clinical modalities (e.g., motivational interviewing, individual and group counseling, support groups, mindfulness, cognitive behavioral therapy,

5A Model); and additional efforts to promote tobacco cessation that include emotional and psychological appeals to heighten motivation to quit (e.g., inspirational text messages, testimonials from former tobacco users on their success stories with quitting). Additional constructs in this content category included an identified quit date; preparation; accounting for ways to curb cravings; tapping into support networks of smokers (e.g., family, friends, colleagues); identifying alternatives to mediate triggers; exercise, deep breathing, hypnosis; quitting for their children; changes in environment (social engineering); contemplation of whether benefits of quitting outweigh risks; contributing towards the next tobacco-free generation; perceived harm reduction strategies (e.g., vaping or e-cigarettes); quitting cold turkey; and quitting incrementally/gradually through a weaning process.

Four outcomes were coded: Relapse, Setback, Quit Attempt, and Quit. The category of quit outcomes was developed in the codebook to account for personalized ups and downs with the process of trying to quit. The overarching goal of including this category was to normalize a range of outcome expectations that a patient with tobacco dependence and/or their support networks could anticipate as the basis to not give up while also experiencing good and bad days in the trajectory of quitting. Possibilities for outcome expectations were quit attempt, quit, relapse, and setback. Quit attempt was included, given that the more attempts a person makes with trying to quit, the likelihood of quitting at some point in the future is substantially higher (Srivastava et al., 2013).

Another element of coding involved the composition of tobacco products. Examples of ingredients found in tobacco products contained the following specific and general possibilities:

nicotine, tar, carcinogens, household chemicals, other toxic chemicals, menthol, and vaping flavors.

Kinds of tobacco products delineated in the codebook were cigarettes, cigars, marijuana/weed, vape products (e.g., vape pens, JUUL, e-cigarettes, and additional different electronic nicotine delivery devices), Black Miles, smokeless tobacco, and any other kinds of products.

Health benefits that were coded included improved quality of life, engaging in activities of daily living, breathing easier, achieving a healthy lifestyle, increased life expectancy, promoting fertility, and reduced risk of acute and chronic diseases.

Social/environmental benefits that were integrated into the instrument were smoke-free homes, vehicles, and buildings, increased socialization, increased finances, optimizing fitness and exercise, positive coping strategies that could replace tobacco use, and reduced intergenerational transmission of smoking to children.

Demonstration of Intra- and Inter-Rater Reliability

The researcher demonstrated the intra- and inter-rater reliability of the data regarding coding of the presence of content in the videos. To demonstrate intra-rater reliability, the researcher randomly selected 10 videos and recoded them within 2 weeks of the original coding. All of the dichotomously coded (Yes versus No) content variables in the instrument were included in this analysis. Intra-rater reliability was found to be very high (Kappa = 0.972). Inter-rater reliability was demonstrated as well. This required training a second coder. The training process entailed explaining each of the content categories to the second coder and allowing the coder to practice on several videos. The researcher reviewed these videos and

observed where inconsistencies occurred. She clarified operational definitions for the coding categories that seemed to have ambiguity; the second coder then coded several additional videos, which led to the researcher's satisfaction that the second coding was consistent with hers. At that point, five videos were randomly selected from the 100 in the sample, and the second coder completed coding of all the dichotomously coded content categories. Inter-rater agreement was found to be very high (Kappa = 0.981).

Statistical Analysis

The analysis required calculating descriptive statistics for the different variables under study. Data describing the characteristics of videos were summarized by calculating frequencies and percentages regarding source, format, number of views, length, and content. For each content category, the number of videos that covered the content was identified, and then the number of collective views from those videos covering each particular content area was determined. In addition, the proportion of total cumulative views was determined by dividing the number of views received by the particular videos covering each content area by the total cumulative views received by all videos (N = 220,174,386 views). This analysis was conducted for all content categories specified in the codebook. All analysis was conducted using Excel.

Limitations

Based on the methods outlined above, several limitations apply. The design was cross-sectional, limiting generalizability over time. The sample may result in bias due to the size and selection method. The data themselves may present biases since the main outcome of interest, number of views, may be misleading for several reasons. Despite these limitations, this study presented one of the only assessments of information being conveyed about tobacco use

cessation on a very widely used communication medium and, thus, helps to fill a gap in current knowledge.

CHAPTER 4: RESULTS

This chapter presents the results pertaining to each aim of the study. First, the sources that uploaded the most widely viewed videos are identified. Second, the format and length of the videos are summarized. Third, the content covered in the videos is described regarding the number of videos that included the respective content, number of views those particular videos garnered, and percent of cumulative views those videos garnered.

The 100 most widely viewed videos on smoking cessation garnered a total of 220,174,386 views (range = 58,454 to 39,857,417). The mean length of time among these videos was 13.70 minutes (SD = 49.476), with a range of 30 seconds to over 8 hours. The median length of the 100 videos was 5.1 minutes, and the interquartile range was 2.8 minutes to 9.783 minutes. The top 10 videos (comprising 142,686,908 cumulative views) were all under 16 minutes in length (range = 0.5 minutes to 15 minutes, 13 seconds; median = 9.7 minutes, interquartile range = 4.4 minutes to 7.242 minutes).

The frequency distribution of the 100 most widely viewed videos did not follow a normal distribution. In fact, there was significant skewness in number of views garnered by the top 10 most widely viewed videos in the sample of 100 videos. The top 10 widely viewed videos garnered a cumulative view count of 64.81%. This finding suggested that these 10 videos were potentially the most useful, relevant, and appealing to viewers. In addition, as aforementioned, these videos were all under 16 minutes. Of note, there was a mix of videos posted by nongovernmental/organizational (n = 3) and consumer (n = 5) sources. The most widely viewed video garnered 39,857,497 views and was a demonstration/experiment published by a consumer source. Formats for these top 10 videos were a mix of talks by professionals or a talk

show discussion panel, animation, v-blog, and testimonials. Further, six of these videos used more than one format. All of the top 10 videos were posted between 2012 to 2019. None of these videos covered content on environmental tobacco exposure. However, all presented content on illness and mortality from tobacco use. The videos in the sample were published between 2007 to 2022 (see Table 1). The majority of videos was uploaded after 2015. Before that time, between 0 and 8 videos were uploaded each year.

Table 1

Widely Viewed YouTube Videos on Smoking Cessation by Year Upload

Year of Video Upload	Number of Video Uploads	View Count	Cumulative View Count Percent (%)
2007	1	135,012	0.061
2008	3	719,929	0.33
2009	0	0	0
2010	8	2,812,639	1.28
2011	0	0	0
2012	5	18,052,304	8.20
2013	5	4,418,564	2.00
2014	5	9,993,775	4.54
2015	4	1,824,933	0.83
2016	10	18,111,664	8.23
2017	11	52,718,544	23.94
2018	10	30,814,470	14.00
2019	17	59,161,425	26.87
2020	10	4,131,021	1.88
2021	10	15,974,714	7.26
2022	1	1,305,392	0.59

Sources of Widely Viewed YouTube Videos on Smoking Cessation

The majority of the widely viewed videos were uploaded by consumers (n = 67), which garnered over 145 million views representing over 65% of the cumulative views (see Table 2). BY contrast, only 27 videos were published by professional sources, including 23 uploaded by Organizational/Nongovernmental sources, which garnered less than 20% of cumulative views (40,158,049 views), and 4 videos uploaded by Governmental sources, which garnered less than 7% of cumulative views (14,367,290 views). Six videos were uploaded by “Other sources,” including talk shows, TV shows, radio shows, or news shows; collectively, these six videos accounted for less than 8% of cumulative views.

Table 2

Frequencies, View Counts, and Cumulative View Count Percent of Widely Viewed Smoking Cessation Videos by Upload Source

Classification of the Source of Video Upload	N	View Count	Cumulative View Count Percent (%)
Consumer	67	145,338,723	66.01
Organizational/Nongovernmental	23	40,158,049	18.24
Governmental	4	14,367,290	6.52
Other, shows	6	20,310,324	9.22
Talk show (n = 3)		17,345,718	7.88
TV show (n = 1)		1,775,814	0.81
Radio show (n = 1)		1,106,072	0.50
News show (n = 1)		82,720	0.04

Formats of Widely Viewed YouTube Videos on Smoking Cessation

The formats of the widely viewed videos varied considerably. The formats used in the greatest number of videos included the V-Blog (n = 43 videos garnering over 105 million views). Other popular formats included Talk by Professional (n = 27 videos garnering over 53 million views) and Testimonial/Story (n = 25 videos garnering almost 45 million views) (see Table 3). While only 14 videos used animation, these garnered over 63 million views, representing almost 30% of total cumulative views. It is also noteworthy that while only five videos used the Demonstration/Experiment format, these videos attracted over 45 million views (more than 20% of total cumulative views). This was due to the most widely viewed video using this format. In contrast, other formats such as Documentary, Interview, New Report with Anchor, and Advertisement were used in fewer than four videos, and each only garnered less than 2% of cumulative views. A considerable proportion of the videos used more than one format, including 39 that used two formats and three that used three or more formats. As mentioned above, six of the top 10 videos used more than one format.

Table 3

Frequencies, View Counts, and Cumulative View Count Percent of Widely Viewed Smoking Cessation Videos by Format¹

Format	N	View Count	Cumulative View Count Percent (%)
V-blog	43	105,713,844	48.01
Talk by Professional	27	53,404,367	24.26
Testimonial / Story	25	44,811,161	20.35
Animation	14	63,236,355	28.72
Other Formats	14	9,691,154	4.40
TV Talk Show/Discussion			
Panel	9	22,619,428	10.27
Demonstration/Experiment	5	45,462,953	20.65
Advertisement	3	3,361,811	1.53
Interview	2	1,782,000	0.81
News report with anchor	2	1,665,781	0.76
Documentary	1	1,305,392	0.59
Still Images	0	0	0.00

¹More than one response is possible across videos

Aesthetic Effects Covered in Widely Viewed YouTube Videos on Smoking Cessation

A total of 13 aesthetic effects were coded for each of the 100 widely viewed videos (see Table 4). These 13 aesthetic effects were mentioned in no videos for Face Masks up to as many as 20 videos for the aesthetic effect of Smell (garnering over 37 million views). In addition to Smell, aesthetic effects of smoking that were covered in more videos included effects on Taste (19 videos garnering over 52 million views), Teeth (14 videos garnering over 43 million views), Skin (13 videos garnering over 27 million views), Wrinkles (10 videos garnering over 22 million views), and Hair (9 videos garnering almost 19 million views). In contrast, the aesthetic effects

that were only mentioned in two to nine videos were effects on Clothes, Nails, Stains, Furniture, and Voice (each garnering 12 million views or less).

Table 4

Frequencies, View Counts, and Cumulative View Count Percent of Widely Viewed Smoking Cessation Videos by Aesthetic Effects¹

Aesthetic Effects	N	View Count	Cumulative View Count Percent (%)
Smell	20	37,005,271	16.81
Taste	19	52,273,349	23.74
Breath	15	49,250,706	22.37
Teeth	14	43,175,348	19.61
Skin	13	27,058,221	12.29
Wrinkles	10	22,230,319	10.10
Hair	9	18,923,523	8.59
Clothes	6	5,527,015	2.51
Nails	5	8,992,766	4.08
Stain	5	8,884,889	4.04
Furniture	4	618,502	0.28
Voice	2	11,894,193	5.40
Face Masks	0	0	0.00

¹More than one response is possible across videos

Health Effects Covered in Widely Viewed YouTube Videos on Smoking Cessation

Six health effects were examined to determine the extent to which they were covered in the sample of widely viewed videos (see Table 5). The two health effects covered in the majority of videos were Signs and Symptoms, in the greatest number of videos (n = 66) and garnering over 150 million views; and Illness/Mortality, which while covered in a smaller number of videos (n = 58) garnered an even greater number of cumulative views (almost 186

million). The other four health effects were only mentioned in 10 or fewer videos. For example, Reproductive Effects were covered in 10 videos garnering almost 26 million views. While Health Effects on Infants were mentioned in eight videos, these videos garnered only a comparatively small number of cumulative views (under 3 million, less than 2% of total cumulative views).

Table 5

Frequencies, Percentages, View Counts, and Cumulative View Count Percentages Across Health Effects for the 100 Most Widely Viewed YouTube Videos on Smoking Cessation¹

Health Effects	N	View Count	Cumulative View Count Percent (%)
Signs and Symptoms	66	150,728,781	68.46
Illness/Mortality	58	185,981,820	84.47
Reproductive Effects	10	25,836,778	11.73
Healthcare Utilization	8	17,342,586	7.88
Health Effects on Infants	8	2,791,438	1.27
Use of Durable Medical Equipment	1	11,734,198	5.33

¹More than one response is possible across videos

Environmental Tobacco Exposure Covered in Widely Viewed YouTube Videos on Smoking Cessation

Three levels of environmental tobacco exposure were coded in each of the videos—namely, firsthand, secondhand, and thirdhand smoke. The vast majority of the 100 widely viewed YouTube videos covered content on firsthand smoke exposure (n = 95), which attracted over 202 million views (~92% of total cumulative views). In contrast, coverage of secondhand and thirdhand smoke exposure was significantly scant across videos, with only eight videos mentioning secondhand smoke (garnering under 5 million views representing ~2% of total

cumulative views); and only two videos mentioning thirdhand smoke exposure (attracting under 1 million views and less than one-half of 1% of the total cumulative views) (see Table 6).

Table 6

Frequencies, View Counts, and Cumulative View Count Percent of Widely Viewed Smoking Cessation Videos by Environmental Tobacco Exposure¹

Environmental Tobacco Exposure	N	View Count	Cumulative View Count Percent (%)
Firsthand Smoke	95	202,435,979	91.94
Secondhand Smoke	8	4,613,095	2.10
Thirdhand Smoke	2	959,360	0.44

¹More than one response is possible across videos

Stressors/Triggers Covered in Widely Viewed YouTube Videos on Smoking Cessation

Eleven Stressors/Triggers were included in the codebook for this study; however, seven were not mentioned in a single video in the sample, and one, Grief/loss, was only mentioned in one of the videos (see Table 7). The only Stressor/Trigger that was mentioned in a substantial portion of the videos (21 of 100) was Poor Coping Skills. These videos attracted over 31 million views (~14% of total cumulative views). Coverage of mood and anxiety disorders was included in six of the videos attracting over 23 million views, 10.53% of total cumulative views).

“Stressful job” was mentioned in five of the videos, with just under 10 million views (4.50% of total cumulative views).

Table 7

Frequencies, View Counts, and Cumulative View Count Percent of Widely Viewed Smoking Cessation Videos by Stressors/Triggers¹

Stressors/Triggers	N	View Count	Cumulative View Count Percent (%)
Poor coping skills	21	31,342,988	14.24
Mood and anxiety disorders	6	23,173,875	10.53
Stressful job	5	9,908,657	4.50
Grief/loss	1	6,321,035	2.87
Food insecurity	0	0	0.00
Homelessness/eviction	0	0	0.00
Limited support (in family and social networks)	0	0	0.00
Childcare challenges	0	0	0.00
Financial stressors secondary to unemployment, single parent, etc.	0	0	0.00
Longevity of COVID-19	0	0	0.00
Quarantine / social isolation	0	0	0.00

¹More than one response is possible across videos

Tips, Strategies, and Resources to Quit Covered in Widely Viewed YouTube Videos on Smoking Cessation

There were 31 distinct Tips, Strategies and Resources coded in this study. The one covered in the greatest number of videos was Curb cravings, which was mentioned in 38 videos attracting over 54 million views (~25% of cumulative views) (see Table 8). Other Tips, Strategies, and Resources that were covered in 25 or more videos included identifying alternatives to mediate triggers, which was covered in 36 videos attracting ~39 million views (~18% of total cumulative views); Exercise, covered in 31 of the videos (garnering ~43 million views and ~20% of cumulative views); Mindfulness, covered in 25 videos (garnering almost 49 million views,

Table 8

Frequencies, View Counts, and Cumulative View Count Percent of Widely Viewed Smoking Cessation Videos by Tips, Strategies, and Resources to Quit¹

Tips, Strategies, and Resources to Quit	N	View Count	Cumulative View Count Percent (%)
Curb cravings	38	54,106,358	24.57
Identifying alternatives to mediate triggers	36	39,211,452	17.81
Exercise	31	42,981,357	19.52
Mindfulness	25	48,898,388	22.21
Testimonials / success stories	25	44,811,161	20.35
Quitting cold turkey	21	41,460,965	18.83
Support networks	18	28,629,521	13.00
Action	17	32,366,310	14.70
Individual counseling	16	34,988,211	15.89
Tobacco treatment clinic / center	16	5,908,443	2.68
Quitline	7	16,983,457	7.71
Nicotine patches as Nicotine Replacement Therapy	15	20,645,902	9.38
Hypnosis	15	13,521,881	6.14
Prescription medications as Nicotine replacement therapy (e.g., Chantix)	13	5,561,740	2.53
Nicotine gum as Nicotine Replacement Therapy Preparation / planning	12	18,713,331	8.50
Vaping/e-cigarettes as harm reduction strategy	12	16,983,404	7.71
Nicotine spray as Nicotine Replacement Therapy	9	46,858,725	21.28
Nicotine lozenges as Nicotine Replacement Therapy	8	18,684,546	8.49
Contemplation	6	18,255,360	8.29
Support groups	6	11,035,399	5.01
Quit date	5	16,486,900	7.49
Cognitive Behavioral Therapy	5	990,653	0.45
Change in environment (social engineering)	4	21,950,164	9.97
Motivational interviewing	4	20,059,418	9.11
Intergenerational	4	13,889,169	6.31
Group counseling	3	17,055,101	7.75
Deep Breathing	3	16,249,711	7.38
Quitting incrementally/gradually through a weaning process	3	1,396,129	0.63
One or more of the 5As	3	846,335	0.38
Inspirational text message	2	10,326,794	4.69
	2	3,453,810	1.57

¹More than one response is possible across videos

>22% of total cumulative views); and Testimonials/success stories, covered in 25 videos, which attracted greater than 44 million views (>20% of the total views).

Although only nine videos delineated content on vaping/e-cigarettes as a harm reduction strategy (these videos attracted ~47 million views, ~21% of cumulative views). Only 21 of the videos mentioned content on quitting cold turkey, which accounted for ~41 million views (~19% of total views).

Nicotine patches were accounted for in 15 of the videos (N = 15). These videos attracted greater than 20 million views and ~9% of the cumulative views. Content on individual counseling was covered in 16 of the videos, which attracted ~35 million views (~16% of cumulative views). Coverage of Action was present in 17 of the videos (~32 million views and ~15% of cumulative views). Eighteen videos mentioned content on Coverage of Support networks (yielding ~28 million views and 13% of cumulative views). Of note, a smaller number of videos (N = 12) included content on Nicotine gum, which attracted ~18 million views and 8.50% of cumulative views. Coverage of Nicotine spray was included in fewer videos (N = 8), which garnered greater than 18 million views and over 8% of the cumulative views. Content on preparation/planning was delineated in 12 videos (garnering ~17 million views and ~8% of cumulative views). Although Tobacco Treatment Clinics/Centers were mentioned in 16 of the videos, these yielded only ~3% of the cumulative views. A slightly larger number of videos (N = 15) covered content on hypnosis (garnering ~13 million views and ~6% of the cumulative views). In contrast, a slightly smaller number of videos (N = 13) presented content on prescription medications, which yielded ~2.5% of cumulative views.

Content on the Quitline, Nicotine lozenges, Contemplation, Support Groups, Social Engineering, Motivational Interviewing, Cognitive Behavioral Therapy, Intergenerational Considerations, Group Counseling, and one or more of the 5As as a cessation care model were present in fewer than 10 videos (garnering fewer than 22 million views each). Quit date, coverage of deep breathing, quitting incrementally/gradually through a weaning process, and inspirational text messages yielded fewer than 5% of cumulative views.

Outcomes Covered in Widely Viewed YouTube Videos on Smoking Cessation

A total of 97 videos covered content on Quit as an outcome. This topic, not surprisingly, was among those most widely covered in the sample and garnered more than 173 million views (nearly 78% of the total views) (Table 9). The rest of the outcomes, Quit Attempt, Relapse, and Setback were covered in fewer videos; and each of these outcomes accounted for less than 7% of cumulative views.

Table 9

Frequencies, View Counts, and Cumulative View Count Percent of Widely Viewed Smoking Cessation Videos by Outcome¹

Outcomes	N	View Count	Cumulative View Count Percent (%)
Quit	97	173,365,299	78.74
Relapse	19	12,744,532	5.79
Setback	18	12,261,357	5.57
Quit Attempt	17	14,454,387	6.56

¹More than one response is possible across videos

Ingredients Covered in Widely Viewed YouTube Videos on Smoking Cessation

Six specific ingredients in tobacco smoke were examined in the study. A total of 47 videos presented content on Nicotine yielding greater than 80 million views (almost 37% of cumulative views) (see Table 10). Fewer videos (N = 13) delineated content on tar (attracting almost 49 million views, representing ~22% of total views). Twelve videos depicted content on (other) carcinogens, attracting more than 28 million views (13% of cumulative views). Eight videos presented content on household chemicals, accounting for over 11 million views (~5% of total views). Only one video included coverage of vaping flavors, garnering less than 1% of cumulative views (just over 2 million views).

Table 10

Frequencies, View Counts, and Cumulative View Count Percent of Widely Viewed Smoking Cessation Videos by Ingredients¹

Outcomes	N	View Count	Cumulative View Count Percent (%)
Nicotine	47	80,711,975	36.66
Other miscellaneous toxic chemicals	20	53,920,037	24.49
Tar	13	48,514,249	22.03
Carcinogens	12	28,578,269	12.98
Household chemicals	8	11,486,927	5.22
Vaping flavors	1	2,040,968	0.93

¹More than one response is possible across videos

Tobacco Products Covered in Widely Viewed YouTube Videos on Smoking Cessation

Five specific tobacco products were examined in the study. There were 39 videos, attracting almost 160 million views (> 72% of total views) that provided coverage of cigarettes (see Table 11). Although vape products were only covered in 13 of the videos, these videos accounted for nearly 52 million views, which comprised almost 24% of the cumulative views. A comparatively larger number of videos (N = 19) delineated content on marijuana/weed, which accounted for greater than 35 million views and approximately 16% of cumulative views. Fewer than five videos covered content on cigars, smokeless tobacco, and other kinds of products, which generated less than 1% of cumulative views.

Table 11

Frequencies, View Counts, and Cumulative View Count Percent of Widely Viewed Smoking Cessation Videos by Tobacco Products¹

Tobacco Products	N	View Count	Cumulative View Count Percent (%)
Cigarettes	39	159,238,518	72.32
Marijuana / weed	19	35,610,403	16.17
Vape products	13	51,883,898	23.56
Other kind of product	4	1,559,166	0.71
Cigars	3	2,001,581	0.91
Smokeless tobacco	1	202,372	0.09

¹More than one response is possible across videos

Health Benefits Covered in Widely Viewed YouTube Videos on Smoking Cessation

Nine health benefits of smoking cessation were examined. Two of these health benefits, improved quality of life and healthy lifestyle, were addressed in 51 and 50 videos, respectively. The former videos attracted more than 116 million views (nearly 53% of the cumulative views) and the latter attracted nearly 80 million views (~36% of the total views) (see Table 12). Thirty-one videos delineated content on breathing easier, attracting more than 77 million views and ~35% of the cumulative views. Approximately one-quarter of the videos addressed reduced risk of chronic disease, Activities of Daily Living, and Increased life expectancy (attracting approximately 30% of cumulative views). The topic of fertility was addressed in eight videos, generating more than 31 million views (~14% of the total views).

Table 12

Frequencies, View Counts, and Cumulative View Count Percent of Widely Viewed Smoking Cessation Videos by Health Benefits¹

Health Benefits of Quitting	N	View Count	Cumulative View Count Percent
Improved quality of life	51	116,439,618	52.89
Healthy lifestyle	50	80,049,835	36.36
Breathe easier	31	77,424,684	35.17
Reduced risk of chronic disease	25	61,165,935	27.78
Increased life expectancy	23	67,842,099	30.81
Activities of daily living	23	63,901,006	29.02
Reduced risk of acute disease	13	24,158,606	10.97
Fertility	8	31,094,449	14.12

¹More than one response is possible across videos

Social/Environmental Benefits Covered in Widely Viewed YouTube Videos on Smoking Cessation

In general, the eight social/environmental benefits of smoking cessation did not attract a large proportion of total views. There was a wide dispersion across social and environmental benefits (see Table 13). Almost half of the videos (n = 47) delineated content on positive coping strategies, garnering almost 60 million views (27% of the cumulative views), and 34 videos depicted content on optimizing fitness/exercise, with greater than 26 million views (~12% of the total views). However, the other social/environmental benefits were not widely covered in the videos and did not attract a large proportion of views. For example, reduced risk of children smoking or vaping was only mentioned in two of the videos, attracting less than .2% of total views.

Table 13

Frequencies, View Counts, and Cumulative View Count Percent of Widely Viewed Smoking Cessation Videos by Social/Environmental Benefits¹

Social/Environmental Benefits of Quitting	N	View Count	Cumulative View Count Percent
Positive coping strategies	47	59,838,738	27.18
Optimizing fitness /exercise	34	26,656,490	12.11
Increased finances	17	34,240,279	15.55
Increased socialization	11	22,861,584	10.38
Smokefree/ vapefree homes	7	1,619,435	0.74
Smokefree/ vapefree buildings	3	1,047,824	0.48
Smokefree/ vapefree vehicles	2	309,086	0.14
Reduced risk of children smoking or vaping	2	295,766	0.13

¹More than one response is possible across videos

Chapter 5: Discussion

This cross-sectional study aimed to describe selected characteristics of the most widely viewed YouTube videos on tobacco cessation, including sources, formats, and content. The researcher characterized pertinent components of each content category based on a review of literature as well as tobacco cessation guidelines from agencies such as the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO). This discussion is organized to present a summary of the study, highlights of the results, conclusions, a comparison of findings to prior published studies, limitations, implications for health and regulatory policies as well as improving access to tobacco cessation resources, and recommendations to improve the value of YouTube videos on tobacco cessation and conduct further research.

Summary of Study and Highlights of Results

The study design was cross-sectional and descriptive. The researcher identified the 100 most widely viewed YouTube videos on tobacco cessation by searching in YouTube using particular keywords, then sorting the videos based on view count; individual videos were the units of analysis. The researcher developed a coding instrument based on a review of literature and guidelines from organizations concerned with tobacco cessation; this covered a wide range of content categories related to a multifactorial landscape of tobacco cessation. The significance of the study was highlighted, in part, by the finding that the sample of videos was collectively viewed more than 220 million times. This indicates that YouTube is a media channel that reaches a huge population and, therefore, has great potential for increasing awareness of

and interest in tobacco cessation as well as helping people make informed decisions about tobacco cessation.

Content about tobacco-related messages that were identified in the videos included both evidence-based and non-evidence-based practices. Evidence-based strategies were in line with U.S. Public Health Service Tobacco Treatment Guidelines and included seeking support from the health system in tobacco treatment as well as using Nicotine Replacement Therapy (NRT) products (U.S. Preventive Services Taskforce, 2021). Non-evidence-based strategies included alternative complementary practices. Among these practices, mindfulness and hypnotherapy received substantial coverage.

One of the most important findings was what was not covered in the widely viewed videos. There was scant coverage on environmental tobacco exposure regarding secondhand smoke (smoke in the air from burning tobacco or exhaled smoke) and thirdhand smoke (pollutants from smoke that settle in the physical environment such as furniture); there was also little coverage on tobacco-free homes, vehicles, buildings and other regulations, and social engineering (e.g., separation of tobacco-free and tobacco-permissible spaces) to reduce tobacco exposure. The lack of coverage on these topics is surprising, given that tobacco use and exposure are leading environmental causes of morbidity and mortality worldwide. Millions of people die from secondhand smoke exposure (U.S. Department of Health and Human Services, 2014), but tobacco-free environments not only protect nonsmokers but also support population-wide norms against smoking. In addition, environmental tobacco exposure has particularly noxious effects on certain populations such as infants and pregnant women. Integrating content into videos that cover this exposure is important for informing both

smokers and nonsmokers who are all at risk for tobacco-related complications and diseases about either use or exposure.

Another highlight of the findings was that the majority of widely viewed videos were published by consumers. By contrast, a comparatively small number were published by the governmental agencies responsible for educating and protecting the public from tobacco; this suggested a need for public health agencies to discover ways to create videos that not only contain accurate content but are engaging and appealing to a lay audience. This finding also aligned with findings from previous studies on widely viewed YouTube videos on a range of health-related topics (discussed below).

Comparison with Prior Studies

The findings on sources of widely viewed videos on health topics are consistent in some ways with prior studies. Videos uploaded by consumers comprised the primary source of the most widely viewed videos (Al-Busaidi et al., 2017; Basch et al., 2015; Basch, Fung et al., 2017; Basch, Menafro et al., 2017; MacLean et al., 2017; Simsek et al., 2020). High prevalence of consumer sources may suggest that individuals with tobacco dependence or anyone in their networks will likely draw on non-expert sources to obtain guidance on smoking reduction and cessation. In addition, the cumulative views generated by this study (approximately 220 million) were comparatively greater than several of these content analysis studies on YouTube, many of which yielded fewer than 80 million views. This finding suggested that many consumers have some interest, stake, and contribution in mitigating the tobacco epidemic in one or more ways, potentially from either being closely affected or more distally affected by it. Furthermore, this finding is in line with additional prior studies that garnered greater than 300 million views and

involved topics that also pertained to individualized health needs (e.g., weight loss, DNA testing) (Basch, Fung et al., 2017; Basch et al., 2021).

With respect to videos on smoking cessation, the findings are consistent with those from Paek et al. (2010), but different from those by Richardson et al. (2011). According to Paek et al., 74% of videos were created by YouTube users and the remaining 26% were uploaded by governmental and organizational sources (e.g., government agencies, nonprofit organizations, private companies, media companies). By contrast Richardson et al. reported that among 82 original videos relevant to smoking cessation, 51 were commercially produced and 31 personally published by YouTube users. Thus, even if consumer videos do not always represent the majority of widely used videos, they are a substantial proportion. It should be noted that both of these studies were conducted more than 10 years ago. It is possible that since several of these consumer videos provided narratives from individuals who have either been successful in quitting or who have documented their journey to quitting, viewers may connect more personally with these videos and find them more relevant to their lives. This is in line with two prior studies that uncovered testimonials in the widely viewed YouTube videos on smoking cessation. In one study, 29% of videos delineated personal experiences with trying to quit smoking (Richardson et al., 2011). In the other study, 15 videos contained narratives from current and former smokers with mental illness on their experiences with smoking and navigating quitting (Sharma et al., 2016).

A significant difference between the present study and these past studies pertains to accounting for environmental tobacco exposure in the coding instrument. In this study, content categories on environmental tobacco exposure—along with variables pertaining to social

engineering, smoke-free homes, vehicles, and buildings—were included in the coding instrument. In the prior studies, environmental tobacco exposure was not accounted for in the coding of content. The findings from this study were similar in some ways to prior studies regarding the kind of content conveyed. In one prior study by Backinger et al. (2011), 49.1% of videos included evidence-based practices in line with the Treating Tobacco Use and Dependence Clinical Practice Guidelines (e.g., Nicotine Replace Therapy, access to quitline); 29.8% of videos included content not in line with these evidence-based practices and recommendations (e.g., emotional freedom techniques, body acidity reduction, biorhythms, graphic imagery, and hypnotherapy); and 21.1% of videos included a combination of evidence-based practices and non-evidence-based practices. This wide dispersion was also evident in the findings from this study. However, substantially more videos in this study accounted for non-evidence-based practices that were not in line with prescribed governmental guidelines. Of note, the prior study was published more than a decade ago; since then, more nontraditional/non-evidence-based practices have emerged on supporting patients to reduce or quit tobacco use which were uncovered among the widely viewed videos in this study.

Qualitative Nature of the Widely Viewed Videos

As aforementioned, the majority of the videos that attracted the most views were published and posted by consumers. Many involved content presented in more than one format. Several of these videos were part of v-blogs involving channels run by lay influencers as well as freestanding healthcare influencers. The videos were relatively short, many lasting less than 15 minutes long. Across many, consumers shared their narratives, strategies for success in quitting, and real struggles in their quest to quit. Among informational videos involving

animation, upbeat instrumental music streamed in the background amidst presentation of animated pictures of body organs, smoke fumes, tobacco products, and additional diagrams complemented by a few words. The nature of these videos did not appear to be formal in nature; rather, several appeared to be homemade and unedited, given their continuous nature, which likely also further heightened their originality and authenticity and contributed overall to creating a more calming, low-key visible presence. There was no one-size-fit-all model for narration of material; in fact, it appeared that no script was followed verbatim by the individuals presenting content in the videos. Rather, the delivery of content seemed more improvised and in line with an active dialogue with the audience, sometimes involving rhetorical questions. Further, there were pauses between points shared by the individuals in the videos across transitions in ideas, thoughts, strategies, and additional educational content. These production-based considerations yield value and promise in heightening engagement across the dissemination of health-related content on social media.

Limitations

This study was limited in several important ways that must be considered when interpreting the results and conclusions. First, the design was cross-sectional, which limits generalizability over time. This is particularly important because the nature of the videos on YouTube and the views they attract are changing constantly. There is a need to determine the degree to which the findings from this study can be replicated. Given the importance of smoking cessation as a way to improve public health and the large number of views that smoking cessation videos on YouTube have received, it was surprising that not more prior

research on this topic was available. Despite the cross-sectional design, this is one of a few studies on this topic; thus, it is helping to fill the gap in the current knowledge.

A second limitation was related to the sample. While the videos were selected using a cleared browsing history, the algorithm that generated the resulting sample is not known. It is possible that some widely viewed videos were not included. This indicates the need for future studies to determine if the findings can be replicated. Delimiting the scope to videos in English further limits generalizability, which is important since smoking rates are high in many parts of the globe where English is not the dominant language. Also, the sample size of 100 videos was arbitrary. While the sample has these limitations, the videos included in this study provided some representation of content being viewed about tobacco cessation during the year 2022.

A third limitation is related to the nature of the data themselves. The main outcome in this study was number of views, as based on the premise that reach is an important way to assess health communications. However, there was no way to distinguish between number of views versus number of viewers. Some videos may have been watched repeatedly by the same individuals. There is also no way to determine who are viewing the videos; where they are located; how much, if anything, was learned or retained by the viewers; or if the videos were viewed entirely versus only partially. Another issue was that the results regarding content coverage were disproportionately influenced by a comparatively small number of videos that attracted a comparatively large proportion of views. While number of views is clearly an imperfect metric, it nevertheless seems important because it provides a way to estimate the reach of different kinds of health education messages.

A fourth limitation pertained to the limitations of the search strategy. As aforementioned, the terms comprising the search strategy were “stop quit smoking.” It is possible that substantially fewer videos among the widely viewed covered environmental tobacco exposure (e.g., secondhand smoke, thirdhand smoke, social engineering, smokefree, etc.), given the inherent nature of the search strategy. Although the researcher accounted for both smokers and nonsmokers in mind with the development of this search strategy, these terms themselves may have delimited the scope of videos to coverage of content pertaining primarily to the health, safety, and additional considerations surrounding smokers. Future search strategies that can account for terms involving environmental tobacco exposure may yield promise in uncovering more widely viewed videos on this impact to smokers, nonsmokers, specialized populations comprising both smokers and nonsmokers, and the environment.

Lastly, the researcher solely viewed and coded all of the videos. As such, there is potential for more attention to certain issues and less attention to others. The demonstration of inter- and intra-rater reliability, which were both found to be high, greatly addressed this concern.

Despite these limitations, the findings are significant for several reasons. The videos in this study received over 220 million views, suggesting that people are searching YouTube to learn about ways to stop smoking. Given this wide reach, descriptions of information that is and is not being conveyed are vital for public health education.

Implications for Health and Regulatory Policies

Tobacco control recommendations by the WHO, U.S. Public Health Service, Healthy People 2030, and United Nations Sustainable Development Goals have the potential to inform

legislation, taxation, and social engineering. Findings from the WHO's MPOWER report revealed that 23 countries (Seychelles, Mauritius, Costa Rica, Brazil, Panama, Surinam, Colombia, Canada, Uruguay, Argentina, United Kingdom, Turkey, Portugal, Russia, Ireland, Romania, Estonia, Denmark, Spain, Norway, Iran, Australia, and New Zealand) obtained the highest scores for the implementation and enforcement of their tobacco control policies and legislation, including smoke-free regulations, advertising bans, taxation, and uptake in the visibility of health warnings on cigarette packages (Heydari, 2019). Integrating this content into the widely viewed videos can align and promote contemporary policies intended to promote smoke-free environments across the world.

In addition, integrating increased smoke-free environment content into videos could also benefit two specialized populations, infants and pregnant women. After the enactment of smoke-free legislation in Brazil, the average infant mortality rate declined substantially from 24.5 to 13.0 deaths per 1,000 live births from 2000 to 2016, and the neonatal mortality rate declined from 15.6 to 9.0 deaths per 1000 live births (Hone et al., 2020). While these declines may not be entirely attributable to the enactment of smoke-free legislation, it is likely that such legislation made a meaningful contribution to saving lives. In Norway, ever since tobacco prohibition was implemented across restaurants, public transport, schools, healthcare institutions, and all public office spaces in 2004, the prevalence of smoking in pregnancy decreased significantly from 26% in 1999 to nearly 2% in 2021 (The Norwegian Institute of Health, 2022). It follows, then, that integration of these tobacco control measures into videos on social media can translate to normalizing such social customs and addressing environmental

tobacco exposure more comprehensively for children and pregnant women as well as the global population of smokers and nonsmokers.

As noted above, videos uploaded by governmental agencies were not as widely viewed as those uploaded by consumers; this was found across a range of YouTube studies on different health topics (Al-Busaidi et al., 2017; Basch et al., 2015; Basch, Fung et al., 2017; Basch, Menafro et al., 2017; MacLean et al., 2017; Simsek et al., 2020). It is important to note that the U.S. Public Health Service is responsible for protecting the public health of citizens across the country; this agency created the Tobacco Treatment Clinical Practice Guidelines, which presented recommendations to address tobacco use and exposure as the single most preventable leading cause of death. While creating policies and guidelines is important, they will not confer maximum benefits to the public unless they are implemented. Review of the most widely viewed YouTube videos posted over the past 16 years suggested that the government has not sufficiently succeeded in creating communications about their guidelines that engage consumers. In turn, this may limit the extent to which the public is aware and supportive of such guidelines. Part of this disconnect could pertain to the content covered, which may not be perceived as directly relevant to the audience's preferences and acceptable for health behavior change. In short, this content may not spark engagement for this lay audience and fails to appeal to them. Among the sample of videos in this study posted by governmental sources, formats for disseminating content included testimonials (N = 2), advertisements (N = 1), and talks by professionals (N = 1). Among the most widely viewed videos within the sample, many utilized two or more formats, which could be a future consideration in delivery of content in videos posted by governmental sources.

Most of the content published by the government pertained directly to Clinical Practice Guidelines and fear-based appeals. The guidelines are more regulatory and thus restrict the marketplace range of options that social media can offer. Fear-based and emotional/psychological appeals were prominent in the CDC's Tips from Former Smokers as well as the FDA's Every Try Counts and Real Cost campaigns (Davis et al., 2017; Murphy et al., 2020; U.S. Food and Drug Administration, 2022). However, before integrating any of these appeals into campaigns or other educational interventions, it is crucial to test them carefully because such messages may potentially be traumatic to some individuals. Future government efforts could benefit from discovering ways to convey intended messages about tobacco-related cessation in ways that are more engaging for consumers.

Implications for Improving Access to Tobacco Cessation Resources

One of the main public health goals for the United States is reducing health disparities among low-income and minority populations. These populations are disproportionately affected by many of the leading causes of mortality, morbidity, and disability. Tobacco use is no exception, given that rates of tobacco use tend to be higher among those with lower levels of income and education. At the same time, access to tobacco cessation resources may be lower. Many people remain underinsured (Collins et al., 2017; Galvani et al., 2020; U.S. Census Bureau, 2018); others may have insurance but have to work multiple jobs that limit their availability for seeking health care (U.S. Bureau of Labor Statistics, 2016; Webster et al., 2019).

Efforts are needed to change these circumstances. Until then, however, for people in these circumstances who have limited to no access to tobacco cessation resources, social media such as YouTube can provide access to information, strategies, and associated resources that

support their efforts to reduce or eliminate tobacco use at low cost and on their own terms. Similar to primary and subspecialty outpatient care, access to high-quality tailored tobacco cessation care is not always attainable. This may be due to issues regarding health insurance, transportation, childcare, and additional barriers. In turn, resource limitations in accessing care make it increasingly more challenging to follow guidelines provided by the U.S. Public Health Service in seeking tobacco treatment through a healthcare system.

In these instances, social media may provide much needed direction on reducing or ceasing tobacco use. To the degree that useful videos on tobacco reduction and cessation are available and presented in an engaging way, accessibility to evidence-based approaches may be extended. Access to social media requires access to technology, which does not exist for everyone. Findings from a study conducted in the United States by the Pew Research Center (2018a, 2018b) suggested that the majority of adults (89%) accessed the Internet and 77% owned smartphones capable of accessing social media platforms such as YouTube. For these individuals, social media may be the most viable way of seeking health-related information about tobacco cessation. At the same time, it should be recognized that some people do not have access to the technology necessary to watch YouTube videos, and efforts are needed to find ways to help this population learn techniques to stop smoking.

Since the U.S. Public Health Service's recommendations include interfacing with the healthcare system, healthcare providers across various healthcare systems could utilize social media to present helpful and relevant cessation-related content. Healthcare providers may be in an optimal position to communicate with patients on social media concerning several topics. One is to heighten their patients' acceptability for engaging with the healthcare system for

tobacco treatment. Another is to provide recommendations on when it could be critical to seek in-person medical treatment for tobacco dependence.

YouTube is a promising way to increase accessibility to smoking cessation resources and could, therefore, help in achieving health equity for marginalized populations in cessation care. As large numbers of people are at risk for tobacco-related diseases from firsthand smoke and environmental tobacco exposure, it is imperative to find ways to extend access to effective tobacco cessation services. Taking a health-systems approach that interfaces with social media could yield a substantial downstream impact that not only aligns with patient preference and acceptability across a range of strategies for tobacco treatment but also heightens cost efficiency across the healthcare system. At the same time, access to social media should not be used to reinforce the status quo, where some have access to high-quality tailored cessation resources and others do not.

Recommendations to Improve the Value of YouTube Videos on Tobacco Cessation

The value of YouTube videos is not a straightforward concept; by contrast, as implied by the term, it is value-laden. For the purposes of this study, three issues are considered. The first is conveying information that is up-to-date and accurate, based on credible sources of information (which can be debated). The second relates to the kinds of topics that are or are not included. The third is sharing messages in a format that engages consumers (hence, the importance of using view count as a metric).

Consistency with Official Governmental Guidelines

Across the most widely viewed videos on smoking cessation, a range of content was covered, including strategies and resources to support individuals with tobacco dependence in

their efforts to quit. Notably, two of the clinical modalities, the 5As Model and Motivational Interviewing supported by the U.S. Public Service Tobacco Treatment Clinical Guidelines (U.S. Preventive Services Taskforce, 2021), received minimal coverage. Both models are supposed to be implemented through clinical interventions delivered by healthcare professionals. Additional resources recommended such as Nicotine Replacement Therapy products were covered to a much greater extent and included in some of the videos by non-expert sources or healthcare providers with their own video channels. Given evidence of their efficacy, there is a need to include information about these topics in YouTube videos.

An issue identified in the findings that warrants attention is that some widely viewed videos convey information about cessation strategies that are not recommended by official agencies such as the CDC or U.S. Public Health Service. Almost 40% of the videos covered content on curbing cravings, while 36% included content on alternatives to mediate triggers; these are apparently relevant and engaging for different segments of the consumer population. Other topics such as hypnosis and mindfulness received substantial coverage across the widely viewed videos, but neither is supported by the U.S. Public Health Service as efficacious tobacco treatment interventions in the clinical guidelines. These approaches have demonstrated some promising success in supporting patients in achieving tobacco cessation (Araujo et al., 2022; Barré et al., 2002; Spears et al., 2017), but the data are not yet sufficiently compelling for them to be included as part of the Clinical Guidelines. Thus, it is crucial for the government to examine the existing tobacco cessation Clinical Guidelines critically in order to account for content that matches patient preference, acceptability, affordability, and accessibility.

Topics That Were and Were Not Covered

A main intent of this study was to describe the content covered in the widely viewed videos. One of the most important findings was that certain content—namely, environmental tobacco exposure—was not widely covered. One of the most controversial topics in the field of tobacco cessation is the use of vaping as a harm reduction strategy, which is considered briefly below. A third set of recommendations is related to ways to expand the reach of tobacco cessation videos. Finally, formats that appear to be most engaging to consumers and warrant further attention are discussed.

Environmental Tobacco Exposure

One of the most important findings from this study related to what was not found in the widely viewed videos. As noted above, hardly any videos covered content on secondhand and thirdhand smoke exposure, both forms of environmental tobacco exposure that significantly impact nonsmokers (Torres et al., 2018). In addition, none of the videos presented content on supporting tobacco-free homes, vehicles, and buildings along with social engineering, all of which also contribute significantly to reducing environmental tobacco exposure for smokers and nonsmokers (Faber et al., 2019; Lee et al., 2016; Painter, 2019; Rado et al., 2021; Sachs, 2012). Tobacco exposure is one of the leading environmental exposures for a host of acute and chronic diseases (WHO, 2021). Oftentimes, coverage of content on social media matches trends in communities across both national and global levels. This finding suggested that since tobacco exposure was not widely covered in social media, it is possible that it also does not receive coverage in other publicly visible modalities (e.g., outdoor advertisements, billboards, print materials). It follows that integrating content that addresses tobacco exposure in prominent

social media could lay the foundation for addressing more seriously this leading environmental exposure as a significant health hazard for both smokers and nonsmokers. Furthermore, viewers who are smokers accessing this content could gain insight into the impact of their smoking on those around them. Perhaps such education on the harmful sequelae to others could heighten their motivation to quit.

Vaping as a Harm Reduction Strategy

Several of the widely viewed videos covered vaping as a strategy for tobacco reduction and cessation. In light of the growing vaping epidemic, controversy surrounding vaping as a harm-reduction strategy persists (Janmohamed et al., 2022; Jiang et al., 2022; Mattingly et al., 2022). It should be noted that while the researcher considers vaping a flawed approach to smoking cessation, many would not consider this misinformation. Of note, the vaping epidemic emerged nearly 5 to 10 years ago. There are still many unknowns about the long-term health effects (beyond EVALI) of vaping, given insufficient knowledge about possible long-term toxicity. One argument in favor of vaping is that, compared with burning tobacco, it does not have the equivalent impact on vapers and their surroundings (Hajek et al., 2019; McAlinden et al., 2020). Nevertheless, the U.S. Public Health Service does not recommend vaping in its tobacco treatment guidelines. As more knowledge is disseminated over time about the impact of vaping on human health, it is possible that perceptions pertaining to its efficacy as a harm-reduction strategy for many could change.

Expanding the Reach of Tobacco Cessation Campaigns

Only one video among all the widely viewed ones on smoking cessation accounted for content pertaining to a tobacco cessation campaign. In fact, the deliverer of this video was the

only source originating from a campaign. In this video, the TIPS campaign spearheaded by the CDC featured a testimonial from a survivor of tobacco-related illnesses. Other campaigns are not directly centered on promoting reduction and cessation (e.g., Safe-to Sleep and American Cancer Society campaigns); however, components of these campaigns can involve delivery of information surrounding tobacco use and support of cessation. The Safe-to-Sleep campaign in particular follows recommendations by the American Academy of Pediatrics to optimize safe sleep conditions for infants. One of these recommendations is to encourage all caregivers of infants to reduce environmental tobacco exposure for infants. Further, as part of this campaign, tobacco use and exposure are environmental and behavioral determinants that are a target for intervention, both prenatally (reduce or stop tobacco use during pregnancy) and postnatally (stop tobacco use and, in turn, reduce or eliminate environmental tobacco exposure for infants); this can reduce the risk of Sudden Infant Death Syndrome (SIDS), which is a leading cause of infant mortality.

Tobacco use and exposure are causal factors that adversely impact response to treatment for many kinds of cancer and can increase both morbidity and mortality for cancer patients. Cessation of tobacco use and reduction of environmental exposure are targets in a variety of cancer prevention and control campaigns. Future content on YouTube could provide more coverage of tobacco-related content across these campaigns, which could increase their visibility. Much of the content found in one social media platform can be disseminated to others. Given that YouTube continues to be the most popular public video-sharing platform, publishing messages on YouTube can extend onto different social media platforms as well.

Another strategy to expand the reach of tobacco cessation efforts on YouTube is incorporating content and resources into videos on specific diseases. This recommendation is based on the premise that people may search for information about a specific disease that is influenced by tobacco use. Across all widely viewed videos on tobacco cessation, many referenced using tobacco as a significant risk factor for a range of tobacco-related diseases. However, none of the videos focused on any specific diseases. It is possible that developing search strategies centered on tobacco cessation pertaining to a specific tobacco-related illness (for example, particular kinds of cancers or chronic obstructive pulmonary disease) could attract the attention of consumers searching for information about their treatment, quality of life, and progression of illness.

Formats That Are Engaging to Consumers

A fourth aspect of recommendations for improving the value of tobacco cessation videos is related to formats that seem to be engaging to consumers. Of note, V-blogs comprised the format with the most cumulative views (48.01%). Several of the deliverers of content in these V-blogs were healthcare providers who had their own YouTube channel but were freestanding from government at local, state, or national levels. As previously noted, multiple deliverers were also non-experts or consumers presenting their perspectives, quitting strategies, and knowledge about content related to traditional as well as electronic tobacco products. Given that these videos generated the most views, it could be possible that a lay audience may feel more connected with the deliverers of these videos, perhaps because they are presented in a more casual format with non-technical language and active dialogue.

Recommendations for Further Research

As tobacco continues to be a leading cause of environmental exposure, it is crucial to find ways to increase awareness and interest among consumers to address this problem. As the findings from this study showed, this topic is not receiving such attention in widely viewed YouTube videos. Thus, additional research is needed to improve understanding about ways to incorporate this topic into videos that will engage consumers. Finding ways to incorporate such deliverable content into more than one format could be a promising approach for engaging consumers. Assuring consistency in messaging across health communication contexts could also ensure that messages are clear and comprehensible for a wide range of audiences. It may be useful to explore different kinds of messages for smokers versus nonsmokers, given the different issues that are relevant for each of these groups.

Given the scant coverage of environmental tobacco exposure as well as firsthand smoke exposure for specialized populations, additional research is needed to increase awareness of how and why environmental tobacco smoke exposure has particularly harmful effects on certain people. As delineated through prior campaigns (Crib for Kids, Safe-to-Sleep), infants are at substantial risk for sleep-related deaths from environmental tobacco exposure. Pregnant women who smoke are increasing the likelihood of adverse health complications for their unborn babies. Research is needed to find ways to highlight these issues for different segments of the population.

There was considerable coverage and, based on the number of views, interest in a variety of tobacco cessation strategies that are not currently recommended by governmental agencies developing guidelines and recommendations for evidence-based practices. As

mentioned previously, there was a wide dispersion in coverage of non-evidence-based practices across the most widely viewed videos. Of note, these non-evidence-based practices are not supported by the U.S. Public Health Tobacco Treatment guidelines. However, these practices have achieved consumer acceptability. Future study designs involving non-evidence-based practices for tobacco cessation could account for prospective and longitudinal studies as the basis to assess the efficacy of these interventions over timespans, settings, and patient populations. Consistency in findings that support the efficacy of these non-evidenced-based practices over time could increase consideration of their inclusion into existing evidence-based practices on tobacco cessation.

The present study assessed view count as the primary outcome variable. As mentioned in the limitations, this is a useful metric but has some disadvantages. Viewers have the opportunity to post comments for YouTube videos. and there were many comments across the videos in this sample. A closer examination of the comments could yield insights into consumers' reactions to different topics or formats in the videos. A thematic analysis of the comments might also yield information related to viewer engagement, perspectives on content, and acceptance of content.

Lastly from a global perspective, social media in our digital era is ubiquitous. Across the trending social media platforms, YouTube is the major one that provides the greatest degree of public video-sharing, thereby making it increasingly easier to find videos. Unlike Twitter that requires more time-intensive mechanisms to locate words across tweets, as well as Facebook and Instagram which may not have as much content publicly available, YouTube itself offers a wealth of data mining with more efficiency which can yield data from the time of its inception.

In addition, YouTube is a communication medium that disseminates knowledge and practice on not only health-related topics but also national and global topics trending across the country and world. Given the large views that videos generated from this study alone, it follows that a wealth of topics may also generate large view counts. In fact, multiple health-related topics have already received thorough coverage on YouTube including vaccinations, developmental disabilities, skin cancer, and much more. For this reason, tapping into YouTube to uncover content that engages viewers is crucial to strengthen the delivery and precision of this communication medium that continues to increase its visibility and prominence in our contemporary digital times. Furthermore, it follows that additional work on understanding the reach of YouTube can help mitigate some of the limitations stemming from it related to misinformation and disinformation, which in turn could strengthen its credibility in the research and practice landscape. This future direction could also offset monetization risk inherent in social media from predatory influencers who project distorted content.

Final Comment

This study produced several findings that have implications for improving public health. Videos posted by consumers attracted the largest number of views. Some of the content in these videos was not in line with evidence-based practices for tobacco treatment established by governmental guidelines. Nevertheless, public health educators need to learn from consumers how to create videos that are engaging. Videos currently posted by governmental agencies are not sufficiently appealing to consumers. Finding ways to deliver content that is not only up-to-date and accurate but also engaging, appealing, and relevant to diverse specialized

populations affected by tobacco use and exposure can align and achieve the goals of reducing the public health burden caused by tobacco use and environmental exposure.

Conclusions

This is one of a few studies to assess the sources, formats, and content of widely viewed YouTube videos on tobacco cessation. Tobacco dependence continues to be a significant risk factor in the onset and progression of a range of harmful illnesses. Education for individuals, families, and communities about tobacco cessation care can be instrumental in helping people achieve cessation. In this digital era, the utilization of social media such as YouTube is a promising way to reach large audiences at very low cost. Given the global reach of YouTube, an assessment of who is disseminating different tobacco-related content revealed information that is relevant to public health education for individuals attempting to stop using tobacco as well as for their families.

As noted above, one of the main findings was the lack of attention regarding exposure to environmental tobacco smoke. This gap in coverage warrants further research to find ways to integrate this content into education, especially for specialized populations such as children, pregnant women, and nonsmokers. Greater attention to environmental tobacco smoke may benefit smokers as well by heightening their awareness of how their tobacco use has harmful consequences not only for themselves but for others in their family and community.

Given that the YouTube videos in the study sample were viewed over 220 million times, it is disappointing that so few videos were uploaded by public agencies who are responsible for reducing population-wide harmful effects from tobacco. Consequently, it is crucial for these governmental agencies and health systems to match delivery of accurate, up-to-date content to

consumers' interests in tobacco cessation and find engaging ways to inform tobacco users how to quit. As mentioned above, increasing awareness about harmful effects associated with secondhand and thirdhand exposure also warrants priority consideration.

The findings revealed a wealth of self-help tips and strategies to support individuals with tobacco dependence, along with their social, familial, and professional networks. Since these videos are reaching so many people, they may have the potential to help those who are not interested or able to seek cessation care in healthcare and community settings. While the ease of accessing these videos on their own terms and time is a significant benefit, it should also be recognized that the efficacy of social media platforms such as YouTube has not been established as an evidence-based practice in mitigating tobacco dependence on individual and population levels. Nevertheless, some of the videos included evidence-based guidelines (e.g., from the U.S. Public Health Service's Treating Tobacco Use and Dependence Clinical Practice Guidelines), and it is reasonable to expect that increasing awareness of such guidance can mitigate the global tobacco epidemic. Establishing credibility in cessation messaging could also contribute to the larger goal of the WHO in creating the next tobacco-free generation worldwide, the goals of Healthy People 2030 on a national level, and the United Nations Sustainable Development Goals on a global level.

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APPENDIX A: SMOKING CESSATION CODEBOOK INSTRUMENT

Coder: _____

Assigned Video Identification Number: _____

Date that the video was uploaded: _____

Date that the video was coded: _____

Length of video (in minutes): _____

Number of Views: _____

Title of the Video: _____

I. Sources

Governmental (e.g., federal/state/local government, city/county/state health department, Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services, Healthy People 2030, policies/legislation/regulations, law enforcement)

Yes = 1 No =0

Organizational/Nongovernmental (e.g., World Health Organization (WHO), United Nations Sustainable Development Goals, American Lung Association, American Cancer Society, American Thoracic Society, American Heart Association, treatment center, healthcare system/institution)

Yes = 1 No =0

Consumer (e.g., mass media, social media, tobacco industries, entertainment industries, sports associations, manufacturers, newspapers, magazines, blogs, any videos posted by lay audience)

Yes = 1 No =0

II. Format

Documentary	Yes = 1	No = 0
Interview	Yes = 1	No = 0
Demonstration/Experiment	Yes = 1	No = 0
Talk By Professional	Yes = 1	No = 0
TV Talk Show/Discussion panel	Yes = 1	No = 0
Animation	Yes = 1	No = 0
Still images	Yes = 1	No = 0
News report with anchor	Yes = 1	No = 0
V-blog	Yes = 1	No = 0
Advertisement	Yes = 1	No = 0
Testimonial/Story	Yes = 1	No = 0
Multiple formats	Yes = 1	No = 0
Other formats	Yes = 1	No = 0

III. Content Categories

Aesthetic Effects

Skin	Yes = 1	No = 0
Hair	Yes = 1	No = 0
Voice	Yes = 1	No = 0
Wrinkles	Yes = 1	No = 0
Nails	Yes = 1	No = 0

Teeth	Yes = 1	No = 0
Smell	Yes = 1	No = 0
Taste	Yes = 1	No = 0
Breath	Yes = 1	No = 0
Stain	Yes = 1	No = 0
Face masks	Yes = 1	No = 0
Clothes	Yes = 1	No = 0
Furniture	Yes = 1	No = 0

Health Effects

Signs and Symptoms (e.g., difficulty breathing/wheezing, secretions, hoarseness, chest tightness, overweight, obesity, high blood pressure, withdrawal)

Yes = 1 No = 0

Illness/Mortality (e.g., Chronic Obstructive Pulmonary Disease (COPD), Cardiovascular disease (CVD), lung cancer, throat cancer, thyroid cancer, esophageal cancer, head and neck cancer, lung transplant, asthma, addiction, pneumonia, ear infection, bronchiolitis, diabetes, eating disorders, death)

Yes = 1 No = 0

Healthcare Utilization (e.g., emergency room visit, urgent care visit, hospitalization, primary care, subspecialty care, obstetrics and gynecology)

Yes = 1 No = 0

Use of Durable Medical Equipment (e.g., oxygen, breathing tube, inhaler, controller medication, as-needed (PRN) or rescuer medication, tracheostomy tube, ventilator, oscillator, feeding tube, continuous positive airway pressure (CPAP), bilevel positive airway pressure (BiPAP))

Yes = 1 No = 0

Tips, Strategies, and Resources to Quit

Quitline	Yes = 1	No = 0
Tobacco treatment clinic/center	Yes = 1	No = 0
Nicotine patches as Nicotine replacement therapy	Yes = 1	No = 0
Nicotine gum as Nicotine replacement therapy	Yes = 1	No = 0
Nicotine lozenges as Nicotine replacement therapy	Yes = 1	No = 0
Nicotine spray as Nicotine replacement therapy	Yes = 1	No = 0
Prescription medications as Nicotine replacement therapy (e.g., Chantix)	Yes = 1	No = 0
Support groups	Yes = 1	No = 0
Individual counseling	Yes = 1	No = 0
Group counseling	Yes = 1	No = 0
Quit date	Yes = 1	No = 0
Preparation/planning	Yes = 1	No = 0
Action	Yes = 1	No = 0
Curb cravings	Yes = 1	No = 0
Support networks	Yes = 1	No = 0
Identifying alternatives to mediate triggers	Yes = 1	No = 0
Exercise	Yes = 1	No = 0
Change in environment (social engineering)	Yes = 1	No = 0
One or more of the 5As (1) Ask about tobacco use; 2) Advise to quit through clear, personalized messages; 3) Assess willingness to quit; 4) Assist in quitting; 5) Arrange follow-up and support)	Yes = 1	No = 0

Motivational interviewing	Yes = 1	No = 0
Contemplation (benefits of quitting outweigh the risks)	Yes = 1	No = 0
Inspirational text messages	Yes = 1	No = 0
Testimonials/Success stories	Yes = 1	No = 0
Cognitive Behavioral Therapy	Yes = 1	No = 0
Mindfulness	Yes = 1	No = 0
Deep Breathing	Yes = 1	No = 0
Hypnosis	Yes = 1	No = 0
Intergenerational (e.g., quitting for children, next tobacco free generation)	Yes = 1	No = 0
Vaping/e-cigarettes for quitting or as harm reduction strategy	Yes = 1	No = 0
Quitting cold turkey	Yes = 1	No = 0
Quitting incrementally/gradually through a weaning process	Yes = 1	No = 0
<u>Outcomes</u>		
Quit attempt	Yes = 1	No = 0
Quit	Yes = 1	No = 0
Relapse	Yes = 1	No = 0
Setback	Yes = 1	No = 0
<u>Ingredients in Tobacco Products</u>		
Nicotine	Yes = 1	No = 0
Tar	Yes = 1	No = 0
Carcinogens	Yes = 1	No = 0

Household chemicals	Yes = 1	No = 0
Other toxic chemicals	Yes = 1	No = 0
Menthol	Yes = 1	No = 0
Vaping flavors	Yes = 1	No = 0
<u>Tobacco products</u>		
Cigarettes	Yes = 1	No = 0
Cigars	Yes = 1	No = 0
Marijuana/weed	Yes = 1	No = 0
Vape products (e.g., vape pens, e-cigarettes, other ENDS devices)	Yes = 1	No = 0
Black Miles	Yes = 1	No = 0
Smokeless tobacco	Yes = 1	No = 0
Other kind of product	Yes = 1	No = 0
<u>Health Benefits of Quitting</u>		
Improved quality of life	Yes = 1	No = 0
Activities of daily living	Yes = 1	No = 0
Breathe easier	Yes = 1	No = 0
Healthy lifestyle	Yes = 1	No = 0
Increased life expectancy	Yes = 1	No = 0
Fertility	Yes = 1	No = 0
Reduced risk of acute disease	Yes = 1	No = 0
Reduced risk of chronic disease	Yes = 1	No = 0

Social/Environmental Benefits of Quitting

Smokefree/vapefree homes	Yes = 1	No = 0
Smokefree/vapefree vehicles	Yes = 1	No = 0
Smokefree/vapefree buildings (e.g., restaurants)	Yes = 1	No = 0
Increased socialization	Yes = 1	No = 0
Increased finances	Yes = 1	No = 0
Reduced risk of children smoking or vaping	Yes = 1	No = 0
Optimizing fitness/exercise	Yes = 1	No = 0
Positive coping strategies	Yes = 1	No = 0

Comments on misinformation or disinformation conveyed in the video:
