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Exploring Variation In How Media Depictions Of Tobacco Use Affect Norm Perceptions: The Roles Of Group Identity And Behavioral Similarity

Abstract

Media depictions of individuals using tobacco can affect people's norm perceptions, stigmatizing beliefs, and, ultimately, their behavior. However, media depictions might vary in their effects. Understanding what factors explain this variation is important for advancing communication theory and promoting positive behavior change. Study 1 paired data from a large-scale content analysis of tobacco-related media content published between 2014-2017 with a rolling cross-sectional survey of young people conducted simultaneously. Findings demonstrated that, while media depictions of individual tobacco use did sometimes affect norm perceptions, variation exists in the significance and direction of these effects. Study 2 sought to test whether behavioral similarity and group identity (people's perceived and desired similarity to a norm referent), might have contributed to this heterogeneity. Study 2a, a content analysis, identified and coded a corpus of YouTube videos depicting individual tobacco use that could be used to explore these research questions. In studies 2b and 2c, young non-tobacco users rated the similarity of different tobacco use behaviors to cigarette smoking (2b) and their perceived and desired similarity to the referents featured using tobacco in videos from study 2a (2c). Results showed that there was variation in participants' behavioral similarity ratings and in the referent similarity ratings assigned to different videos, but this variation was limited, and these two variables couldn't be manipulated separately. In study 2d, young non-tobacco users were randomly assigned to a control condition or one of two video conditions in which they were shown either higher or lower referent similarity videos. Participants' smoking-related norm perceptions and stigma were then measured. Ultimately, no differences were found between participants in the two video conditions on any of these outcomes. Thus, the hypothesized effects of the referent similarity manipulation were not observed. Some differences were observed between the lower referent similarity and control conditions; however, these differences could not be causally attributed to referent similarity. While study 2d's hypotheses were largely unsupported, results from the set of studies point to a need for more research into how behavioral similarity and referent similarity shape the effects of individual tobacco use depictions on norm perceptions and stigma.

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EXPLORING VARIATION IN HOW MEDIA DEPICTIONS OF TOBACCO USE
AFFECT NORM PERCEPTIONS: THE ROLES OF GROUP IDENTITY AND
BEHAVIORAL SIMILARITY

Leeann N. Siegel

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Supervisor of Dissertation

Robert C. Hornik, Ph.D.
Wilbur Schramm Professor of Communication and Health Policy

Graduate Group Chairperson

Guobin Yang, Ph.D.
Grace Lee Boggs Professor of Communication and Sociology

Dissertation Committee

Joseph N. Cappella, Ph.D., Gerald R. Miller Professor of Communication
Emily Falk, Ph.D., Professor of Communication, Psychology, and Marketing
Andy Tan, Ph.D., Associate Professor of Communication

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BEHAVIORAL SIMILARITY

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Leeann Nicole Siegel

DEDICATION

This dissertation is dedicated to my parents Tori and Jesse Siegel. Thank you for everything.

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ABSTRACT

EXPLORING VARIATION IN HOW MEDIA DEPICTIONS OF TOBACCO USE AFFECT NORM PERCEPTIONS: THE ROLES OF GROUP IDENTITY AND BEHAVIORAL SIMILARITY

Leeann N. Siegel

Robert C. Hornik

Media depictions of individuals using tobacco can affect people's norm perceptions, stigmatizing beliefs, and, ultimately, their behavior. However, media depictions might vary in their effects. Understanding what factors explain this variation is important for advancing communication theory and promoting positive behavior change.

Study 1 paired data from a large-scale content analysis of tobacco-related media content published between 2014-2017 with a rolling cross-sectional survey of young people conducted simultaneously. Findings demonstrated that, while media depictions of individual tobacco use did sometimes affect norm perceptions, variation exists in the significance and direction of these effects.

Study 2 sought to test whether behavioral similarity and group identity (people's perceived and desired similarity to a norm referent), might have contributed to this heterogeneity. Study 2a, a content analysis, identified and coded a corpus of YouTube videos depicting individual tobacco use that could be used to explore these research questions. In studies 2b and 2c, young non-tobacco users rated the similarity of different tobacco use behaviors to cigarette smoking (2b) and their perceived and desired similarity

to the referents featured using tobacco in videos from study 2a (2c). Results showed that there was variation in participants' behavioral similarity ratings and in the referent similarity ratings assigned to different videos, but this variation was limited, and these two variables couldn't be manipulated separately.

In study 2d, young non-tobacco users were randomly assigned to a control condition or one of two video conditions in which they were shown either higher or lower referent similarity videos. Participants' smoking-related norm perceptions and stigma were then measured. Ultimately, no differences were found between participants in the two video conditions on any of these outcomes. Thus, the hypothesized effects of the referent similarity manipulation were not observed. Some differences were observed between the lower referent similarity and control conditions; however, these differences could not be causally attributed to referent similarity. While study 2d's hypotheses were largely unsupported, results from the set of studies point to a need for more research into how behavioral similarity and referent similarity shape the effects of individual tobacco use depictions on norm perceptions and stigma.

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Introduction

Norm perceptions are a powerful driver of human behavior (Cialdini et al., 1991; Fishbein & Azjen, 2010). Whether or not people chose to engage in a behavior is influenced by their perceptions of how common that behavior is (descriptive norm perceptions), as well as their perceptions of the extent to which that behavior is socially approved or sanctioned (injunctive norm perceptions) (Cialdini et al., 1991; Kallgreen et al., 2000). Recognizing the role norm perceptions play in shaping behavior, researchers have long been interested in studying how norm perceptions related to risky behaviors like smoking are formed, including how communication affects this process.

Indeed, communication plays a fundamental role in transmitting normative information and shaping the effects of that information on individuals' perceptions and behaviors (Real & Rimal, 2007; Rimal & Lapinski, 2015). One way in which communication can affect norm perceptions is through descriptive norm information found in media (Kwan et al., 2015). One shape such information can take is depictions of individuals engaging in a behavior or expressing that they engage in a behavior. Exposure to media depictions of individuals' behavior can influence people's descriptive norm perceptions by providing cues about how common a given behavior is (Mead et al., 2014; Tankard & Paluck, 2016). This type of behavior depiction can also influence injunctive norm perceptions, even if the depiction is not accompanied by an explicit statement about whether the behavior in question is approved of or frowned upon. People often infer the extent to which a behavior is acceptable based on its popularity, so repeated exposure to individuals engaging in a behavior might make one believe that behavior is more acceptable (Rimal, 2008; Rimal & Real, 2005). In addition, one might glean the

injunctive norms around a behavior by witnessing how others react to a media exemplar engaging in that behavior (Bandura, 1986).

In the context of tobacco use, the focus of this dissertation, research has documented the effects that tobacco use depictions in media can have on people's normative beliefs (Fulmer et al., 2015; Nan & Zhao, 2016). However, there is no reason to expect that every type of tobacco use depiction would have the same impact on norm perceptions. Indeed, as described in greater detail later in the Introduction, results from study 1 of this dissertation provide evidence that the effects of depictions or descriptions of individuals using tobacco, i.e., individual tobacco use depictions, vary depending on the media source and type of norm perception considered. Results from this study led me to speculate about what may have caused this heterogeneity in the effects of individual tobacco use depictions on norm perceptions. Subsequent exploratory analyses (described in Chapter 2) and a review of related literature helped to identify two possible explanatory variables: behavioral similarity and group identity.

Behavioral similarity refers to the perceived similarity between the specific tobacco use behavior featured in an individual tobacco use depiction and the behavior about which normative perceptions are being measured (which, throughout my dissertation, is cigarette smoking). Norm perceptions about a behavior may be influenced not only by norm information about that behavior, but also by norm information about other related behaviors (Aarts et al., 2004; Cialdini et al., 1990; Loersch et al., 2008; Nook et al., 2016). However, effects may differ depending on the proximity of the related behavior to the behavior about which norm perceptions are being measured (Cialdini et al., 1990). Thus, depictions of different tobacco use behaviors that differ from one

another in how people perceive their similarity to cigarette smoking may differ in their effects on smoking-related norm perceptions.

Group identity judgments may also shape the effects of norm information on norm perceptions. Multiple theories (e.g., Rimal & Lapkinski, 2015; Turner, 1987; Tajfel & Turner, 1979) and findings from empirical research all suggest that an individual might be more likely to change their norm perceptions to comply with the norm stated in or inferred from a normative message if the referent included in that message is seen as sharing their group identity (i.e., a member of their in-group). Thus, exposing an individual to media depictions of referents smoking who that individual perceives to be similar to them and to whom they would like to be similar might cause them to see smoking as a more normative behavior. At the same time, exposing an individual to media depictions of referents smoking who are seen as dissimilar to them and not people to whom they would like to be similar to (i.e., members of an out-group) might cause them to shift their perceptions of the norms around smoking within their in-group to better differentiate their in-group norms from the perceived out-group norms (Hogg & Reid, 2006; Christensen et al., 2004). These effects might then generalize to individuals' broader norm perceptions (e.g., perceptions of the norms around smoking in society as a whole) as many people more heavily weigh their perceptions of the norms among proximal others when evaluating such general norm perceptions (Paek, 2009).

While exposure to media depictions of dissimilar or out-group others smoking might cause individuals to see smoking as less normative, it could also potentially exacerbate smoking stigma. Stigma directed towards smokers is pervasive in the United States and stigmatizing beliefs about smoking are held by both smokers and nonsmokers

alike (Evans-Polce et al., 2015; Heley et al., 2020; Stuber et al., 2008). Smoking stigma has negative impacts on the health and wellbeing of smokers and may undermine tobacco control efforts (Evans-Polce et al., 2015; Riley et al., 2017; Stuber et al., 2009). Thus, it is important to explore how media depictions of smoking might contribute to the perpetuation of smoking stigma.

The studies that comprise this dissertation were intended to further our understanding of the factors that contribute to heterogeneity in the effects of exposure to media depictions of individual tobacco use on young people's smoking-related norm perceptions. In study 1, I tested the associations between changes in the weekly prevalence of individual tobacco use depictions (as well as individual e-cigarette use depictions) in different media sources on smoking-related injunctive and descriptive norm perceptions among young people. To carry out this study, I leveraged data from two sources: a large-scale content analysis conducted using a corpus of all tobacco-related media content published on two social media sources and four long-form media sources between 2014 and 2017 and a rolling cross-sectional survey of young people carried out over the same time period.

Results from this study demonstrated that there was heterogeneity in the effects of individual tobacco use depictions. As predicted, the prevalence of individual tobacco use depictions in traditional long-form media sources in a given week was positively associated with smoking-related descriptive and injunctive norm perceptions reported by young people. In other words, the more media depictions there were of individuals smoking in these sources, the more young people reported that smoking was approved of and common. In contrast, more views of YouTube videos featuring individual tobacco

use depictions in a given week predicted lower descriptive norm perceptions (i.e., perceptions that smoking is less common), while more Tweets featuring individual tobacco use depictions in a given week predicted lower injunctive norm perceptions (i.e., perceptions that smoking is less socially approved).

Given this evidence that the effects on norm perceptions of exposure to media depictions of individual tobacco use depictions can differ, in study 2 I sought to test how behavioral similarity and group identity (i.e., individuals' perceived and desired similarity to referents included in media depictions of individual tobacco use) shape these effects. In this study, I narrowed my focus to just YouTube videos drawn from the large media corpus used in study 1 and included only participants who were non-tobacco users. Studies 2a, 2b and 2c all led up to study 2d, in which I had initially planned to expose participants in different experimental conditions to sets of YouTube videos that varied in their referent similarity to average respondents as well as the similarity of the tobacco use behaviors they depicted to cigarette smoking.

In study 2a, I drew random samples of YouTube videos featuring individual tobacco use depictions and used manual coding to rate them on several characteristics including which tobacco use behaviors they featured, and which categories they fell into in a categorization schema I had developed based on prior literature and findings from an earlier round of coding. This coding was intended to both give me a better sense of what individual tobacco use videos on YouTube look like, as well as to assess whether such videos could feasibly be used as experimental stimuli in study 2d. Ultimately, this study led me to identify 152 videos that could potentially be used as experimental stimuli in study 2d. Findings from coding these videos showed that they featured a variety of

tobacco use behaviors (although about half featured cigarette smoking) and fell into a range of different categories, suggesting that they might also feature a range of referents using tobacco.

For studies 2b and 2c, which were conducted simultaneously, I recruited a group of young non-tobacco users from Amazon Mechanical Turk and, after screening them to determine whether they met the eligibility criteria for these studies, randomly assigned each participant to either study 2b or study 2c. Participants in study 2b ($n = 50$) were asked to rate the similarity of various tobacco use behaviors to cigarette smoking. Findings from this study showed that there were some differences in how participants viewed the similarity of different tobacco use behaviors to cigarette smoking. Specifically, participants tended to rate vaping e-cigarettes as less similar to smoking cigarettes compared to most other tobacco use behaviors, and also rated smoking hookah (the behavior that was rated highest in behavioral similarity) as more similar to smoking cigarettes compared to two other tobacco use behaviors: smoking pipes and using smokeless tobacco products. Despite these differences, the results from study 2b did not support the feasibility of manipulating behavioral similarity in study 2d for reasons described in greater detail in Chapter 4.

Participants in study 2c ($n = 290$) were asked to view 10 randomly selected videos from the 152 videos that had been identified as potential experimental stimuli in study 2d and answer questions pertaining to the referent depicted using tobacco in each video. These questions were used to measure how similar to the referent in each video participants perceived themselves to be as well as how similar to that referent they wanted to be. Because each video was viewed by about 20 different participants, I was

able to use participants' responses to these questions to develop, for each video, ratings of how the average participant scored their own similarity to the referent in that video. I was then able to assess whether videos could be scored consistently for referent similarity, whether videos varied from one another on this variable, and whether videos' referent similarity ratings differed depending on the tobacco use behaviors they featured and the categories they fell into.

Overall, results from studies 2c revealed that there was consistency in how participants rated their similarity to the referent featured in each video. Additionally, different videos did vary in the referent similarity scores they were assigned. However, no videos were given scores that could appropriately be thought of as 'high' in referent similarity. In other words, no video featured a referent to whom average participants wanted to be similar or perceived themselves to be similar. Additionally, the referent similarity rating assigned to a video was correlated with both the tobacco product it featured as well as the category it fell into.

Findings from both studies 2b and 2c affected the design of study 2d. Based on the pattern of differences observed in the behavioral similarity ratings given to different tobacco use behaviors in study 2b as well as the relationship observed between referent similarity and behavioral similarity in study 2c, I ultimately was only able to manipulate referent similarity in study 2d. I therefore limited my focus to videos that featured cigarette smoking. Using the cigarette-related videos coded for referent similarity in study 2c, I divided videos into two groups: 'higher' referent similarity videos ($n = 18$) and 'lower' referent similarity videos ($n = 31$). I then recruited 353 young non-tobacco users from MTurk and assigned them to one of two video conditions (higher referent

similarity or lower referent similarity) or to a control condition. Participants in each of the two video conditions watched a stratified (by video category) sample of six videos selected from either the higher or lower referent similarity videos, while participants in the control condition did not watch any videos. I then measured all participants' smoking-related descriptive and injunctive norm perceptions and stigmatizing beliefs about smoking. I compared how participants in each of the two video conditions responded to these outcomes. I predicted that participants in the lower referent similarity condition would have lower smoking-related injunctive and descriptive norm perceptions (i.e., believe that smoking was less socially approved of and less common) and report more smoking stigma. I also compared participants in both video conditions to the control condition, predicting that participants in both video conditions would have lower smoking-related norm perceptions and more stigma.

Ultimately, my study 2d hypotheses were generally not supported. I did not observe any differences between the two video conditions on any outcomes. While I did observe differences between the participants in the lower referent similarity condition and participants in the control condition on my measures of injunctive norm perceptions, these results are difficult to interpret and cannot be definitively attributed to the effects of referent similarity. However, findings from studies 2b and 2c suggest that future research exploring how behavioral similarity and group identity shape the effects of exposure to media depictions of individual tobacco use may be warranted, particularly because limitations inherent in the design of study 2d may have contributed to its null results.

Chapter 1. Literature Review

Tankard and Paluck (2016) argue that exposure to instances of individuals or groups of individuals engaging or expressing that they engage in a behavior can shape one's perceptions of the norms around that behavior. Exposure to other people's behavior may influence an individual's perceptions about which behaviors are common or viewed as socially acceptable by providing both information about others' behaviors and beliefs, as well as information about how their behaviors and beliefs are viewed by their social networks (Mead et al., 2014; Bandura, 1986). These effects can occur whether the exposure to others' behavior occurs in an individual's real-world social environment or in the media, which can be thought of as a symbolic social environment (Mead et al., 2014).

Indeed, there is a substantial body of literature demonstrating that exposure to depictions of individuals using tobacco in media can impact young people's tobacco use. Smoking depictions are common across many different types of media including movies (Goldstein et al., 1999; Tynan et al., 2017), episodic programming available on broadcast television and streaming platforms (Hazan & Glantz, 1995; Truth Initiative, 2019), video games (Forsyth & Malone, 2016), music videos (Cranwell et al., 2015; DuRant et al., 1997) and social media (Cavazos-Rehg et al., 2021) and evidence suggests that such depictions impact young people (Bennett et al., 2020; Charlesworth & Glantz, 2005; Depue et al., 2015; Sargent et al., 2002). In addition, online marketing by tobacco manufacturers has increased the prevalence of tobacco use depictions on websites and social media platforms (O'Brien et al., 2020; Soneji et al., 2017), and may make young people more likely to use tobacco (Cruz et al., 2019).

One way in which individual tobacco use depictions in media influence young people's tobacco use is by impacting their descriptive and injunctive norm perceptions (Wakefield et al., 2003). Repeated exposure to instances of individuals using tobacco in media can affect young people's perceptions of the real-world prevalence (K. C. Smith et al., 2008; Wakefield et al., 2003) and social approval (Elmore et al., 2017) of tobacco use, both of which affect their susceptibility to smoking. In a 2016 study, Nan and Zhao demonstrated that both descriptive and injunctive norm perceptions mediated the relationships between young people's levels of exposure to three types of tobacco-related media (anti-smoking PSAs, cigarette ads, and smoking scenes in movies) and their smoking intentions. Another study found that exposure to tobacco advertising and instances of tobacco use in TV and movies affected youth tobacco use by first affecting perceptions about the prevalence of peer use (Fulmer et al., 2015).

Furthermore, tobacco-related norm perceptions, and thus behavior, can be impacted not only by an individual's absolute level of exposure to tobacco-related media but also by the number of media sources in which they encountered tobacco content. A recent study found that the total number of media sources in which young people had happened to encounter mentions of e-cigarettes or vaping in the past month predicted their vaping-related descriptive norm perceptions which, in turn, affected their e-cigarette use (Liu et al., 2020).

Interestingly, research investigating the effects of tobacco marketing suggests that media messages about a given tobacco product may influence not only the likelihood that a young person would begin using that tobacco product but also the likelihood that they would begin using a different product not mentioned in the advertisement (Auf et al.,

2018; Cruz et al., 2019). Cruz et al. (2019) found that young people's exposure to online advertising for cigars, smokeless tobacco and pipe tobacco all predicted their subsequent cigarette smoking. Papaleontiou et al. (2020) found that young people's self-reported exposure to e-cigarette advertisements affected the odds that they would use smokeless tobacco products, combustible tobacco products and hookah. Of relevance to the current study, these findings highlight the fact that young people's cognitions related to a given tobacco product, including their norm perceptions, could potentially be affected not only by media messages about that product but also by media messages about tobacco products perceived to be like the target product. However, the likelihood that such effects occur may vary depending on individuals' perceptions of the similarity of the products in question, as will be discussed later in this chapter.

Group Identity

While depictions of individuals carrying out a behavior or describing their opinions about a behavior can be thought of as a type of norm information, such depictions could alternatively be conceptualized as exemplars or behavioral models. Thus, research that has examined group identity as a potential moderating variable that can shape the effects of each of these can inform our understanding of the possible effects of individual tobacco use depictions in media on norm perceptions. Below I summarize relevant findings from each body of research.

Group Identity and Norm Information. The Theory of Normative Social Behavior or TNSB (Rimal & Lapinski, 2015) argues that the effects of norm information on individuals' behavior are contingent on group identity, which is represented in the theory as a bidimensional construct reflecting (1) how similar to a norm referent an

individual perceives himself or herself to be and (2) how similar to that referent he or she would like to be. Some evidence exists to support this claim (Lapinski et al., 2007, 2014; Rimal & Real, 2003; Rimal, 2008). For example, Lapinski et al. (2014) found that descriptive norm information about handwashing among childcare workers had a stronger effect on handwashing behavior among childcare workers who strongly identified with (i.e., saw themselves as similar to and wanted to be similar to) other childcare workers. However, other studies guided by the Theory of Normative Social Behavior (e.g. Rimal & Real, 2005) that have adopted this conceptualization of group identity have not found evidence of the effects of group identity. These inconsistent findings warrant further investigation (Rimal & Lapinski, 2015).

It should be noted that the tests of the moderating effects of group identity done in the TNSB-guided studies described above all included behavior or behavioral intentions, rather than norm perceptions, as the outcome variable of interest. However, it is reasonable to assume that norm information affected behavior in these studies by first affecting norm perceptions. If this was the case, one might expect to see a stronger effect of exposure to norm information on participants' norm perceptions than on their behavior given the closer proximity of norm perceptions on the causal pathway. Such an interpretation would be consistent with the Reasoned Action Approach (Fishbein & Ajzen, 2010), which argues that beliefs about the norms of different individuals or groups (which could be directly impacted by receiving norm information about the individual or group in question) affect behavioral intentions by first affecting perceived norms.

The Reasoned Action Approach (2010) also offers an explanation for why group identity might moderate the relationship between exposure to norm information and norm

perceptions. This theory holds that the effect of a given referent's injunctive norm opinion about a behavior on an individual's overall injunctive norm perception about that behavior will vary based on that individual's motivation to comply with that referent. Likewise, the effect of a given referent's descriptive norm pertinent to a given behavior (i.e., whether or not that referent engages in that behavior) on an individual's overall descriptive norm perception about that behavior will vary based on that referent's perceived importance and salience in the mind of the individual. An individual's perceived and desired similarity to a referent could affect both of these factors (Fishbein & Ajzen, 2010).

The social identity perspective, which encompasses both social identity theory (Tajfel & Turner, 1979) and self-categorization theory (Turner et al., 1987), also points to the importance of group identity in the formation of norm perceptions and the influence of those perceptions on behavior (Hogg & Reid, 2006). This perspective explains how group identity influences the norms with which one complies through the following processes: (1) individuals self-categorize themselves into different social categories; (2) individuals cognitively represent these social categories as prototypes whose behavior and likenesses reflect in-group norms; (3) individuals conform to these in-group norms (Hogg & Reid, 2006). At least for individuals who identify strongly with a group, group identity can become internalized as a level of self-identity, and thus can influence individuals' norms both through social influence as well as through self-influence (Spears, 2021). People may conform to these in-group norms in part because doing so elicits positive emotions (Christensen et al., 2004).

According to the social identity perspective, not only will the extent to which an

individual identifies with a given in-group shape his or her compliance with the perceived norms of that group, it will also shape the extent to which he or she positions his or her behavior or attitudes in opposition to the norms ascribed to by a group seen as an out-group (Hogg & Turner, 1987; Turner et al., 1989). Just like conforming to an in-group norm can elicit positive emotions, so can conforming to a descriptive norm that differs from that of an out-group (Christensen et al., 2004). Especially in circumstances in which only normative information pertaining to the behavior of the out-group is available or salient, individuals will construct an in-group norm that differs sharply from this out-group norm and then use this in-group norm to guide their behavior (Hogg & Reid, 2006). Demonstrating this phenomenon through a series of experiments, Berger and Rand (2008) found that exposing college-aged participants to either articles or flyers describing high rates of unhealthy behaviors (either eating unhealthy foods or drinking excessive amounts of alcohol) among members of an outgroup with whom participants would not want to be associated made participants less likely to engage in these behaviors.

Research guided by social identity and self-categorization theory has demonstrated that the effects of perceived behavioral norms among a reference group on engaging in health-relevant or prosocial behaviors were stronger among individuals who identified strongly with the group (Johnston & White, 2003; Terry et al., 1999; Terry & Hogg, 1996). For example, Johnston and White (2003) found that the perceived drinking norms of a relevant reference group had a stronger effect on intentions to binge drink among individuals who identified strongly with that reference group. Likewise, Terry and Hogg (1996) found that the perceived norms of a reference group around exercise affected individuals' intentions to engage in regular exercise only if they identified

strongly with that reference group. Finally, White et al. (2009) found that the effects of group norms on household recycling intentions were larger for individuals who identified strongly with the group.

Group Identity and Exemplars in Narrative Persuasion. Research in the field of narrative persuasion suggests that the effects of a narrative may be stronger when audience members perceive themselves to be similar to a character featured in the narrative. Prior studies have demonstrated the effects of perceived similarity to characters in narratives on outcomes including behavioral intentions and perceived risk. For example, Ooms et al. (2019) found that manipulating characteristics of the exemplar featured in a story about an individual's experience with cancer to make that exemplar more similar to audience members enhanced the effects of that story on audience member's behavioral intentions. de Graff (2014) found that the effects of exposing participants to a narrative about an individual with cancer on their perceptions of their own risk for cancer differed depending on whether participants were shown a version of the narrative with an exemplar intended to be perceived as similar to or different from themselves.

Audience members' perceptions of their similarity to a character in a narrative may increase their identification with the character (Hoeken et al., 2016; McQueen et al., 2011; Murphy et al., 2013; Ooms et al., 2019; Slater et al., 2003). In contrast, perceiving a character in a negative light may make audience members resistant to identifying with that character (Tal-Or & Cohen, 2010). Perceived similarity to and identification with characters may in turn affect the extent to which audience members are transported into the narrative (Green, 2006; Green & Brock, 2000). Transportation enhances the extent to

which narratives change individuals' real-world beliefs; thus, by enhancing audience members' transportation, narratives featuring exemplars engaging in a behavior who are perceived as similar may be more likely to influence audience members' norm perceptions about that behavior (Green, 2006). Because of its important role in shaping narrative persuasion effects, Green and Clark (2013) argue that transportation can help explain how tobacco use depictions in entertainment media affect young people's tobacco use.

Some evidence suggests that narratives told by similar exemplars have greater impacts on audience members' norm perceptions (Hinyard & Kreuter, 2007). One study, in which participants were exposed to either a narrative or non-narrative film about Pap testing to detect cervical cancer, found that the narrative film was more effective in increasing participants' descriptive norm perceptions around Pap testing and that this effect was mediated by identification with the characters in the film (Moran et al., 2013). Another study, which exposed participants to different versions of a narrative blog about HPV, found that participants who saw themselves as similar to the blogger had higher descriptive and injunctive norm perceptions (Lee & Su, 2020).

Group Identity and Behavioral Models. Social cognitive theory (Bandura, 1986) elucidates one pathway through which individual norm mentions in media might affect norm perceptions: vicarious learning. Seeing media exemplars engage in behaviors and witnessing the results of those behaviors, including others' reactions to them, can affect individuals' norm perceptions about those behaviors. Individuals may be more likely to adopt behaviors they see modelled by media exemplars with whom they identify because of their perceived similarity, or by models who are portrayed as attractive

(Andsager et al., 2006; Bandura, 1989, 2001, 2004). Studies from the field of education entertainment have demonstrated that perceived similarity can enhance the effects of modeling (Singhal & Rogers, 2002).

Group Identity and Tobacco Use Depictions in Media. Prior studies looking at the effects of tobacco-related media - including tobacco advertisements, anti-smoking public service announcements (PSAs) and movies - have considered the potential moderating impact of group identity judgments. Elmore, Scull and Kupersmidt (2017) found that adolescents' perceptions of the similarities between their own lives and the lives of people depicted in tobacco ads significantly predicted their tobacco-related injunctive norm perceptions. Likewise, Scull, Kupersmidt and Erausquin (2014) found that children's perceived similarity to the people depicted in tobacco ads predicted their intentions to use tobacco. Other studies have demonstrated a relationship between on-screen tobacco use by young people's favorite actors, who they would presumably rank high on desired similarity, and those young people's subsequent tobacco use and tobacco-related attitudes (Distefan et al., 2004; Tickle et al., 2001).

A 2016 study focusing on how anti-smoking PSAs affect and are perceived by smokers offers insight into how similarity might shape the effects of tobacco-related media (M. Kim et al., 2016). In this study, participants (all of whom were smokers) were exposed to a randomly selected set of PSAs featuring smoker characters that differed in their similarity to the research participants in terms of both demographic characteristics and quitting status. Results showed that PSAs featuring smoker characters who were more similar to the participants generated higher engagement with the ads, which in turn caused participants to rate the ads higher on perceived message effectiveness.

Group Identity and Stigma

Individuals' perceived and desired similarity to exemplars depicted engaging in behaviors in media may both influence and be influenced by stigma. When individuals hold stigmatizing beliefs about others, they often try to psychologically distance themselves from those others and view them as part of an out-group (Goffman, 1963; Link & Phelan, 2001). Thus, holding stigmatizing beliefs about a media exemplar may cause individuals to fail to perceive similarities between themselves and an exemplar or express little desire to be similar to an exemplar (R. A. Smith, 2007; R. A. Smith et al., 2019). Demonstrating these effects, one study exposed participants to two different versions of a film that was manipulated so that the protagonist was portrayed as a member of either a more stigmatized group or a less stigmatized group. Results revealed that participants exposed to the version of the film in which the protagonist was portrayed as belonging to a more stigmatized group rated her lower on a measure of social acceptance (which encompassed their perceived similarity to, social distance from and social attraction to the protagonist) and showed lower levels of perspective taking (Chung & Slater, 2013).

Prior studies have shown that exemplar depictions in narratives can actually reduce levels of stigma and increase favorable attitudes towards stigmatized groups (Heley et al., 2020; Oliver et al., 2012; Tamul & Hotter, 2019). However, these effects may be contingent on individuals' judgments about their similarity to the exemplar. Tamul and Hotter (2019) demonstrated that a negative relationship exists between individuals' perceived similarity to an exemplar included in narrative communications and their stigma towards the group to which that exemplar belongs. Likewise, a study

about the effects of entertainment media on mental illness stigma showed that participants who reported identifying more with a character in a film who had a mental illness reported less stigma after seeing the film (Caputo & Rouner, 2011).

Exemplification theory (Krämer & Peter, 2020; Zillmann, 1999) holds that people implicitly infer that characteristics shown by an exemplar are also true of all members of the group to which that exemplar belongs. Therefore, exposure to a particular exemplar who is viewed in a negative light and perceived as highly dissimilar to oneself might affect one's level of stigma towards the entire group of people who engage in the behavior the exemplar is depicted engaging in. This, in turn, might cause individuals to develop more negative injunctive norm perceptions about the behavior as individuals may construct personal norm perceptions that differ from those they perceive to be held among out-groups, such as groups of stigmatized individuals (Hogg & Reid, 2006).

In light of the focus of the studies that compose my dissertation, it is worth noting that an exemplar's very status as a tobacco user may cause individuals to hold some stigmatizing beliefs about that exemplar. Considerable evidence exists demonstrating that stigma towards smokers is pervasive in the United States and that stigmatizing beliefs about smoking are held by both smokers and nonsmokers (Evans-Polce et al., 2015; Heley et al., 2020; Stuber et al., 2008). However, exemplars depicted as tobacco users in YouTube videos may differ from one another in other ways that affect the stigmatizing beliefs formed by individuals who view those videos. For example, research looking at stigma through an intersectional lens suggests that an exemplar's membership in multiple stigmatized groups may have a compounding effect on the stigmatizing beliefs held by individuals exposed to that exemplar (Lipperman-Kreda et al., 2019; Turan et al., 2019).

Manipulating Group Identity

It should be noted that group identity has been operationalized in many different ways in studies that have looked at its effects. For example, some studies looking at the effects of group identity on normative influence have experimentally manipulated group identity by first choosing different groups that were expected to vary in the extent to which all participants saw themselves as and desired to be similar to them and then randomly assigning participants to receive normative information about one of those groups (Berger & Rand, 2008; Rimal et al., 2005; Stangor et al., 2001). Other studies have taken a different approach and experimentally manipulated group identity by providing information to participants (e.g., information about personality characteristics) that was intended to alter the extent to which they saw themselves as prototypical or not prototypical of a certain reference group (Goode et al., 2014). A third group of studies did not experimentally manipulate group identity at all but rather selected a single reference group and tested the effects of naturally-occurring variation in participants' levels of perceived and desired similarity to that reference group (e.g. Lapinski et al., 2014).

As described in the chapters that follow, I intend to use a somewhat different approach to manipulating group identity. Rather than a priori identifying group-level or individual-level characteristics of media exemplars that I expect to affect study participants' perceived and desired similarity to those exemplars, in study 2c I had a sample of individuals from my target population (young non-tobacco users) rate their perceived and desired similarity to each different exemplar depicted in the YouTube videos used as experimental stimuli. I then used the average ratings assigned to each as my operationalization of group identity for the equivalent participants in study 2d.

It should be noted that, in choosing this operationalization of group identity, I made two major assumptions. First, I assumed that there would be some consistency in how a diverse group of young non-tobacco users rate their perceived and desired similarity to media exemplars and that these ratings would not be merely a function of individual-level characteristics (e.g., gender identity, style of clothing) that would vary from person to person. Second, I assumed that this type of referent similarity judgments, which can be thought of as the average young non-tobacco users' perceptions of their actual and desired similarity to a given referent, would affect the outcomes of interest in this study even in the presence of other cues tied to individual-level characteristics (e.g., shared or different gender identity, similar or dissimilar style of clothing) that might indicate to a participant that they do or do not share a given identity with a media exemplar. Despite the risks involved in relying on these assumptions, I chose to use this method of manipulating group identity in light of the expected difficulties that would be involved in specifying in advance which characteristics of exemplars should be expected to shape the extent to which participants identify with them. Individuals see themselves as belonging to many different groups and the particular group identity or identities most salient at any moment may not always be evident (Hogg & Reid, 2006).

Behavioral Similarity

Studies have shown that our behavior, and likely our norm perceptions about that behavior, may be influenced not only by norm information about that behavior, but also by norm information about other related behaviors. Two (non-mutually exclusive) explanations exist for this finding: spreading activation and goal contagion. Spreading activation describes the notion that similar concepts are organized in networks in one's

memory and that activation of one concept “spreads” across this network, resulting in the activation of related concepts (Anderson, 1983; Anderson & Pirolli, 1984; Collins & Loftus, 1975). Thus, making one norm salient in an individual’s mind could also make salient other related norms in the same network. The theory of goal contagion argues that individuals are affected not only by the norm communicated by a given behavioral norm (e.g., giving a charitable donation) but also by the inferences they make about the goals of the individuals who engage in that norm (e.g., helping others), and may adopt this goal and utilize it in an another behavioral domain when given the opportunity (Aarts et al., 2004; Loersch et al., 2008).

Demonstrating how norms can generalize across behaviors, a study on prosocial norms found that exposing participants to norm information about one prosocial behavior (charitable donations) affected their performance on another prosocial behavior (exerted effort in a note-writing task) (Nook et al., 2016). Likewise, Cialdini, Reno and Kallgren (1990) found that littering behavior among participants in their experiment was impacted not only by exposing them to a norm message reminding them of the injunctive norm against littering, but also by exposing them to norm messages reminding them of injunctive norms around other behaviors. However, the effects of these norm messages on participants’ littering behavior varied depending on the conceptual proximity of the norm in question to the anti-littering norm. Participants exposed to a message about the norm determined to be the most highly related to the anti-littering norm (the norm around recycling) littered the least while participants exposed to a message about a norm determined to be largely unrelated to the anti-littering norm (the norm around voting) littered the most. This suggests that norm messages pertaining to behaviors seen as more

distal to the target behavior will have smaller effects on norm perceptions than norm messages pertaining to behaviors seen as more proximal.

In the context of tobacco, few studies have tested whether exposing individuals to messages about one tobacco product will affect their normative perceptions regarding the use of another tobacco product. More research has investigated whether exposure to messages about one tobacco product affects other types of cognitions or behavioral intentions related to a different product. For example, some studies testing whether depictions of e-cigarette use can act as smoking cues have found that exposing current daily smokers and former smokers to e-cigarette advertisements containing visual depictions of e-cigarette use can increase their urge to smoke cigarettes (Durkin et al., 2016; Maloney & Cappella, 2016). Among the studies that have measured normative perceptions, M. Kim et al. (2019) found that exposing adolescents to e-cigarette advertisements did not affect their injunctive norm perceptions related to cigarette smoking, although it did have a significant effect on their perceptions of the risks associated with cigarette smoking (M. Kim et al., 2019). In contrast, a study including adult participants in both the United States and the United Kingdom found that exposure to e-cigarette advertisements did affect participants' injunctive norm perceptions but the effect was not in the expected direction (Booth et al., 2019). Rather than normalizing cigarette use, viewing e-cigarette advertisements caused e-cigarette users to score cigarette use as less socially acceptable.

The mixed results that have been found in the few prior studies that have investigated whether and how exposure to messages about one tobacco product affects people's normative perceptions about a different topic point to the need for more research

investigating this question. While, as discussed above, findings from past research related to spreading activation and goal contagion would lead us to predict that exposing individuals to norm information suggesting that one tobacco use behavior is normative might impact their perception that the target tobacco use behavior is also normative (though to a lesser degree than would exposing them to norm information about the target behavior), this might not be the case if the tobacco use behaviors in question are seen as being in direct competition with one another. For example, if an individual perceives using smokeless tobacco as a behavior one engages in instead of smoking combustible cigarettes, and sees the two behaviors as largely mutually exclusive, that individual might infer from a message conveying that smokeless tobacco use is normative that combustible cigarette smoking is not. This perception of tobacco products serving as substitutes for one another might be influenced by hearing about or observing smokers switching to other tobacco products to help them quit smoking (Popova & Ling, 2013).

Chapter 2. Study 1 - Evidence of Heterogeneity in the Effects of Temporal Trends in Media Depictions of Tobacco Use on Young People's E-cigarette and Tobacco-Related Norm Perceptions

Introduction

Through this study, we sought to fulfill two main goals. First, we sought to test the associations between young people's tobacco and e-cigarette-related norm perceptions and one type of descriptive norm information found in media: *individual use depictions*, which we defined as depictions of particular individuals or groups of individuals engaging in a behavior or expressing that they (or someone else) engage in that behavior (Tankard & Paluck, 2016). Second, recognizing that all individual use depictions may not have the same effects on young people's norm perceptions, we sought to test whether these effects differed depending on the media source, behavior (i.e., tobacco or e-cigarette use), or type of norm perception (i.e., descriptive or injunctive) considered. To do this, we built on work done in a prior study (Liu et al., 2019), in which we had exogenously measured the prevalence of tobacco and e-cigarette individual use depictions across six different media sources over a three-year period. In this study, we tested the effects of changes in the prevalence of tobacco and e-cigarette individual use depictions in media on youth and young adults' tobacco- and e-cigarette-related descriptive and injunctive norm perceptions and looked for heterogeneity in these effects.

How individual use depictions impact norm perceptions. Research has shown that individuals accumulate cues about the prevalence of a behavior through witnessing the behavior of others around them (Paluck & Shepherd, 2012; Tankard & Paluck, 2016). This can occur both in individuals' real-world social environments as well as through

media, which can be thought of as a type of symbolic social environment (Mead et al., 2014; Tankard & Paluck, 2016; Yanovitzky & Stryker, 2001). Through vicarious learning, individuals can gauge the norms around a behavior by witnessing media exemplars enact that behavior (Bandura, 1986). While individual use depictions, as we define them, are really a type of descriptive norm information, they have the potential to impact injunctive as well as descriptive norm perceptions because people often infer that behaviors that are common must also be socially approved (Rimal & Real, 2005).

Why focus on tobacco- and e-cigarette individual use depictions? We chose to focus on tobacco and e-cigarette individual use depictions in this study for two main reasons. First, while prior studies (e.g., Elmore et al., 2017; K.C. Smith et al., 2008; Wakefield et al., 2003) have demonstrated that individual tobacco use depictions in media can affect young people's norm perceptions, more research is needed to improve our understanding of the conditions under which these effects can be expected to occur. Additionally, tobacco- and e-cigarette individual use depictions are very common in media. In our previous study (Liu et al., 2019), we conducted a content analysis that combined crowd-sourcing and supervised machine learning (SML) methods in order to quantify and measure trends in the prevalence of tobacco and e-cigarette-related individual use depictions in four long-form media sources (the Associated Press (AP) newswires, newspapers, websites and broadcast news transcripts) and two short-form social media sources (tweets and YouTube videos) over three years.¹ Overall, findings from this study revealed that tobacco- and e-cigarette-related individual use depictions

¹ This study also measured another type of descriptive norm information, population norm information. Findings regarding that information are not described here because they are not directly relevant to the focus of this dissertation.

are prevalent across media types. Roughly a third (34%) of tobacco long-form texts featured individual use depictions, while 17% of e-cigarette long-form texts featured individual use depictions. For Twitter, the prevalence of individual tobacco use depictions (33%) and e-cigarette individual use depictions (16%) was similar to their prevalence in long-form texts. Among YouTube videos, the vast majority of both tobacco-related videos (88%) and e-cigarette-related videos (96%) included individual use depictions. The frequency with which tobacco- and e-cigarette individual use depictions appeared in this media corpus underscores the importance of testing the effects of this type of norm information on young people's norm perceptions.

Exploring heterogeneity in the effects of individual use depictions on norm perceptions. While prior research gives us good reason to believe that tobacco and e-cigarette individual use depictions can affect young people's related norm perceptions, these effects could vary depending on the specific types of behavioral depictions and outcome variables considered. In this study, we explored whether effects differ depending on the type of norm perception, specific media source, and behavior being considered.

Regarding the former, descriptive norm information, including individual use depictions, could impact both injunctive norm perceptions as well as descriptive norm perceptions (Rimal, 2008). If an individual use depiction did affect both types of perceptions, the effects would likely be in the same direction because a message that makes an individual believe a behavior is common is likely to make that individual believe that behavior is more socially approved. However, this may not always be the case, particularly if the individual use depiction is accompanied by an injunctive norm

message indicating that the behavior is not approved of. Additionally, some individual use depictions could conceivably affect both descriptive and injunctive norm perceptions, but to differing degrees.

Individual use depictions appearing on certain media sources may be more likely to impact young people's norm perceptions simply because they are more likely to be exposed to them. This could be due to the differences we observed in the prevalence of individual use depictions across sources, or due to differences in the frequency with which youth and young adults consume content from each source. Sources may also differ in other important ways (e.g., credibility, surrounding content, style of use) that could shape their effects on youth and young adults' norm perceptions.

The effects of individual use depictions may also depend on the stability of individuals' norm perceptions about a behavior. In the context of our study, youth and young adults may have more established norm perceptions about tobacco use than about e-cigarette use. The harms associated with tobacco use have long been recognized, tobacco sales have been regulated by the FDA since 2009, and public perceptions of the tobacco industry are largely negative among both youth and adults (Malone et al., 2012). In contrast, e-cigarettes were a relatively new product during our study period and evidence suggests that, at that time, they may have been viewed ambivalently by both the general public and the public health community (Glantz & Bareham, 2018). Further, for much of this period, e-cigarette sales were inconsistently regulated at the state and local level and unregulated at the federal level (e-cigarettes were brought under the FDA's regulatory purview in 2016) (Barraza et al., 2017). While big tobacco companies have increasingly taken over parts of the e-cigarette market, small independent e-cigarette

manufacturers still exist and the public may have viewed these companies less negatively than they viewed tobacco companies (Glantz & Bareham, 2018). Thus, we might expect stronger effects of individual use coverage on e-cigarette-related norm perceptions as they may be more labile than tobacco-related norm perceptions.

The Current Study

In this study, we combined the findings from our content analysis with findings from a rolling cross-sectional survey of a nationally representative sample of youth and young adults aged 13-25 that was conducted over the same time period (2014-2017) to assess how over-time changes in the prevalence of e-cigarette- and tobacco-related individual use depictions in media affected young people's norm perceptions.

Main hypotheses. We predicted that participants' descriptive and injunctive norm perceptions about peer smoking would be positively associated with the prevalence of individual tobacco use depictions that appeared in each of the measured media sources during the seven days prior to their interview dates. Likewise, we predicted that participants' descriptive and injunctive norm perceptions about peer vaping would be positively associated with the prevalence of e-cigarette individual use depictions that appeared in these media sources during the seven days prior to their interviews.

Additional hypotheses and research questions. In addition to our main hypotheses described above, we had two additional research questions and an additional hypothesis focused on factors that might shape the effects of individual use depictions on norm perceptions. First, we wondered whether the effects of individual use depictions on norm perceptions differed across media sources, with mentions from some sources affecting perceptions more than mentions from others. Given that this question has been

relatively unexplored in prior research, we did not make any specific predictions about our comparisons across media sources. We were also interested in comparing the effects of individual use depictions in media on the two types of norm perceptions we measured: descriptive and injunctive. Finally, we tested whether the effects of individual use depictions on norm perceptions varied across the two behavioral domains we studied: tobacco and e-cigarette use. Because e-cigarettes are a comparatively newer product, we expected that participants' norm perceptions about e-cigarette use might be less firmly established and thus more likely to be influenced by normative media content.

Methods

To assess the effects of e-cigarette and tobacco use depictions in media on norm perceptions held by youth and young adults, we paired matched-in-time data from our large-scale automated content analysis of e-cigarette and tobacco-related media content with data from our rolling cross-sectional phone (landline and cell phone) survey of young people. Data were collected over a three-year period from 2014 to 2017.

Content data. As introduced earlier, we used automated content analysis procedures to measure the prevalence of individual use depictions appearing in six different media sources over a three-year period from 2014-2017. The methods used in this content analysis are described in great detail in an earlier paper (Liu et al., 2019). Briefly, the corpus used in our content analysis included all tobacco-relevant (any mention of tobacco other than e-cigarettes; see Footnote 2) and e-cigarette-relevant (any mention of e-cigarettes or vaping) texts and videos collected from mid-May 2014 to June 2017 from four long-form media sources and two social media sources. The former included 135,764 texts from: the AP newswires, 50 high-circulation U.S. English-

language newspapers, the 50 most popular websites among the 12-17 and/or 18-24 age groups for each quarter according to Nielsen ratings, and broadcast news transcripts from eight networks. Roughly 8% of these long-form texts ($n = 10,599$) mentioned e-cigarettes while 92% ($n = 125,165$) mentioned other tobacco products. Lexis-Nexis was used to collect texts from the first three sources and the MIT MediaCloud database was used to collect texts from websites. The social media sources included 24,341,610 e-cigarette-relevant tweets, 50,981,301 tobacco-relevant tweets, 9,168 e-cigarette-relevant YouTube videos, and 3,094 tobacco-relevant videos. Tweets were collected from the Gnip Twitter Historical Powertrack which provided full historic access to all public tweets. YouTube videos were collected using YouTube search APIs. It is worth noting that the e-cigarette and tobacco-relevant content in our corpus included user-generated content as well as content created by journalists, commercial entities and institutions.

We utilized crowd-sourcing methods to develop our training and test samples in preparation for classifier development by recruiting qualified workers through the Amazon Mechanical Turk platform. Using these hand-coded samples, we were able to develop supervised machine learning classifiers for tobacco and e-cigarette individual use depictions. Separate classifiers were developed and used to classify long-form texts, YouTube and Twitter.² Additional information about the steps taken to develop our codebooks and ensure the quality of our hand-coding, and the processes used to develop our classifiers and assess the accuracy and reliability of our classifiers' coding can be found in Liu et al. (2019).

² Separate classifiers were also developed and used to code each media source for e-cigarette and tobacco-related population norm information. Information about those classifiers can be found in Liu et al. (2019).

While each item in our corpus was coded for the presence or absence of individual use depictions, analyses were not conducted at the item-level. Rather, measures of the total coverage containing individual use depictions in a given week were computed by summing either the total number of items published in that week that were coded as containing an individual use depiction (for Twitter or YouTube) or the probabilities of containing an individual use depiction assigned to each item published that week by a SML classifier (for long-form texts). For this reason, we took steps to establish the reliability of our coding using both item-level and weekly-level data. Our assessment of the reliability of our coding at the item-level is summarized in Liu et al., 2019. To assess weekly-level reliability, we (1) calculated the consistency of weekly estimates of coverage of each norm category from randomly split halves, (2) re-estimated the split-half correlation 100 times and took the average, and (3) applied the Spearman-Brown prophecy formula to estimate the reliability of a weekly measure summing two halves (Eisinga, te Grotenhuis, & Pelzer, 2013). Results from this analysis are summarized in Table 1.

Table 1. Spearman Brown Reliabilities for Weekly Estimates

Source	Individual Tobacco Use		Individual E-Cigarette Use	
	<i>N</i>	Reliability	<i>N</i>	Reliability
Long-Form	124,595	.91	10,558	.75
Twitter	50,981,301	.99	24,341,610	.99
Logged YouTube Views	11,551.75	.84	12,744.77	.94

Note. Values are Spearman Brown reliabilities = $(2 * \text{split-half correlation}) / (1 + \text{split-half correlation})$ calculated from the average of 100 random split-half correlations with week as the unit of analysis ($N=162$ weeks, except for YouTube where $N=155$).

Survey data. A total of 11,847 participants between the ages of 13 and 25 took part in our survey. Participants were surveyed between June 2014 and June 2017 (AAPOR #3 Response Rate = 21%) with fresh samples released each week and interviewed for up to one month after release. The sample was designed to be representative of the US population within that age group and weighting procedures were used to ensure representativeness. These weighting procedures were designed by Social Science Research Solutions (SSRS), who also implemented the survey. Summary demographic information about our participants is included in Table 2.

The four primary survey measures we looked at assessed descriptive and injunctive norm perceptions. Parallel measures were used to assess norm perceptions around tobacco and e-cigarette use. Our measure of descriptive norm perceptions asked participants: “How many people your age would you guess (*smoke cigarettes / vape or use e-cigarettes*)? Would you say (1) none, (2) a few, (3) about half, or (4) most?” Our measure of injunctive norm perceptions asked: “How do you think your close friends feel or would feel about you (*smoking cigarettes / vaping or using e-cigarettes*) every day? Would they (1) strongly disapprove, (2) disapprove, (3) approve, or (4) strongly approve?” This measure of peer injunctive norms was selected because research has shown that young people’s perceptions of their close friends’ opinions and behaviors may be particularly influential (Olds et al., 2005; Paek & Gunther, 2007; Yanovitzky & Rimal, 2006). Furthermore, while the reference group specified in this measure was “close friends,” this measure of peer injunctive norms was expected to also reflect individuals’ perceptions of injunctive norms among their peers more broadly because individuals often estimate the views of a group of social referents from the views of

Table 2. Overview of Study 1 Participant Characteristics

	Unweighted Estimates	Weighted Estimates
<i>Demographic variables</i>		
Age, in years (mean)	18.38	19.05
Female (%)	47.1%	49.1%
<i>Ethnicity (%)</i>		
Hispanic or Latino	24.1%	21.9
<i>Race (%)</i>		
White	61.9%	62.0%
Black or African American	17.1%	16.9%
Asian	4.8%	4.7%
American Indian or Alaska Native	2.0%	2.2%
Native Hawaiian or Pacific Islander	1.1%	1.1%
Other	10.1%	10.1%
More than one	2.9%	3.0%
<i>Highest level of parental education (%)</i>		
Less than high school degree	6.0%	7.0%
High school degree	21.6%	25.9%
Some college	15.9%	18.8%
College degree	31.1%	26.8%
Completed graduate school	25.4%	21.6%
<i>Tobacco/E-cigarette related variables</i>		
Tried smoking (%)	28.5%	34.0%
Tried vaping (%)	26.2%	29.2%
Number of 4 closest friends who smoke (mean)	.83	.96
Number of 4 closest friends who vape (mean)	.68	.72

members of that group who are closest to them (Paek, 2009).

Data analysis. All analyses were performed in Stata version 15. We tested each of our hypotheses using ordinal logistic regression models and Wald tests. All tests of significance were conducted at the $\alpha = .05$ level. After finding that the four long-form media variables for a given norm category (e.g., individual tobacco use depictions in AP, BTN, newspapers and websites), were highly correlated with one another, we created a single long-form media variable for each norm category by taking the average of standardized versions of the variables for each source in order to mitigate concerns about collinearity. These variables represented indices of all coverage of a given norm category appearing in long-form sources over the past week. We also created standardized versions of the Twitter and YouTube coverage variables. While the former represented the total number of tweets coded as containing an individual use depiction over the past week, the latter represented the natural log of the total number of views received by YouTube videos³ in our corpus that had been coded as containing an individual use depiction over the past week.

To test the effects of individual tobacco use depictions in media on participants' descriptive norm perceptions, for example, we fit an ordinal logistic regression model predicting participants' descriptive norm perceptions from their interview date and the

³ We limited the e-cigarette and tobacco-related YouTube videos in our corpus to “popular” videos that received at least 10,000 views in the first 180 days following their release. We initially computed our measure of YouTube views at the daily level by summing, for each day, the total number of views of YouTube videos containing a given norm category occurring on that day. Views of a particular video were only counted towards this measure for the first 30 days after their release in order to ensure that some videos would not be weighted more heavily than others in our views measure simply because they had been released earlier in our study period. We found that the vast majority of views of videos in our corpus occurred within this 30-day span, and thus felt confident constructing our views measure in this way. We then took the natural log of this views variable to deal with skewness. To create our measure of YouTube views at the weekly level, we summed the logged views for each day in a seven-day period.

three standardized coverage variables representing past seven-day (1) long-form media coverage containing individual tobacco use depictions, (2) Twitter coverage containing individual tobacco use depictions, and (3) logged views of YouTube videos containing individual tobacco use depictions. We used clustered standard errors with participants clustered by their interview dates to reflect the fact that two participants interviewed on the same date would have the same values for our media coverage variables. After fitting this model, we used a Wald test with a bootstrapped standard error clustered on interview date to test the joint significance of the three coverage variables as a set. We used parallel strategies to test our other hypotheses regarding the effects of individual use depictions in media on norm perceptions.

Results

Effects of individual use depictions on norm perceptions. Results from the ordinal logistic regression models used to test the effects of individual tobacco use depictions in media on descriptive and injunctive norm perceptions are summarized in Table 3 and panels A and B of Figure 1. Overall, we found evidence of a significant relationship between past seven-day media coverage featuring individual tobacco use depiction and descriptive norm perceptions. Our ordinal logistic regression model showed that the more individual tobacco use depictions appeared in long-form texts during a given week, the more likely participants interviewed at the end of that week were to report that smoking was common among people their age (*Odds Ratio (OR)* = 1.09; $p = .02$). We found a similar relationship between the prevalence of individual tobacco use depictions on Twitter coverage and descriptive norm perceptions, although it did not reach statistical significance ($OR = 1.08$; $p = .18$). Unexpectedly, we found that

participants interviewed at the end of weeks during which there were more views of YouTube videos containing individual tobacco use depictions were *less* likely to report that smoking was common among their peers ($OR = 0.93; p = .03$). Our Wald test with bootstrapped clustering by interview date confirmed that, as a set, the individual tobacco use coverage variables were significantly associated with descriptive norm perceptions ($p = .01$).

We also found evidence of a significant relationship between past seven-day prevalence of individual tobacco use depictions in media and injunctive norm perceptions. The more individual tobacco use depictions there were in long-form media during a given week, the more likely participants interviewed at the end of that week were to report that their

friends would approve of them smoking ($OR = 1.09; p = .03$). Surprisingly, however, the more individual tobacco use depictions on Twitter occurred during a given week, the *less* likely participants interviewed at the end of that week were to report that their friends would approve of them smoking ($OR = 0.87; p = .005$). No significant relationship was

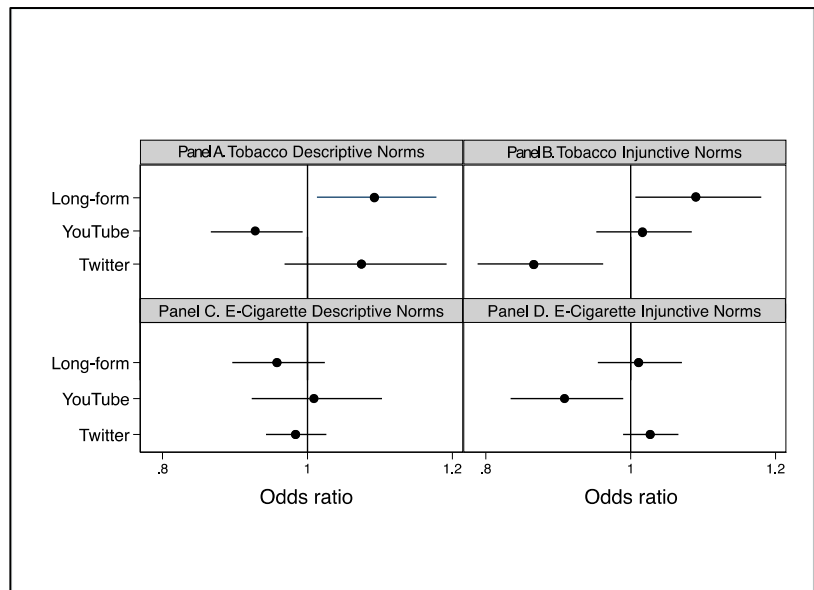


Figure 1. Effects of Individual Use Depictions on Norm Perceptions by Media Source, Behavioral Domain, and Type of Norm Perception: Results from Ordinal Logistic Regression Models

found between views of YouTube videos containing individual tobacco use depictions and injunctive norm perceptions ($OR = 1.02$; $p = .62$). However, our Wald test confirmed that our individual tobacco use depiction variables, as a set, were significantly associated with injunctive norm perceptions ($p = .007$).

Results from the models used to test the effects of e-cigarette individual use depictions are summarized in Table 3 and panels C and D of Figure 1. Overall, we found no evidence of significant associations between any of the e-cigarette individual use depiction media coverage variables (or the set of variables) and e-cigarette-related descriptive norm perceptions. We did find evidence of an effect of past seven-day views of YouTube videos containing e-cigarette individual use depictions on e-cigarette-related injunctive norm perceptions; however, again, this effect was not in the hypothesized direction. The more views there were of YouTube videos containing e-cigarette individual use depictions in a given week, the *less* likely participants interviewed at the end of that week were to report that their friends would approve of them using e-cigarettes ($OR = 0.91$; $p = .03$). Neither long-form ($OR = 1.01$; $p = .71$) nor Twitter e-cigarette individual use coverage ($OR = 1.03$; $p = .16$) was significantly associated with injunctive norm perceptions and the Wald test showed that, as a set, the three individual use coverage variables were not significantly associated with e-cigarette injunctive norm perceptions.

Table 3. Effects of Tobacco & E-cigarette Individual Use Depictions in Media on Norm Perceptions: Ordinal Logistic Regression Models

Variable	<i>Tobacco</i>				<i>E-Cigarette</i>			
	Descriptive Norm Perceptions		Injunctive Norm Perceptions		Descriptive Norm Perceptions		Injunctive Norm Perceptions	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Interview Date	1.03	[0.92, 1.14]	0.86**	[0.77, 0.96]	1.18**	[1.08, 1.28]	1.00	[0.92, 1.09]
Long-form	1.09*	[1.01, 1.18]	1.09*	[1.01, 1.18]	0.96	[0.90, 1.02]	1.01	[0.95, 1.07]
YouTube	0.93*	[0.87, 0.99]	1.02	[0.95, 1.08]	1.01	[0.92, 1.10]	0.91*	[0.83, 0.99]
Twitter	1.08	[0.97, 1.19]	0.87**	[0.78, 0.96]	0.98	[0.94, 1.03]	1.03	[0.99, 1.07]
/cut1	-2.66		0.06		-2.05		-0.72	
/cut2	-0.17		2.00		0.28		1.09	
/cut3	1.25		4.01		1.73		3.32	
Observations (N)	11,344		11,224		11,318		11,159	
Pseudo R ²	.003		.001		.003		.001	

* $p < .05$; ** $p < .01$

Note. All variables in the model were standardized. All models cluster on date to account for the fact that respondents who were interviewed on the same date were assigned the same amount of media coverage. After fitting each ordinal logistic regression model, Wald tests with bootstrapped cluster errors were used to test the joint significance of the set of individual use depiction variables included in the model. The p -values for each of these tests were as follows: tobacco descriptive norms: $p = .01$, tobacco injunctive norms: $p = .01$; e-cigarette descriptive norms: $p = .52$, e-cigarette injunctive norms: $p = .1$

Discussion

This study is the first to assess how individual use depictions in the real-world media environment can shape norm perceptions by looking over time and across media sources and behavioral domains. Overall, our findings provided support for our main hypotheses by demonstrating that both e-cigarette and tobacco individual use depictions in media are, at least some of the time, associated with young people's norm perceptions.

In addition to providing further evidence for the role that media plays in norm formation, this finding underscores the need for greater attention to the type of norm information. In the context of tobacco and e-cigarettes, individual use depictions were the most frequently encountered type of norm information in our prior study (Liu et al., 2019) and were particularly prevalent in media sources that are popular among youth. For example, we found that individual use depictions occurred in 88% of popular tobacco-related videos and 96% of popular e-cigarette related videos on YouTube, the most commonly used social media platform among teens (Liu et al., 2019).

It should be noted that the relationships between individual use depictions and descriptive and injunctive norm perceptions were observed despite the limitations of the measure of injunctive norm perceptions used in this study, an issue discussed further below. We found stronger evidence consistent with a claim that individual use depictions in media impacted normative perceptions regarding tobacco (five of eight tests) than regarding e-cigarettes (one of eight tests). This was somewhat surprising because we expected that individuals might have more firmly established normative perceptions regarding tobacco use.

Furthermore, we found that both the significance and direction of effects of

individual use depiction on normative perceptions differed depending on the combination of media source and behavioral domain considered. Two (of four tested) long form individual use variables significantly predicted normative perceptions in the expected direction: more coverage meant higher normative perceptions. In contrast, three (of the eight tested) short form individual use variables predicted normative perceptions but in an unexpected direction: more coverage meant lower normative perceptions. We wondered how these negative effects might be explained, given that they were only found for the YouTube and Twitter analyses.

Our findings that the effects of individual use norm depictions on norm perceptions differ across sources, behavioral domains and types of norm perceptions have practical implications as well as implications for future research. For public health interventionists interested in stemming the effects of media coverage that normalizes risky behavior on young people, our findings indicate that not all norm information in media warrants equal concern. For example, despite the high prevalence of individual use depictions in e-cigarette-related videos on YouTube and YouTube's popularity among young people, we found no relationship between views of YouTube videos containing individual use norms and descriptive norm perceptions and a *negative* relationship between views of such videos and injunctive norm perceptions. Furthermore, given that descriptive norm perceptions may have stronger effects on a behavior when injunctive norm perceptions are strong and in the same direction (Lapinski et al., 2014; Rimal & Lapinski, 2015), it may be worthwhile to focus attention on types of norm information in media that have similar effects on both descriptive and injunctive norm perceptions. The prevalence of individual tobacco use depictions in long-form media was positively

associated with both descriptive and injunctive norm perceptions and might therefore be expected to show a particularly strong relationship with participants' behavior compared to other types of norm information.

For researchers, these findings demonstrate that more work remains to be done in delineating attributes that shape the effects of individual use depictions in media on norm perceptions. Future research investigating both message-level and source-level moderating variables would be useful, particularly because such variables may also help explain findings from other studies indicating that differences exist across media sources in the effects that messages about risky behaviors have on other outcomes such as beliefs or attitudes (Cho et al., 2019). In this study, we identified two possible variables that might have contributed to the unexpected findings we observed in some of our analyses testing the effects of individual use depictions on norm perceptions. These two variables, group identity and behavioral similarity, are described in greater detail below. However, we were only able to hypothesize about the role these variables might have played in shaping the effects of individual use depictions in media on norm perceptions in the current study. The effects of these variables will be directly tested in study 2.

Exploring group identity as a potential moderator. One potential variable that could be responsible for the negative effects of individual use coverage on YouTube and Twitter on young people's norm perceptions is group identity. Research has demonstrated that the effects of norm information may be contingent on group identity (i.e., an individual's perceived and desired similarity to the referent featured in the norm message) (Rimal & Lapinski, 2015). It is conceivable, for example, that an individual repeatedly exposed to individual use depictions that include referents whom he or she

sees as unattractive, dissimilar from him or herself, and not aspirational, might begin to perceive all individuals who engage in the depicted behavior in that way and come to believe that only distant or deviant others perform the pictured behavior. The behavior could then become associated with negatively perceived others. In line with the presumed influence hypothesis (Gunther et al., 2006), is it possible that an individual might also come to believe that others also hold negative perceptions of people who engage in the behavior. He or she might thus develop lower descriptive norm perceptions and less favorable injunctive norm perceptions towards that behavior.

Unfortunately, our survey did not include questions that would allow us to directly test this hypothesis. Our survey did, however, ask participants about their perceptions of how “uncool” they would look if they smoked (no parallel question was asked related to e-cigarette use). Specifically, the item read “If I smoke everyday, I will look uncool” and participants were asked to report the extent to which they agreed with this statement on a four-point Likert scale with options ranging from “strongly disagree” (1) to “strongly agree” (4). Though it wasn’t designed for this purpose, this question could be seen as a reflection of participants’ desired similarity to smokers.

If the categories of individual use messages that had negative effects on smoking norm perceptions had these effects because participants viewed the referents in these messages in a negative light, the prevalence of such messages in a given week might be positively associated with participants’ endorsement of the belief that smoking would make them look uncool. To test whether this was the case, we fit the same ordinal logistic regression models we had used to assess the effects of individual tobacco use mentions on injunctive norm perceptions but instead used “uncool” perceptions as our outcome

variable. We found a positive relationship between Twitter individual tobacco use depictions and “uncool perceptions” ($OR = 1.13; p = .04$); thus, the more individual tobacco use mentions occurred on Twitter in a given week, the more likely participants were to believe that smoking would make them look uncool. This would seem to support our hypothesis given that we had found a negative relationship between Twitter individual tobacco use mentions and injunctive norm perceptions. However, there was not a significant relationship between YouTube individual tobacco use depictions and uncool perceptions, even though a significant negative relationship had been observed between YouTube individual tobacco use depictions and descriptive norm perceptions. Overall, additional research is needed to understand how group identity judgments may affect the relationships we observe between the prevalence of Twitter and YouTube individual tobacco use depictions and norm perceptions.

Exploring behavioral similarity as a potential moderator. Another speculative explanation for the negative relationships observed between individual tobacco use coverage on Twitter and YouTube and smoking norm perceptions has to do with the specific behaviors depicted on each medium we studied. In this study, our measure of individual tobacco use coverage included depictions of any tobacco use behavior besides e-cigarette use (including depictions of cigarette smoking, but also of smokeless tobacco, hookah and other tobacco products), whereas our measures of norm perceptions only captured perceptions related to cigarette smoking. It is possible that individual use depictions on different platforms varied in the frequency with which featured different tobacco use behaviors, and that long-form individual use texts featured cigarette smoking more often than did YouTube videos or tweets. While norm information about behaviors

perceived as related to but distinct from cigarette smoking (such as the use of other tobacco products) might still impact individuals' norm perceptions, these effects would be expected to be weaker than the effects of norm information directly pertaining to cigarette smoking (Cialdini et al., 1990). Furthermore, if individuals perceived different tobacco use behaviors as substitutes for one another, repeated exposure to norm information suggesting that a tobacco use behavior other than cigarette smoking is common (e.g., instances of hookah use) might have caused them to infer that cigarette smoking is less normative.

To assess whether the specific behaviors depicted in individual tobacco use depiction may have differed across platforms, potentially contributing to the different effects on norm perceptions we observed for long-form texts, YouTube videos, and Twitter, we coded samples of 55 tweets, 50 long-form texts, and 200 YouTube videos. The samples of tweets and long-form texts were randomly selected, while the YouTube sample was a weighted random sample in which each video's probability of being selected was weighted by the total number of views it received. Of the long-form texts that contained individual tobacco use depictions, 79% pertained to cigarette use. In contrast, only 34% of tweets and 53% of YouTube videos featuring individual tobacco use depictions pertained to cigarette smoking. This finding, though based on very small samples from the corpus, lends some support to the hypothesis that differences in the behaviors depicted in individual tobacco use depictions on different platforms may have contributed to their differing effects on norm perceptions.

Conclusions

Communication researchers have identified media as one force that can shape individuals' norm perceptions (Shah & Rojas, 2008). By leveraging automated content analysis methods and the availability of a large-scale media corpus collected over a three-year period, this study was able to test the effects of one type of descriptive norm information, individual use depictions, on norm perceptions for two different behaviors across six media sources. Our results showed that routine exposure to e-cigarette- and tobacco-related individual use depictions in media is, at least in some cases, associated with young people's descriptive and injunctive norm perceptions. These results underscore the need for more attention to this type of norm information, particularly considering its high prevalence in our media corpus. Further, additional research is needed to understand the factors that determine whether and to what extent individual use depictions in media impact people's norm perceptions, given that we saw differences in the strength, significance and direction of the relationship between individual use coverage and norm perceptions across different media sources, behavioral domains and types of norm perceptions. Two possible factors that warrant further research are group identity and behavioral similarity, both of which might moderate the relationship between exposure to individual use depictions and norm perceptions. Study 2, which is described in the chapters that follow, will seek to directly test whether these variables shape the relationship between exposure to individual tobacco use depictions in media and tobacco-related norm perceptions among young adults.

Chapter 3. Study 2a - Content Analysis of YouTube Videos Depiction Individual Tobacco Use

Introduction to Study 2

Study 1 demonstrated that, at least in some cases, the prevalence of e-cigarette and tobacco-related individual use depictions in media (which we used as a proxy measure for young people's exposure to media depictions of individual use) predicted young people's descriptive and injunctive norm perceptions. However, the effects we observed differed in both their direction and their significance depending on the combination of media source, behavior, and type of norm perception we considered. As we predicted, past-week prevalence of individual tobacco use depictions in long-form media showed significant positive relationships with both descriptive and injunctive norm perceptions. In contrast and contrary to our predictions, past-week prevalence of individual tobacco use depictions on Twitter showed a significant negative relationship with injunctive norm perceptions and no significant relationship with descriptive norm perceptions while past-week views of YouTube videos featuring individual tobacco use depictions showed a significant negative relationship with descriptive norm perceptions and no significant relationship with injunctive norm perceptions. The only significant effect we found for e-cigarette individual use depictions was also not in the expected direction; there was a significant negative relationship between past-week views of YouTube videos featuring e-cigarette individual use depictions and injunctive norm perceptions.

In study 1, we proposed two moderating variables that might be responsible for this unexpected pattern of results, group identity and behavioral similarity. In study 2, I

planned to test the effects of these variables directly by experimentally manipulating them (although, as will be described later, it was ultimately only possible to manipulate group identity). In order to do this, I selected a sample of media content from the larger corpus that was studied in study 1; this content had already been coded for the presence of individual use depictions (Liu et al., 2019). Rather than selecting a sample that included e-cigarette and tobacco-related content from all media sources in our corpus, I chose to focus only on tobacco-related content from a single source: YouTube. I chose to exclude e-cigarette-related content from study 2d as I initially intended to examine them in a follow-up study to study 2. I chose to focus on a single media source because, in order to experimentally manipulate the variables of interest in study 2d, I hoped to identify media messages that differed from one another in terms of their group identity and behavioral similarity but were otherwise at least somewhat similar to one another. By focusing on a single source, I eliminated the need to control for other message characteristics that might vary systematically across media sources.

I chose to focus specifically on YouTube videos featuring individual tobacco use depictions for several reasons. First, as described in the prior chapter, individual tobacco use depictions were more prevalent in YouTube videos than in other sources included in our corpus and these videos included individual use depictions of several different tobacco use behaviors (e.g., combustible cigarette smoking, hookah smoking, smokeless tobacco use, etc.), which could potentially allow me to select videos featuring depictions of tobacco use behaviors that varied in their behavioral similarity to cigarette smoking. Further, as described in Chapter 2, findings from Study 1 suggested that exposure to such videos might have negative impacts on individuals' tobacco-related norm perceptions but

the data available from this study did not permit us to empirically determine why these negative effects might have occurred. Testing the effects of group identity (i.e., perceived and desired referent similarity) and behavioral similarity on the relationship between exposure to YouTube videos depicting individual tobacco use and norm perceptions could offer a possible explanation for this unexpected result.

Additionally, compared to the other media sources from which we had compiled content while creating the corpus we used in Study 1, YouTube videos that feature individual tobacco use depictions could potentially contain more vivid and detailed depictions of exemplars that could influence the inferences participants might make regarding their group identity. Individual tobacco use depictions in both the tweets and long-form texts in our corpus are relatively brief. During the time period over which our data was collected, tweets could be no longer than 140 characters. The majority of individual tobacco use depictions in long-form texts occur in texts that include only “passing mentions”⁴ of tobacco (Gibson et al., 2019); thus, the tobacco-related portion of these texts and the individual tobacco use depictions are short. The YouTube videos that feature individual tobacco use in our corpus have an average length of approximately eight minutes. While, as described in more detail below, only a one-minute segment of each video was shown to participants in subsequent studies, even a video clip of this length gives viewers ample opportunity to gather information about the exemplar

⁴ All long-form texts in our corpus were categorized as either more than passing mention (MPM) or passing mention (PM) texts, with the former representing texts that are substantially about tobacco and the latter representing texts that only mention tobacco in passing. MPM texts are those that (1) have titles that include one of the set of search terms that were used to identify tobacco-relevant texts (i.e., keywords), or (2) that include at least keywords within 100 words and have keywords appearing in more than one sentence (operationalized as having more than 20 words between the first and last keyword). PM texts are those that do not meet either of these criteria. Gibson et al. (2019) explain this distinction in greater detail.

depicted using tobacco that could influence the inferences they make about perceived and desired similarity.

Finally, the multimedia nature of the YouTube platform could potentially enable individuals to gather information about the exemplars depicted using tobacco in YouTube videos that is pertinent to their group identity through visual (e.g., physical appearance) and auditory (e.g., tone of voice) information that might not be available in tweets or long-form texts. While tweets and long-form texts could potentially also include pictures and/or short videos of exemplars, only a subset did so. The multimedia nature of YouTube might also make individual tobacco use depictions more vivid, causing them to have greater impacts on viewers (Tran, 2012).

Goals of Study 2a

Study 2a was primarily intended to identify YouTube videos that could be used as experimental stimuli in study 2d. As described in greater detail below, in order to be used as stimuli, videos had to meet certain eligibility criteria. Namely, they had to be in English, tobacco-relevant, and contain an individual tobacco use depiction. While all videos in the corpus from which the videos used in this study had been pulled had previously been coded for these characteristics using machine learning classifiers, this earlier coding, though reliable, was not perfectly accurate. Therefore, in study 2a videos were coded for these characteristics again using hand-coding in order to identify videos that had been misclassified as meeting one or more of these criteria and ensure that they were not mistakenly used as stimuli in study 2d. Additionally, for reasons that will be described later, I was only interested in using videos in study 2d that mentioned a single tobacco product (rather than multiple tobacco products) and included a single referent

shown using tobacco or described as a tobacco user. Videos were also coded for these characteristics in study 2a.

Study 2a was also intended to gather additional information about the individual tobacco use videos in our corpus that would help shape the design of studies 2b, 2c and 2d as well as aid in my interpretation of the findings from these studies. Specifically, in order to be able to test the moderating effects of behavioral similarity on the relationship between exposure to videos featuring individual tobacco use depictions and tobacco-related norm perceptions, each video had to be coded for the particular tobacco use behavior depicted in it. Additionally, grouping videos into categories was useful both for expanding my understanding of the types of videos featuring individual tobacco use depictions that exist on YouTube as well as allowing me to identify videos within the same category that differed in their assigned referent similarity ratings. Finally, coding for different characteristics of exemplars that could affect participants' group identity-related judgments could be useful in future research examining what identity-related variables are most salient when members of our study population watch tobacco-related YouTube videos.

A secondary purpose of study 2a is to add to the body of literature that has examined tobacco-related content on YouTube. Many prior content analyses have focused only on videos featuring one type of tobacco product such as smokeless tobacco (e.g., Bromberg et al., 2012; Seidenberg et al., 2012), or little cigars or cigarillos (e.g., Richardson & Vallone, 2014). Additionally, most prior studies have limited their focus to specific subcategories of tobacco-related videos such as smoking fetish videos (e.g., Kyongseok Kim et al., 2010), "vape trick" videos (e.g., Kong et al., 2019), antismoking

videos (e.g., Paek, Kim & Hove 2010), or music videos (e.g., Cranwell et al., 2015). A recent content analysis (Romer et al., 2020) looked at protobacco YouTube videos that fell into five categories, but did not include anti-tobacco videos or videos that did not fit into these prespecified categories.

In contrast to these prior studies, the current content analysis includes videos depicting a range of different tobacco use behaviors, does not limit the videos included to any particular category and looks at both anti- and pro-tobacco videos. However, it should be noted that the procedures used in this study were designed with the goal of efficiently identifying videos that could be used as experimental stimuli in study 2d and that the design choices made in service of this goal may limit the generalizability of this study's findings. Namely, only videos that met the criteria for serving as experimental stimuli in study 2d were coded for all variables of interest in this study.

Methods

Summary of first round of coding. Coding of videos was conducted in two rounds. In the first round, which was completed in May 2020, a weighted sample of 300 videos was selected from the 2,721 tobacco-related videos in our corpus that had been coded as containing individual tobacco use depictions in our prior study (see Chapter 2 and Liu et al., 2019 for more information about this coding) and had received at least 10,000 views in the first 180 days following their release. Weighting was used in the sampling procedure so that the probability of each video being selected into the sample was proportionate to the total number of views it had received within this 180 day-period. Because videos that had received more views were, by definition, more likely to have been seen by YouTube users during their routine YouTube use, this weighting helped

ensure that the sample of videos reflected the tobacco-related content most frequently viewed on YouTube in the real world. The sample of videos received an average of 922,854 views within the first 180 days following their publication.

As a first step in the coding process, I checked whether these videos were still publicly available on YouTube and thus could be used in this and future studies. Two hundred of the 300 videos (67%) were still available on YouTube, whereas the others had been removed either by the channels that had posted them or by YouTube content moderators or had been made private and thus not publicly accessible. The videos that were still available on YouTube had a higher average view count than did those that had been removed, receiving an average of 1,058,480 views in their first 180 days following their publication compared to an average of 634,125 views for the removed videos.

These 200 videos were coded by me and another coder: an undergraduate research assistant who completed a training process and was provided with a codebook (see Appendix 1) to guide her coding decisions. All videos were coded for the following variables: English language, tobacco relevance, and the presence of an individual tobacco use depiction. Through coding for the presence of individual tobacco use depictions, we realized that some videos that had been previously classified as containing individual tobacco use depictions actually contained *non-use* depictions or explicit statements that the exemplar featured in the video was not a tobacco user or had quit using tobacco. Thus, we checked to make sure that all videos contained individual use depictions and that any videos featuring individual non-use depictions were considered ineligible for use in studies 2c and 2d. Overall, videos that were not English, not tobacco-relevant or did not contain an individual tobacco use depiction were not considered eligible for use in

study 2d and thus were not coded for any additional characteristics. The numbers of videos eliminated for each of these reasons are summarized in Figure 2.

Each video that was considered eligible based on its language, tobacco relevance, and the presence of an individual tobacco use depiction was also coded for: the tobacco use behavior(s) it featured, and the number of referents depicted using tobacco or described as tobacco users in it. Videos that depicted multiple tobacco use behaviors or featured multiple referents⁵ were considered ineligible for use in the subsequent studies and were not coded for any additional characteristics. The former category of videos was excluded from subsequent studies because of the expected difficulties of categorizing videos that featured multiple tobacco use behaviors according to their behavioral similarity to tobacco when designing the experimental conditions to be used in study 2d. The latter videos were excluded due to the concern that having participants rate their desired and perceived similarity to referents depicted using tobacco in videos in study 2c would be too arduous a task if multiple referents were featured within a single video. The numbers of videos excluded because they featured multiple tobacco use behaviors or multiple referents are shown in Figure 2.

The remaining eligible videos were coded for the following characteristics of the referent shown using tobacco products or described as tobacco users in these videos: gender, racial/ethnic group, age group (which was operationalized as whether the referent could conceivably fall into the same group as the target population for study 1 – i.e.,

⁵ Of note, the decision to exclude videos featuring multiple referents from inclusion in subsequent studies was made after the initial first round of coding had been completed. After making this decision, I re-watched all 200 videos in the sample and coded them for the number of referents featured. Thus, these videos were only coded for this variable by one coder and it was not possible to compute metrics of interrater reliability.

young people between the ages of 13 and 25 years – or not), as well as whether the referent was a cartoon or other animated figure. It should be noted that, with the exception of the latter variable (whether the referent was a cartoon), this coding was not intended to be a definitive assessment of these referent characteristics but rather a reflection of what viewers seeing these videos might perceive to be the gender, racial/ethnic identity and age group of these exemplars. Summary information about each of these variables, as well as the relevant interrater reliability information, is presented in Appendix 2. Videos that featured a referent who was a cartoon character constituted a very small proportion of the sample (see Figure 2) but were excluded from subsequent studies due to the concern that individuals would rate the perceived and desired similarity of cartoon referents very differently than they would that of human referents. Videos were also coded for the category into which they fell in a categorization schema that is described in greater detail below.

Interrater reliability was assessed using the kappaetc program in Stata version 15 and was found to be high for each variable according to two metrics: percent agreement and Gwet's AC. Gwet's AC was selected as an indicator of reliability in this study because it exhibits more stability than do other measures of interrater reliability in situations in which one category of a variable is much more common than the other categories, which was the case for several of the variables in this study (Gwet, 2008). Interrater reliability metrics pertaining to the variables used to determine each video's eligibility for inclusion in subsequent studies (English language, tobacco relevance, the presence of an individual tobacco use depiction and the number of referents featured) as well as the tobacco product featured and the category can be found in Table 5. Interrater

reliability metrics pertaining to the coding of referent characteristics can be found in Appendix 2. As can be seen from both tables, interrater reliability was found to be high for every variable. After interrater reliability was assessed, all coding disagreements were resolved through discussion and final codes were assigned to each video.

Of note, when conducting this coding, coders watched only a brief segment of each YouTube video and assigned their codes accordingly. Initially, the segment selected from each video consisted of the first three minutes of that video (or the entirety of the video if its length was less than three minutes), as the original plan for studies 2c and 2d involved participants watching the first three minutes of each video. However, after the first round of coding had been completed, I chose to limit the video segments to a maximum duration of one minute. This choice was made in light of how these videos would be used in studies 2c and 2d. Given the number of videos participants in these studies would be asked to view, limiting the length of the videos to one minute was seen as necessary to prevent the protocols used in studies 2c and 2d from becoming too time-consuming and cognitively demanding for participants.

After making the decision to limit the length of each video, I selected a one-minute segment from each video. For the vast majority of videos, this segment was simply the first minute of the video or the entirety of the video if its length was less than one minute. However, in a few cases (e.g., when the video featured a long introduction or introductory song that was irrelevant to its content), a cohesive one-minute-long segment was selected from later in the video. I then watched the segments selected from all videos in the sample and coded them for whether they featured an individual tobacco use depiction within the one-minute-long segment selected from them (typically the first

minute of the video); videos that did not feature an individual tobacco use depiction were deemed ineligible for use in subsequent studies. When re-watching videos, I also checked whether any of the codes that had been assigned to each video for the variables of interest should be changed if only a one-minute-long segment, rather than a three-minute-long segment, was considered. For the most part, the coding assigned to each video did not change when only a one-minute-long segment of the video was considered.

Ultimately, 82 videos from the first sample met the eligibility criteria for use as stimuli in study 2d and were coded for all variables of interest in this study, including the tobacco use behavior depicted, the category into which they fell, and characteristics of the referents featured in them. I then analyzed descriptive statistics for each of these variables. Descriptive statistics were also analyzed for videos' pro- and anti-tobacco valence. Videos had previously been coded for their overall valence, or opinion slant, regarding tobacco; this coding process is summarized in a paper authored by Kwanho Kim et al. (2020). While a video's pro- or anti-tobacco valence is not necessarily related to the normative message it conveys, and indeed all the individual tobacco use videos included in this sample were expected to implicitly convey that tobacco use was more rather than less common, a video's valence might impact the judgments a viewer makes about the exemplar(s) depicted in that video. I did not consider valence when designing the experimental conditions used in study 2d; however, I did use this information to test whether the videos in each of the two video conditions in study 2d differed from one another in their valence.

Through the first round of coding, I identified a total of 82 videos that met the eligibility criteria for use as experimental stimuli in study 2d. I wanted a larger pool of

videos from which to select experimental stimuli for use in study 2d as I wanted to ensure that I had videos that varied sufficiently in their referent similarity and behavioral similarity, the two variables that I planned to experimentally manipulate in study 2. Therefore, I chose to pull another sample of videos and conduct another round of coding in order to identify more videos that met my eligibility criteria.

Summary of second round of coding. The second round of coding took place between September and November 2020. A random weighted (by views) sample of 350 videos was drawn from the same corpus of videos from which the first sample was drawn; however, videos that were included in the first sample were not eligible for inclusion in the second sample. Because videos were weighted by the total number of views they had received when selecting the videos for both samples, videos in the second sample had a much lower average view count than did videos in the first sample. Videos in the second sample received an average of 188,775 views during the first 180 days following their publication, while the eligible videos from the first sample received an average of 922,854 views.

Of the 350 videos included in the second sample, 172 (49%) were still posted and publicly accessible on YouTube at the time at which the sample was compiled. While the reasons for which a lower proportion of videos in this sample had been removed from YouTube or made private compared to the first video sample are not definitively known, there are three plausible and non-mutually exclusive explanations. First, the second sample was compiled approximately seven months after the first sample; thus, a longer period of time had elapsed between when the videos were initially posted on YouTube (the videos included in the corpus were posted between 2014 and 2017) and when I

sought to retrieve them from YouTube. It is possible that the longer period of time between when these videos were posted and when they were retrieved allowed more opportunities for video creators or YouTube content moderators to choose to take the videos down. It is also possible that YouTube changed its policies regarding the removal of certain types of videos during the time between when the first sample was compiled and when the second sample was. Finally, in both samples, videos that were no longer available on YouTube when I sought to retreat them tended to have lower average view counts compared to the videos that were still available on YouTube. Because the videos in the second sample tended to have lower view counts in general compared to the videos in the first sample (due to the weighting schema used and the sequential manner in which the two samples were compiled), it is possible that their lower view counts may have been responsible for the difference.

After the sample of videos to be used in the second round of coding had been compiled, a parallel process to that which took place during the first round of coding commenced. The other coder and I watched each video and coded it for all relevant characteristics outlined in Appendix 1. Interrater reliability was analyzed, and interrater reliability metrics are summarized in Table 4 and Appendix 2. There were, however, two notable differences between the coding processes used in the first and second rounds of coding. First, during the second round of coding, both coders watched only a one-minute-long segment of each video. Second, unlike during the first round (see Footnote 3) both coders coded each video for the number of referents featured.

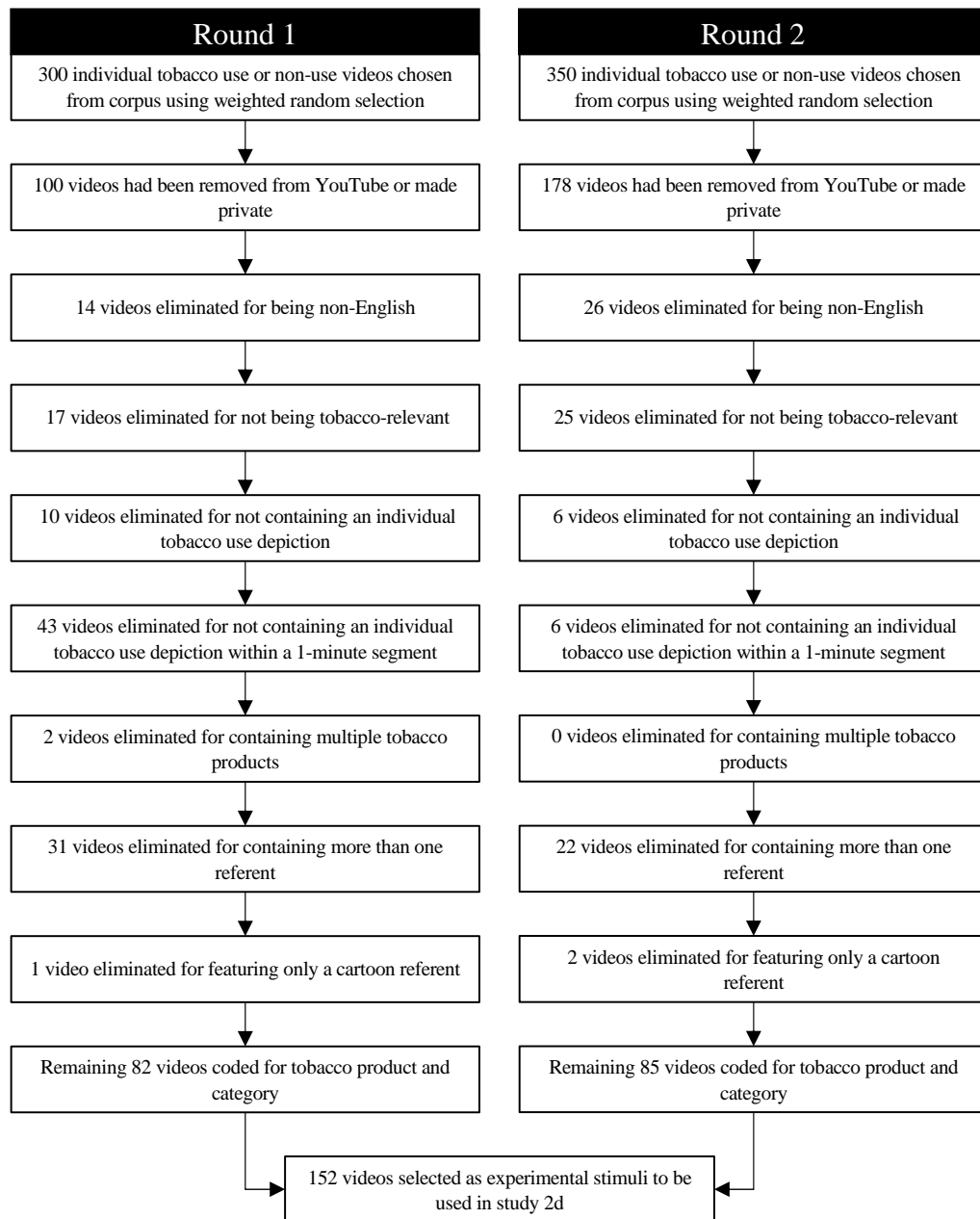


Figure 2. Overview of Coding Process Used in Study 2a

A total of 85 videos from the second sample were found to meet the eligibility criteria to be used as experimental stimuli in study 2d. The numbers of videos eliminated at each step of the coding process can be found in Figure 2. Like in the first round of coding, these videos were coded for all variables of interest, and descriptive statistics for these variables were analyzed. Descriptive statistics were also analyzed for the eligible videos' pro- and anti-tobacco valence.

Categorization Schema. The categorization schema I used was informed by existing literature about tobacco-related videos on YouTube (e.g., Carroll et al., 2013; Kyongseok Kim et al., 2010; Romer et al., 2020) and the categories developed were intended to be mutually exclusive and exhaustive. I tested and adjusted this categorization schema during a preliminary coding phase in which I watched 125 randomly selected YouTube videos featuring individual tobacco use depictions and attempted to sort them into categories while iteratively adding categories to accommodate newly emerging clusters of similar videos and removing categories that contained very few videos. Ultimately, I landed on a schema of ten categories, each of which is described in greater detail below. To evaluate the utility of these categories, I assessed whether myself and another coder could use them to sort the videos in the 200-video sample described with adequate interrater reliability (Table 4).

The first category of videos are anti-smoking videos, which are defined as videos that are obviously intended to convince viewers not to smoke cigarettes or to educate viewers about the negative effects of smoking cigarettes. This category includes but is not limited to videos that would be considered traditional anti-smoking public service announcements (PSAs). Of note, this category is limited to videos discussing cigarettes as

there are no videos in the sample (PSAs or otherwise) that are obviously intended to convince viewers not to use or educate viewers about the risks involved in using any other tobacco product. The second category of videos are celebrity gossip videos, which share gossip and news updates about celebrities, including entertainers, politicians, athletes and other public figures; this gossip typically relates to these individuals' tobacco use. The third category of videos are instructional videos, which seek to teach viewers how to do something, typically related to tobacco use (e.g., how to make their own hookah at home). The fourth category encompasses movie/show scenes and compilations of scenes. This category includes any single scene from a movie or show or any compilation of scenes from movies or shows that depict individuals using tobacco. Videos were only classified into this category if they featured scenes from movies or shows that could be identified through an online search and had not been edited (except to shorten their duration). Movie/show scenes and compilations of scenes were initially separated into two different categories in my categorization schema. However, because of the similarities between these two categories of videos as well as the small proportions of videos that fell into each, I ultimately decided to combine them.

Music videos are the fifth category in the schema. This category includes any music video, including official videos created for songs by the artists who created those songs, as well as unofficial music videos created by individuals other than the artists to accompany an artist's songs. The sixth category of videos, personal testimonial videos, includes any video that was created by an individual with the primary purpose of sharing his or her story or experiences related to tobacco use but that is not obviously intended to dissuade viewers from smoking (such videos would fall into the antismoking video

category). The seventh category of videos, prank/stunt videos, includes any video featuring any sort of prank, stunt, magic trick, or social experiment.

The eighth category of videos, review channel videos, includes any video published on a channel whose primary purpose is to review tobacco products. All videos posted on review channels are grouped into this category, regardless of whether the video itself actually includes a review of a tobacco product, because all videos posted on these channels can be thought of as sharing an implicit purpose of promoting both the channel itself as well as particular tobacco products and because videos posted on these channels share certain production characteristics that differentiate them from videos posted on different types of channels. Namely, these videos are typically more highly produced than are other videos posted by individuals (as opposed to institutions or professional production companies) and typically feature a set introduction (often a song). The ninth category of videos, smoking fetish videos, includes videos intended for individuals with a sexual fetish related to smoking. Finally, the tenth category of videos is an 'other' category that encompasses all other videos that do not fit into any other category.

While the primary purpose of sorting videos into categories is to generate a richer understanding of the type of content featured in these videos, videos in different categories might also differ from one another in other ways that might affect perceived and desired referent similarity. Videos in different categories are likely produced for different purposes. For example, anti-smoking ads might be produced by public health organizations or other parties interested in dissuading individuals from smoking while review channel videos might be produced by tobacco users who are interested in sharing their opinions about or promoting particular tobacco products. Because of the different

purposes for which they are produced, videos in different categories might differ from one another in the ways in which exemplars are portrayed and these differences might affect how viewers rate their similarity to them and the extent to which viewers hold stigmatizing beliefs about them.

Videos in different categories might also differ from one another in the centrality of tobacco use to their content. Tobacco use may be central to the content of some categories of videos (such as smoking fetish videos, for example) and may be featured throughout the entirety of these videos, whereas tobacco use may be tangential to the core content of other categories of videos, such as scenes from movies, and shown only briefly. The centrality of tobacco use to the content of a given video may impact the availability, and thus the salience, of the depicted exemplar's status as a tobacco user when viewers of the video form their perceptions of the extent to which they share group identities with him or her (Hogg & Reid, 2006; Stets & Burke, 2000), which may also impact the extent to which referent similarity affects the relationship between exposure to the video in question and tobacco norm perceptions. Thus, different categories of videos could potentially differ from one another in both the judgments that viewers of those videos make about the referents in those videos as well as the extent to which these judgments impact the relationship between exposure to those videos and tobacco-related norm perceptions.

Results

A total of 167 videos that met the criteria for being included as experimental stimuli in study 2d were identified. Of those, 152 were selected as experimental stimuli. Although the remaining 15 videos did meet the initial criteria for inclusion in study 2d,

they were eliminated for reasons related to their suitability as experimental stimuli. Of these, four videos were much shorter in length than the other videos; these videos ranged in length from 7 to 10 seconds while the other videos that were ultimately chosen as experimental stimuli were all between 30 and 60 seconds. An additional four videos featured only very brief depictions of tobacco use that could easily be missed by a viewer. Four videos were removed for containing highly sexually suggestive content; the decision to remove these videos was made in light of concerns about the discomfort they might cause to participants. Finally, three videos were removed for being identical or nearly identical to other videos in the dataset. Two of these videos were the shortened (15 second) versions of longer (30 second) anti-smoking public service announcements.

The 152 videos that were ultimately selected were published on 92 unique YouTube channels, suggesting that they were created by a number of different content creators and might feature a diverse group of referents. These videos were coded for their category and the tobacco products they feature. Coding results are summarized in Table 5, which presents the proportions of all videos that fell into each category and featured each tobacco product. Coding results are also broken down by round of coding. However, videos coded in Round 1 did not differ substantially from those coded in Round 2 in either their categories or the tobacco products they feature.

As can be seen from Table 5, the proportions of videos falling into each category varied greatly. The two most common categories of videos among those that were selected to be experimental stimuli in study 2d were review channel videos (41% of all videos), a group of primarily promotional videos published on channels created with the

Table 4. Interrater Reliability: Video Coding in Study 2a

Variable	N Categories	<u>Coding Round 1</u>			<u>Coding Round 2</u>		
		N Videos	% Agreement	Gwet's AC	N Videos	% Agreement	Gwet's AC
English	2	200	1.00 [.99, 1.00]	.99 [.98, 1.00]	173	.96 [.93, .99]	.94 [.90, .90]
Tobacco relevant	2	186	.96 [.93, .99]	.95 [.92, .99]	144	.94 [.90, .98]	.92 [.86, .97]
Use or non-use	2	170	.95 [.91, .98]	.94 [.90, .98]	119	.98 [.96, 1.00]	.98 [.96, 1.00]
Individual use	2	161	.98 [.96, 1.00]	.97 [.95, 1.00]	116	.95 [.91, .99]	.94 [.90, .99]
Tobacco product	6	140	.95 [.92, .99]	.95 [.91, .99]	107	.98 [.95, 1.00]	.98 [.95, 1.00]
# referents	3	-	-	-	107	.91 [.85, .96]	.89 [.82, .96]
Category	10	82	.87 [.80, .95]	.86 [.78, .94]	85	.86 [.79, .94]	.85 [.76, .93]

Note: This table presents two interrater reliability metrics, percent agreement and Gwet's AC, for five variables that were used to determine videos' eligibility for inclusion in study 2d, and two additional variables of interest (tobacco product and category). The 95% confidence intervals for each reliability estimate appear next to the relevant estimate. Because videos that were determined not to be eligible based on any of the eligibility criteria were not coded for additional variables, the number of videos included when calculating interrater reliability for each variable are specified. Of note, in the first round of coding, only a single rater coded videos for the number of referents they featured because the decision to eliminate videos featuring more than one referent was made after the initial coding was completed. Thus, it was not possible to compute interrater reliability metrics for this coding.

Table 5. Distribution of Videos Coded in Study 2a by Category and Tobacco Product

Variable	Proportion of All Videos <i>n</i> = 167	Proportion of Round 1 Videos <i>n</i> = 82	Proportion of Round 2 Videos <i>n</i> = 85	Proportion Final Study 2d Videos <i>n</i> = 152
<i>Category</i>				
Anti-smoking video	.05	.07	.04	.04
Celebrity gossip video	.02	.02	.01	.02
Instructional video	.07	.06	.07	.07
Movie/show scene(s)	.04	.05	.04	.05
Music video	.01	.02	.00	.01
Personal testimonial video	.05	.06	.04	.05
Prank/stunt video	.03	.04	.02	.02
Review channel video	.37	.33	.41	.41
Smoking fetish video	.27	.27	.27	.26
Other	.09	.07	.11	.07
<i>Tobacco product</i>				
Cigarettes	.49	.50	.47	.44
Cigars	.13	.11	.15	.14
Little cigars or cigarillos	.01	.00	.01	.01
Hookah	.11	.10	.13	.12
Pipes	.05	.09	.02	.06
Smokeless tobacco	.21	.21	.21	.23

main purpose of reviewing tobacco products. Approximately 26% of videos were smoking fetish videos. No other category of videos had more than 10% of videos in it. As might be expected considering that the two most prevalent categories of videos in this sample either promote or fetishize tobacco use, most videos (84%) were classified as pro-tobacco, while only 7% were classified as anti-tobacco. Approximately 3% of videos were classified as containing both pro- and anti-tobacco valence, while the remaining 7% contained neither pro- nor anti-tobacco valence.

Nearly half (44%) of all videos only featured the use of cigarettes, while 23% featured the use of smokeless tobacco. Similar numbers of videos featured the use of cigars (14%) and hookah (12%), while a small proportion (6%) depicted pipe smoking. Of note, only one video featured the use of little cigars / cigarillos

Conclusions

Overall, this study identified 167 videos that met the target eligibility criteria. From these 167 videos, 152 were selected as experimental stimuli to be used in the studies that follow. These 152 videos vary greatly both in terms of the tobacco products they feature and in their content. Nearly half the videos (44%) included in this study featured cigarette smoking, which might be expected given that cigarettes are the most commonly used tobacco product among adults (Creamer et al., 2019) and the second most commonly used product among youth (Gentzke et al., 2019) in the United States. However, videos also depicted smokeless tobacco use (23%), cigar use (14%), hookah use (12%) and pipe use (6%). Only one video featured the use of little cigars / cigarillos. Videos also fell into several different categories, with no single category containing the majority of videos. The largest category of videos was review channel videos (41%),

followed by smoking fetish videos (26%). Fewer videos fell into each of the other categories.

These findings support the feasibility of using these videos to test whether behavioral similarity and referent similarity play moderating roles in the relationship between exposure to videos depicting individual tobacco use and norm perceptions. Regarding behavioral similarity, a range of tobacco products are shown in these videos and individuals' judgments about the similarity of each tobacco use behavior to cigarette smoking may vary. Regarding referent similarity, videos were published on 92 distinct channels and came from a range of different categories; this suggested that a range of different types of referents would be available and average participants in subsequent studies might view the referents differently in terms of their perceived and desired similarity. The steps that were taken to generate measures of each video's behavioral similarity and referent similarity in order to formally assess the amount of variation in each of these characteristics that exists among this set of videos is described in the chapters that follow.

Findings from this study also add to our understanding of the types of tobacco-relevant content that can be found on YouTube. They demonstrate that tobacco-relevant YouTube videos feature the use of many different types of tobacco products, although cigarette smoking is still the most frequently depicted behavior. Further, while many of the categories of videos identified align with those that have been studied in prior research, this study also uncovered categories of tobacco-related YouTube videos that, to my knowledge, have yet to be investigated.

However, the procedures used in this content analysis do limit the generalizability of its findings. First, the corpus from which the videos were drawn included only videos that had received 100,000 views within the first 180 days following their publication. While these videos might be more worthy of investigation compared to videos that received fewer views, given that they, by definition, were more likely to have been seen by a larger number of YouTube users, they might also differ in important ways from videos that received fewer views. Further, because of the time lapse between when the videos were initially added to the corpus (between 2014 and 2017) and when they were retrieved from YouTube (in 2020), many of the videos that were randomly selected into samples drawn for this study could no longer be accessed on YouTube because they had either been removed from the site or made private. This restricted which videos could be coded in this study and prevented the selection of video samples from being truly random. It is possible that the videos that were still available to be retrieved from YouTube in 2020 differ systematically from the videos that were no longer available for retrieval. Indeed, as mentioned earlier, we know that the videos that were still available to be retrieved tended to have higher viewer counts than those that had been removed.

The generalizability of findings from this content analysis to all tobacco-relevant YouTube videos is also limited by the use of procedures specifically designed to allow it to fulfill its main purpose in the most efficient manner. Because the main purpose of this study was to identify videos that could be suitable experimental stimuli in study 2d, videos that were found not to meet the eligibility criteria were not coded for all variables of interest. For example, videos that did not feature individual tobacco use depictions were excluded from further coding. While prior research has found that nearly 90% of

tobacco-related YouTube videos contain individual use depictions (Liu et al., 2019), tobacco-related videos that do not contain such depictions may differ in important ways from those that do. Videos that feature the use of multiple tobacco products or multiple referents, which were also considered to be ineligible for use in study 2d, may also differ from videos that feature only a single tobacco product and a single referent.

Chapter 4. Studies 2b & 2c – Assessing Variation in Individuals’ Perceptions of the Similarity of Different Tobacco Use Behaviors and in the Referent Similarity

Ratings Assigned to YouTube Videos

Introduction

Study 2a presented preliminary evidence suggesting that the individual tobacco use YouTube videos in our corpus differ from one another in many ways, including in the behaviors they depict and the categories they fall into. However, it did not allow us to directly ascertain whether videos differed in terms of their behavioral similarity and referent similarity, the two variables I hoped to manipulate in study 2d. To determine whether this is in fact the case, it is necessary to measure how participants from the target population (young adult non-tobacco users) view the similarity of different tobacco use behaviors to combustible cigarette smoking, and to have participants from this target population rate their perceived and desired similarity to the individual shown using tobacco in each YouTube video. The former was accomplished in study 2b while the latter was accomplished in study 2c.

Through measuring behavioral similarity and referent similarity, studies 2b and 2c were intended to fulfill four main objectives: (1) to test the actual amount of variation that exists in young adult non-tobacco users’ ratings of the similarity of different tobacco use behaviors and ratings of their own perceived and desired similarity to referents shown in individual tobacco use YouTube videos; (2) to assess the bivariate distribution of behavioral similarity and referent similarity for the set of videos; (3) to determine whether video category is related to behavioral similarity and referent similarity; and (4) to gather preliminary data about how members of the target population respond to the

outcome measures of interest in study 2d (e.g., mean scores, amount of variance) in order to be able to generate estimates of meaningful effect sizes for each outcome measure to help determine the sample size needed for study 2d. Through fulfilling these objectives, studies 2b and 2c were intended to shape the design of study 2d by providing information about how many experimental conditions should be included, which videos should be shown to participants to each condition, whether and how video category should be accounted for when designing the conditions and how many participants should be included in each condition. At the same time, this set of studies is meant to further our understanding of young adults' perceptions of the similarity of different tobacco use behaviors, ratings of their similarity to referents shown in individual tobacco use YouTube videos and tobacco-related norm perceptions and stigmatizing beliefs.

Regarding the first objective, measuring the amount of variation that exists in the variables of interest in this study is important for assessing the feasibility of experimentally manipulating these variables in study 2d. If, for example, findings from study 2b suggest that young non-smokers do not view certain tobacco use behaviors as more similar to smoking combustible cigarettes than others, it will not be possible to manipulate this variable by showing these individuals videos featuring varying tobacco use behaviors. Likewise, if there is not systematic variation in the referent similarity ratings assigned to each video by participants, it will not be possible to identify videos that could be thought of as 'low referent similarity' and videos that could be thought of as 'high referent similarity.'

However, even if sufficient variation is found in both behavioral and referent similarity to support the possibility of experimentally manipulating these variables, it is

still necessary to look at their joint distribution (the second objective of these studies) to determine whether they can be manipulated separately. If the two variables are very related to one another, this may not be possible. For example, if all the videos featuring referents who are assigned high referent similarity ratings depict tobacco use behaviors that are categorized as high in behavioral similarity while all the videos featuring referents assigned low referent similarity ratings depict tobacco use behaviors that are categorized as low in behavioral similarity, it will not be possible to manipulate these variables separately. Additionally, if either behavioral similarity or referent similarity is highly related to video category, it is necessary to account for this in the design of study 2d to ensure that the effects of these variables can be separated from the effects of video category.

It should be noted that all the objectives of studies 2b and 2c involve exploring research questions rather than testing specific hypotheses. I am not making any a priori predictions about how the set of tobacco use behaviors investigated in study 2b will be ranked in terms of their perceived similarity to smoking combustible cigarettes. To my knowledge, no prior research has directly addressed this question and, given that there are multiple dimensions on which individuals might compare the similarity of different tobacco products, it is difficult to predict what their summary evaluations of behavioral similarity might look like. For example, while some tobacco products might share certain obvious characteristics with cigarettes (e.g., being combustible), others might be seen as more similar to cigarettes in terms of the health risks or the social benefits or risks associated with their use (Roditis et al., 2016). In addition, because no prior studies have investigated how young adults perceive their similarity to individuals depicted using

tobacco products in YouTube videos, I am not making any predictions about how different videos will be rated in terms of their referent similarity, or about whether or how referent similarity will be related to behavioral similarity or video category.

Methods

Studies 2b and 2c were carried out simultaneously in February and March 2021 and were conducted on Amazon's Mechanical Turk (MTurk) through the CloudResearch research platform (Litman et al., 2017). MTurk is a crowdworking platform that has grown in popularity in recent years as a source of convenience samples for online studies. A recent study comparing findings from both observational and experimental tobacco control studies using MTurk samples with parallel studies including probability-based samples suggest that results from MTurk-based tobacco control studies can be generalizable (Jeong et al., 2019). Ethical concerns have been raised about the low compensation often given to workers who complete tasks on MTurk (often referred to as MTurkers) (Williamson, 2016). In light of these concerns, each individual who participated in the studies that comprise my dissertation was compensated at a rate equivalent to between \$15-\$20 per hour, well above the federal minimum wage at the time. Therefore, to determine the amount of compensation given for each study, I first estimated the amount of time it would take to complete it and then calculated the appropriate amount of compensation accordingly.

A screening survey administered through Qualtrics was used to identify participants who were eligible to participate in studies 2b and 2c. As eligible participants were identified they were randomly assigned to be invited to participate in either study 2b or study 2c on a rolling basis. I continued collecting responses to the screening survey

until enough eligible participants were identified to meet the target sample size for study 2b (target $n = 50$) and study 2c (target $n = 304$). All participants who completed the screening survey, which had an average completion time of approximately 3 minutes, received \$1. Eligible participants who went on to complete study 2b, which had an average completion time of about 2 minutes, were compensated \$1 while eligible participants who went on to complete study 2c, which had an average completion time of approximately 20 minutes, were compensated \$6.

I initially conducted a pilot launch of this set of studies, in which I collected responses from 100 participants in the screening survey and invited eligible participants to either study 2b or study 2c; ultimately, 23 eligible participants went on to complete study 2b and 35 eligible participants went on to complete study 2c. I then paused data collection and used this early data to check for any potential issues in how the surveys were functioning or how participants were interpreting or responding to the questions. Specifically, I looked for unexpected response patterns and assessed the reliability of multi-item scales through checking Cronbach's alpha metrics or interitem correlations and conducting principal component analyses. After finding no obvious issues, I resumed data collection. The protocols used in the screening survey, study 2b, and study 2c are all described in greater detail below.

Screening survey & eligibility criteria. In order to be eligible to participate in study 2b or 2c, participants were required to: be between 18 and 28 years old, live in the United States, have completed over 100 prior tasks on MTurk with at least a 70% approval rating, not be current tobacco users, and never have been regular tobacco users. Eligible participants were identified through a two-step process. To identify participants

who met the first four criteria, available functions on the CloudResearch research platform (Litman et al., 2017) were used to ensure that only participants who fell into the target age group, were located in the U.S. and had sufficiently high HIT completion rates and approval rates were able to see and take part in the screening survey. Participants who qualified as non-tobacco users were identified through questions about their tobacco use that were included in the screening survey, as described below.

These eligibility criteria were selected for several reasons. The age limit and requirement that participants live in the United States were used because this study is focused on young adults in the U.S. Initially, I had intended to limit the study population to individuals between the ages of 18 and 25 in order to match (as much as possible given that only individuals over age 18 are allowed to use MTurk) the population included in Study 1. However, after initially using this age criterion during the pilot phase of data collection and experiencing a very slow response rate, I ultimately decided to expand the age range in order to increase the likelihood that I would identify enough MTurkers within the target age range for these studies to complete in a timely manner. The requirement that MTurkers have completed at least 100 prior tasks with a 70% approval rating was intended to identify participants who had track records of devoting sufficient care and attention to tasks completed on MTurk.

Finally, current and former users of tobacco products were excluded from studies 2b and 2c because their tobacco use could potentially have influenced the judgments they made about their similarity to the referents portrayed in the videos or the similarity of different tobacco use behaviors to cigarette smoking but may not have done so in a consistent manner (e.g., heavy smokers might have considered smoking status more when

making judgments about group identity than light smokers; people who use hookah might think differently about the similarity of cigarette smoking and hookah use than do people who smoke cigarettes). Limiting the study population to non-tobacco users was intended to avoid having to sort out the potentially complex contributions of personal tobacco use to the observed relationships between variables.

Screening survey instrument. The full screening survey instrument is included in Appendix 3. Participants were first asked a series of questions about demographic variables including their age, gender, race, ethnicity, the state in which they live, whether they live in an urban or rural area and the highest level of education they completed. Participants' responses to the question about age were used to verify that they did indeed fall into the target age range.

After completing these initial questions, participants were asked a series of questions about their tobacco use. First, they were asked to report if they had ever used any of the following tobacco products, even if on only one occasion: cigarettes, hookah, pipe tobacco, cigars, little cigars or cigarillos, smokeless tobacco products, and electronic cigarettes. For each product they reported having used, they were asked whether they had used that product within the past 30 days and whether they had ever used it fairly regularly. The latter set of items (e.g., "Have you ever used hookah fairly regularly?") have been validated as measures of regular tobacco use and used to measure this variable in many prior studies (e.g., Kasza et al., 2017; Lopez et al., 2018). Additionally, participants were asked two questions specific to tobacco use. The first of these asked whether they were a current smoker, while the latter asked whether they had smoked

more than 100 cigarettes in their lifetime. Both of these measures have also been frequently used as measures of smoking status in prior studies.

Respondents were considered to be eligible to participate in studies 2b and 2c if they reported that they had not used any tobacco product other than e-cigarettes within the past 30 days, had never used any tobacco product other than e-cigarettes fairly regularly, were not a current smoker, and had not smoked more than 100 cigarettes in their lifetime. Participants' current and past e-cigarette use was not considered when determining their eligibility because videos depicting e-cigarette use were not included among the YouTube videos used in studies 2c and 2d.

Study 2b protocol. Participants who were randomly assigned to and agreed to participate in Study 2b were directed to a short Qualtrics survey. Participants were first shown two brief introductory pages that included a statement of informed consent and described the study. Then, participants were shown a series of questions that all used the same structure: "How similar do you think the following behavior is to smoking cigarettes: (*behavior*)?" (see Appendix 3 for full study 2b instrument). They were asked to rate the similarity of behaviors on a 6-point Likert scale including the following response options: (1) extremely dissimilar, (2) quite dissimilar, (3) somewhat dissimilar, (4) somewhat similar, (5) quite similar, (6) extremely similar. The specific tobacco use behaviors participants were asked about included: smoking hookah, smoking pipes, smoking cigars, smoking little cigars or cigarillos, using smokeless tobacco and using e-cigarettes. Participants were instructed that they could use whatever criteria they thought to be relevant when making these judgments. To ensure participant comprehension, these questions included expanded definitions of each tobacco product of interest, which were

adapted from a prior study (Gibson et al., 2019). It should be noted that the behavioral similarity of smoking cigarettes to itself was not directly measured, as such a question would likely seem nonsensical to participants; smoking cigarettes was instead assumed to have the highest behavioral similarity score.

In addition to the questions about different tobacco use behaviors, participants were asked to rate the similarity of a seventh behavior that was unrelated to tobacco use: eating oranges. This question served as a type of attention check measure, as described in greater detail below. The order in which questions about each of the seven behaviors appeared was randomized for each participant and each question was displayed on a separate page in order to minimize the extent to which participants' similarity ratings of each behavior were influenced by the behavior that had just been asked about.

It is worth noting that, while vaping e-cigarettes was included among the tobacco use behaviors asked about in these behavioral similarity questions, videos depicting e-cigarette use were not included among the videos studied in the study 2a content analysis and would not be used as experimental stimuli in study 2d. Thus, findings regarding how vaping e-cigarettes compared to other tobacco use behaviors in terms of its perceived behavioral similarity to smoking cigarettes, although interesting, will not be used to inform the design of study 2d.

Study 2b data analysis. All study 2b analyses were conducted in R version 3.4. Before proceeding with the main analyses, I used participants' responses to the measure that asked about the behavioral similarity of eating oranges to identify participants who may not have been paying sufficient attention while completing the survey. Participants failed this attention check assessment if they did not give 'eating oranges' the lowest

behavioral similarity score they gave to any behavior or if they did not assign at least one of the tobacco use behaviors a behavioral similarity score that was higher than the score they gave to 'eating oranges.' I did not compute interrater reliability for the behavioral similarity measures or eliminate individual participants from the study based on their low individual reliability with the others. Because participants' ratings of behaviors' similarity to cigarette smoking should be thought of as representing their individual perceptions, different participants could reasonably assign different similarity scores to the same behavior.

After eliminating responses from participants who failed the attention check assessment, I used the responses from the remaining participants to compare the perceived behavioral similarity of different tobacco use behaviors. I computed the mean, standard deviation, median, range of responses and 95% confidence interval for the scores given to each behavior. I used these descriptive statistics to assess whether different behaviors had been consistently assigned different behavioral similarity scores and whether the confidence intervals around the scores assigned to each behavior overlapped with one another. Then, I used a series of t-tests to assess whether the scores given to each behavior were significantly different from one another.

Study 2c protocol. Participants who were randomly assigned to and agreed to participate in study 2c were also directed to a Qualtrics survey. The first pages of the survey included an informed consent statement and introductory information about the study that explained the task participants would be completing and informed them that it was necessary to view the videos in full with their audio turned on. Participants were then shown a set of randomly selected individual tobacco use YouTube videos that were

embedded in the Qualtrics survey. Each of the 304 participants in the study was randomly assigned to view 10 of the 152 tobacco individual norm videos chosen as potential experimental stimuli in Study 2a so that each video was viewed and rated by about 20 participants.

To help ensure that participants watched each video in its entirety before answering the questions about it, the survey was programmed so that questions did not appear on the same pages as the videos. In addition, participants were not able to advance past each video page until they had stayed on that page for at least one minute (the maximum duration of the videos included in the study). After viewing each video, participants were asked a series of questions about it. First, participants were asked if they had seen the video before; this question was included to give a plausible explanation for why I was asking participants questions about these videos (i.e., to gauge viewership). Then, participants were asked one of three attention check measures. Two of these attention check measures were designed to be questions that participants would only be able to answer correctly if they had listened to the audio of the video. Specifically, one of these attention check measures asked whether the video had contained any background music, while another of the attention check measures asked whether multiple people had spoken during the video. The third attention check measure asked whether any text had appeared on the screen throughout the video. These attention check measures were varied across the ten videos each participant watched in random order so that participants would not know which question they would be asked after each video, which could potentially have led them to only pay attention to the element of the video asked about it in that question.

After completing the attention check measure, participants were asked a series of questions about their own similarity to the individual featured using tobacco in each video. These questions asked about participants' perceptions of their own similarity to the individual depicted as a tobacco user in each video (perceived similarity) as well as how similar to that individual they would like to be (desired similarity). Four questions were asked about perceived similarity and five were asked about desired similarity. Each of these questions was asked on a four-point Likert scale with the following response options: (1) strongly disagree, (2) disagree, (3) agree and (4) strongly agree; higher scores indicated higher similarity. The wording of these questions, which can be found in Table 6, was informed by relevant literature. Specifically, the questions about desired similarity were adapted from a study testing the predictions about the moderating effect of group identity on the relationship between descriptive norms and behavioral intentions (Rimal & Real, 2005). The questions about perceived similarity were adapted from the homophily scale developed by McCroskey et al. (1975) and are also quite similar to those used by Rimal & Real (2005). In addition to these items, participants were also asked a question about the attractiveness of the individual, which was measured using the same four-point Likert scale as the similarity questions (see Table 6). Participants' responses to this question were used in a type of discriminant validity assessment, as I expected participants' ratings of both their perceived and desired similarity to the individual featured using tobacco in each video to be related to but distinct from their assessments of that person's attractiveness. The order in which the similarity questions and the attractiveness question were asked was randomized for each participant.

Table 6. Wording of Referent Similarity & Attractiveness Items

Introduction used for all items: The following questions are about the person who was shown using tobacco, discussing their tobacco use or who was described as a tobacco user in the video you just watched. When answering these questions, please use whatever criteria come to mind to make your judgments . . .

Perceived Similarity

- Thinking about that person, do you agree or disagree that they: are like you?
- Thinking about that person, do you agree or disagree that they: think like you?
- Thinking about that person, do you agree or disagree that they: behave like you?
- Thinking about that person, do you agree or disagree that they: are similar to you?

Desired Similarity

- Thinking about that person, do you agree or disagree that they: are respectable?
- Thinking about that person, do you agree or disagree that they: are inspiring?
- Thinking about that person, do you agree or disagree that they: are someone you look up to?
- Thinking about that person, do you agree or disagree that they: are someone you think highly of?
- Thinking about that person, do you agree or disagree that they: are likable?

Attractiveness

- Thinking about that person, do you agree or disagree that they: are attractive?

One purpose of study 2c was to gather data about how participants in the target population respond to the questions that will be used to measure the outcomes of interest in study 2d. Therefore, after watching all ten of their assigned videos and answering questions about each, participants were asked a series of questions about their injunctive and descriptive norm perceptions related to cigarette smoking, as well as their stigmatizing beliefs about smoking. The norm perception questions included the same measures of injunctive and descriptive normative perceptions included in study 1 as well as two additional measures of injunctive norm perceptions adapted from Rimal & Real

(2005) and three additional descriptive norm items adapted from Liu (2017). One of these injunctive norm questions (“How do you think your closest friends would feel about you smoking cigarettes every day?”) was intended to measure participants’ local injunctive norms, or their perceptions of the injunctive norms around smoking in their immediate social circle, while the other two questions were intended to measure general injunctive norms, or participants’ perceptions about the injunctive norms around smoking in society more generally. The measures of stigma were adapted from a smoking stigma scale developed by Stuber and colleagues (Stuber et al., 2008). The wording of all of these items is included in Appendix 3.

The four descriptive norm perception questions, three injunctive norm perception questions and four smoking stigma questions were all designed so that each question had four possible response options and higher response options indicated more pro-tobacco descriptive or injunctive norm perceptions or higher levels of stigma. These items were eventually used to create scale measures of descriptive norm perceptions, general injunctive norm perceptions (the question about local injunctive norm perceptions was treated as a separate single-item measure), and smoking stigma. These scales were created by taking the average of responses to each of the relevant questions, thus higher measures on these scales indicated more pro-tobacco descriptive norm perceptions, more pro-tobacco general injunctive norm perceptions, and higher levels of smoking stigma.

Study 2c data analysis. Analyses were conducted using R version 3.4 and Stata version 15. First, responses to the attention check questions described above were assessed. Participants who responded correctly to at least 7 of the 10 attention check questions they answered were considered to have passed the attention check assessment.

Participants who responded correctly to fewer than 7 of these questions failed the attention check assessment and their data was not included in further analyses.

Using data from the remaining participants, I first created separate scales for desired referent similarity and perceived referent similarity. These scales were initially constructed by taking averages at the person-video level; for example, the referent desired similarity scale score for person X's rating of the first video they viewed was calculated by taking the average of that person's responses to the five desired similarity questions they had been asked about that video. I then assessed the reliability of the perceived and desired similarity scales using Cronbach's alpha and principal components analyses. Because each participant had viewed 10 videos and both the videos shown to each participant and the order in which they were shown was randomized, I conducted ten separate reliability assessments (i.e., one for the first video shown to each participant, one for the second video shown to each participant, and so on), yielding ten Cronbach's alpha estimates and ten principal components analyses for each scale.

After assessing the reliability of these scales at the person-video level, I then transformed the data to the video level. I assigned average desired similarity and perceived similarity scores to each video by taking the mean of the scores given to that video on the desired similarity scale and the perceived similarity scale, respectively, by the group of participants who had watched it. These scores reflected the average participant's desired similarity and perceived similarity ratings for the referent featured in each video. I also computed an average attractiveness measure by taking the average score given to each video on the single-item attractiveness measure by all participants who watched it. In addition to these variables, I also computed three video-level variables

intended to represent the consistency among the desired similarity scale scores, perceived similarity scale scores and attractiveness scores that had been assigned to each video by the participants who had watched it. These variables were calculated by taking the standard deviation of the scores assigned to that video for the variable of interest by all participants who had watched it.

I analyzed descriptive statistics for these new video-level average and standard deviation variables. Then, I looked at the pairwise correlations for the average desired similarity, average perceived similarity, and average attractiveness variables. The correlations between each of the similarity variables and the attractiveness variable was used to establish discriminant validity. As described in greater detail in the Results section, the average perceived similarity scores and average desired similarity scores were found to be very highly correlated with one another. The high correlation between these items led me to collapse them into a single overall average similarity variable: overall referent-self similarity. This variable, which I created by taking the mean of the average desired similarity and average perceived similarity variables, represented how similar the average participant in study 2c perceived him or herself to be and wanted to be to the referent featured in each video.

To assess whether videos differed from one another in the overall referent-self similarity scores I looked at the univariate distribution of and summary statistics for this variable. I then assessed whether video category and tobacco product were related to overall referent-self similarity. For the former, I looked at summary statistics for overall referent-self similarity for the videos that fell into each category. To assess the latter, I looked at summary statistics for the overall referent-self similarity variable for videos

featuring each tobacco product. I also fit a linear regression model predicting overall referent-self similarity from tobacco product. I did not use a regression analysis to assess whether overall referent-self similarity was related to video category because of the large number of categories into which videos fell and the relatively small number of videos that fell into each category.

The final set of analyses involved the questions used to measure participants' smoking-related norm perceptions and smoking stigma. First, I assessed participants' responses to each individual item. Then, I used Cronbach's alpha and principal components analyses to assess the reliability of my four-item smoking stigma scale and four-item descriptive norm perceptions scale. To check the reliability of my two-item general injunctive norm perceptions scale, I looked at the correlation between the two items.

After assessing whether these items could constitute reliable scales, I created scales for descriptive norm perceptions, stigma, and injunctive norm; each scale was created by taking the average of all relevant items. When creating the descriptive norms scale, I reverse-coded one of the items, which was originally negatively-worded (see the note accompanying Table 12 for more information). Then, I looked at descriptive statistics for each of these scales, as well as for the single-item local injunctive norm perceptions measure, in order to get a sense of how members of the target population respond to these questions. These descriptive statistics were also used to inform power analyses that were used to determine the sample size needed for study 2d; results from these analyses will be described in the next chapter.

Results

A total of 851 people completed the screening survey. Of those, 503 people were determined to be eligible and were randomly invited to complete either study 2b (20%) or study 2c (80%). Ultimately 52 people completed study 2b and 304 people completed study 2c. Of note, a larger proportion of participants invited to complete study 2c than participants invited to complete study 2b went on to complete their assigned study. This is likely due to the higher compensation given to participants in study 2c because of the longer amount of time required to complete it.

Demographic information about participants in the screening survey, study 2b and study 2c is presented in Table 7. As can be seen from this table, participants in each study had a mean age of around 23 years and were diverse in terms of their gender, race and ethnicity. Participants were also geographically diverse; individuals from 46 states completed the screening survey. Study 2c included participants from 40 states while study 2b included participants from 22 states. The largest group of participants in each study lived in suburban locations, while similar proportions lived in large cities and small cities or towns and fewer participants (and no participants in study 2b) lived in rural areas. Participants tended to be very highly educated, particularly considering their young ages. Over 80% of participants in each sample had completed at least some college.

Table 7. Summary of Demographic Characteristics for Participants who Completed the Screening Survey, Participated in Study 2b, and Participated in Study 2c

	Screening Survey (<i>n</i> = 851)	Study 2b (<i>n</i> = 52)	Study 2c (<i>n</i> = 304)
Age in years (Mean (<i>SD</i>))	23.5 (2.6)	22.8 (2.2)	23.3 (2.5)
<i>Gender</i>			
Male	44.9%	32.7%	42.8%
Female	52.4%	63.5%	54.9%
Transgender or non-binary	2.2%	3.8%	2.0%
Prefer not to answer / to self-describe	0.5%	0.0%	0.3%
<i>Race</i>			
American Indian or Alaskan Native	0.5%	0.0%	0.0%
Asian	13.0%	13.5%	18.4%
Black or African American	12.5%	11.5%	10.5%
Native Hawaiian or Pacific Islander	0.2%	0.0%	0.3%
White	66.4%	63.5%	63.5%
More than one	4.1%	7.7%	4.3%
Prefer not to answer/ to self-describe	3.3%	3.8%	3.3%
<i>Ethnicity</i>			
Latinx / Hispanic	10.8%	13.5%	9.2%
Not Latinx / Hispanic	88.1%	86.5%	90.5%
Prefer not to answer	1.1%	0.0%	0.3%
<i>Highest level of education</i>			
Less than high school degree	0.7%	1.9%	1.0%
High school graduate or GED	12.7%	9.6%	10.2%
Some college but no degree	30.6%	34.6%	29.6%
Associate degree in college	9.6%	1.9%	8.9%
Bachelor's degree in college	39.4%	46.2%	42.4%
More than a bachelor's degree	7.1%	5.8%	7.9%
<i>Type of residential area</i>			
A large city	26.1%	19.2%	24.7%
A rural area	9.6%	0.0%	10.5%
A small city or town	23.9%	21.2%	27.0%
A suburb near a large city	40.4%	59.6%	37.8%

Overall, there appeared to be few notable demographic differences between the participants who completed the screening survey, the participants who were determined to be eligible ($n = 503$, demographic data for these individuals was also analyzed but is not included separately in Table 7) and the participants who went on complete studies 2b or 2c. To determine whether participants in studies 2b and 2c were roughly equivalent on all of the measured categorical demographic variables (i.e., all variables except age), I used Chi-squared tests. To assess whether participants in studies 2b and 2c differed from one another on age, I fit a univariate OLS regression model predicting age from a binary variable representing whether participants were in study 2b (vs. study 2c). These tests revealed that participants in studies 2b and 2c did not differ significantly from one another on gender ($Chi\text{-squared} = 2.44, p = .49$), race ($Chi\text{-squared} = 2.55, p = .77$), ethnicity ($Chi\text{-squared} = 1.19, p = .55$), or education ($Chi\text{-squared} = 4.15, p = .44$). They did, however, differ from one another in the types of residential areas they lived in ($Chi\text{-squared} = 11.43, p = .01$); likely because no participants from study 2b lived in rural areas, while 10.5% of participants in study 2c did. Results from the regression model showed that participants in the two studies did not differ significantly from one another on age ($Coef = -.61, p = .09$).

Study 2b results. Among the 52 participants who completed study 2b, two failed the attention check assessment. These respondents did not give ‘eating oranges’ the lowest score that they had given to any behavior. After eliminating responses from these two participants, I computed descriptive statistics for the behavioral similarity scores given to each behavior. These statistics are summarized in Table 8.

As can be seen from Table 8, each tobacco use behavior received a relatively wide range of responses although only two behaviors (hookah and smokeless tobacco) were assigned any ‘extremely similar’ ratings. Each of the tobacco use behaviors tended to have mean and median behavioral similarity scores of around 4 (‘somewhat similar’). Smoking hookah had the highest mean score ($M = 4.32$), followed by smoking cigarillos ($M = 4.02$), smoking cigars ($M = 3.96$) and smoking pipes ($M = 3.86$). Using smokeless tobacco ($M = 3.72$) and vaping e-cigarettes ($M = 3.44$) had the lowest mean scores.

Table 8. Summary Statistics for Behavioral Similarity Scores from Study 2b ($n = 50$)

Behavior	Mean	Standard Deviation	Median	Range	95% Confidence Interval
Hookah	4.32	1.15	4.5	[1, 6]	[3.96, 4.62]
Pipe	3.86	1.03	4	[1, 5]	[3.46, 4.08]
Cigar	3.96	1.18	4	[1, 5]	[3.62, 4.27]
Cigarillo	4.02	0.96	4	[1, 5]	[3.65, 4.23]
Smokeless	3.72	1.20	4	[1, 6]	[3.36, 4.03]
E-cigarette	3.44	1.03	4	[1, 5]	[3.12, 3.73]
Orange	1.02	0.14	1	[1, 2]	[0.98, 1.21]

Note: Behavioral similarity was measured on a 6-point Likert scale with options ranging from extremely dissimilar (1) to extremely similar (6).

There was substantial overlap among the confidence intervals around the behavioral similarity scores assigned to each tobacco use behavior. Only one pair of behaviors, smoking hookah and using e-cigarettes, had confidence intervals that did not overlap at all. However, because I considered this a conservative test of whether tobacco use behaviors differed from one another in their perceived behavioral similarity, particularly given the small number of participants included in study 2b, I used a series of

t-tests to determine whether each pair of behaviors differed significantly from one another in their mean behavioral similarity scores.

Of the 15 t-tests used to test for differences in the behavioral similarity scores assigned to each tobacco use behavior, six yielded significant results. Four tobacco use behaviors had mean behavioral similarity scores that were significantly higher than those assigned to e-cigarettes, including: hookah ($t = 4.02, p < .001$), pipes ($t = 2.04, p = .04$), cigars ($t = 2.35, p = .02$), and cigarillos ($t = 2.91, p < .01$). Additionally, hookah had a significantly higher behavioral similarity score compared to pipes ($t = 2.11, p = .04$) and smokeless tobacco products ($t = 2.56, p = .01$). There were no other significant differences in behavioral similarity scores among the other pairs of tobacco products.

Study 2c results. A total of 304 participants completed study 2c. Of those, 14 people failed the attention check assessment because they answered fewer than 7 of the 10 attention check measures correctly. Their responses were excluded from the analyses summarized below. After eliminating responses from these participants, each of the 152 videos was rated by between 15 and 21 coders and the vast majority (87.5%) was rated by between 18 and 21 coders. The median number of coders was 19.

Results from the reliability assessments conducted at the person-video level suggested that the scales used to measure desired similarity and perceived similarity were both highly reliable. The ten Cronbach's alpha estimates generated for desired similarity ranged between .87 and .92, while the ten Cronbach's alpha estimates for perceived similarity ranged between .91 and .96. In addition, in each of the ten principal components analyses conducted, all the desired similarity items loaded onto a single

component with an Eigenvalue larger than one. The same was true for the principal components analyses conducted using the perceived similarity items.

After completing these analyses at the person-video level, I then moved to the video-level analyses. As described in the Methods section, I created average desired similarity and perceived similarity scores for each video by taking the mean of the scores given to that video on the desired similarity scale and the perceived similarity scale, respectively, by all participants who had watched it. I also created an average attractiveness measure by taking the average score given to each video on the single-item attractiveness measure by the participants who watched it. In addition to these variables, I also created variables intended to represent the consistency among the desired similarity scale scores, perceived similarity scale scores and attractiveness scores that had been assigned to each video by the participants who had watched it. These variables were calculated by taking the standard deviation of the scores assigned to that video for the variable of interest by all participants who had watched it. After creating these variables, I looked at descriptive statistics for the average desired similarity, average perceived similarity and average attractiveness measures assigned to each of the 152 videos. I also looked at descriptive statistics for the variables representing the standard deviation of the desired similarity scale, perceived similarity scale and attractiveness scores assigned to each video by the participants who rated it in order to assess the extent to which each video had been consistently scored on each of these variables. These statistics are summarized in Table 9.

As Table 9 shows, videos in this set were given higher scores for desired similarity than they were for perceived similarity and the videos' average attractiveness

scores were higher than either their perceived or desired similarity scores. However, it should be noted that the average desired similarity, average perceived similarity and average attractiveness scores given to these videos were all relatively low. Because of the way these variables were measured, each had a possible range of values between 1 and 4 with higher values representing higher similarity or attractiveness. The mean and median scores for both average desired similarity and average perceived similarity were all below 2, while the mean and median scores for average attractiveness were slightly above 2.

Table 9. Descriptive Statistics for Desired Similarity, Perceived Similarity and Attractiveness Measures for Videos Included in Study 2c ($n = 152$ Videos)

Variable	Range	Mean (<i>SD</i>)	Median
Average Desired Similarity	1.18, 2.85	1.89 (.36)	1.87
Average Perceived Similarity	1.0, 2.51	1.68 (.30)	1.72
Average Attractiveness	1.24, 3.32	2.13 (.50)	2.05
Std. Dev. Desired Similarity	.27, .87	.56 (.12)	.55
Std. Dev. Perceived Similarity	0.0, .92	.61 (.14)	.63
Std. Dev. Attractiveness	.32, 1.12	.74 (.15)	.75
Overall Referent-Self Similarity	1.13, 2.68	1.79 (.32)	1.80

Summary statistics for the standard deviations of the variables (see Table 9) suggest that, while there was variation, there was some consistency in the average desired similarity, average perceived similarity and average attractiveness scores assigned to each variable. The mean and median scores for the attractiveness standard deviation variable were higher than those for the desired similarity and perceived similarity standard deviation variables, as would be expected given that attractiveness was measured using a single item while the other variables were measured using multi-item scales.

I then examined the pairwise correlations between the average desired similarity, average perceived similarity and average attractiveness measures assigned to each video. Both average desired similarity and average perceived similarity were moderately and significantly correlated with average attractiveness. The correlation between average desired similarity and average attractiveness was .41, while the correlation between average perceived similarity and attractiveness was .43. These moderate correlations confirmed that both participants' ratings of their perceived and desired similarity to individuals depicted using tobacco in YouTube videos could be accurately thought of as related to but distinct from their ratings of these individuals' attractiveness.

As previously mentioned, average desired similarity and average perceived similarity were found to be highly correlated with one another ($r = .88$). The high correlation between these two variables suggested that they could reasonably be collapsed into a single variable and so I created such a variable (overall referent-self similarity) by taking the mean of the average desired similarity and average perceived similarity scores for each video. Descriptive statistics for this variable are summarized in Table 9.

Descriptive statistics for the overall referent-self similarity scores assigned to videos featuring different tobacco use behaviors are summarized in Table 10. Because only one video featured the use of cigarillos, this video was excluded from these analyses. As can be seen from the data presented in Table 10, it does appear that overall referent-self similarity differed depending on the tobacco use behavior featured in a video. Videos featuring smokeless tobacco had the lowest overall referent-self similarity scores while videos featuring pipe smoking and cigar smoking had higher overall

referent-self similarity scores. Videos featuring hookah and cigarette smoking had scores somewhere in the middle. I then fit a linear regression model predicting overall referent-self similarity from dummies for each tobacco product with cigarette videos as the residual category. Results from this model confirmed that overall referent-self similarity was significantly related to tobacco product. Compared to videos featuring cigarette smoking, videos featuring individuals smoking cigars ($Coef = .23, p < .01$) and videos featuring individuals smoking pipes ($Coef = .30, p < .01$) both had significantly higher overall referent-self similarity scores, while videos featuring individuals using smokeless tobacco products had significantly lower overall referent-self similarity scores ($Coef = -.33, p < .001$). Videos featuring individuals smoking hookah did not significantly differ from videos featuring individuals smoking cigarettes in their overall referent-self similarity scores ($Coef = .03, p = .68$).

Table 10. Summary Statistics for Overall Referent-Self Similarity Scores Assigned to Videos Featuring Each Tobacco Product

Product	N Videos	<i>Overall Referent-Self Similarity</i>		
		Range	Mean (SD)	Median
Cigarettes	67	1.24, 2.68	1.81 (.32)	1.75
Cigars	22	1.77, 2.51	2.04 (.18)	2.02
Hookah	18	1.63, 2.24	1.83 (.12)	1.83
Pipes	9	1.88, 2.35	2.11 (.14)	2.11
Smokeless	35	1.13, 1.91	1.47 (.23)	1.42

To assess whether videos in each category differed from one another in the overall referent-self similarity scores they had been assigned, I looked at summary statistics for the overall referent-self similarity scores assigned to videos in each category.

This information is summarized in Table 11. As can be seen from this table, there were some notable differences between video categories. Music videos, personal testimonial videos and anti-smoking videos tended to have the highest overall referent-self similarity scores, while smoking fetish videos, review channel videos, and celebrity gossip videos tended to have the lowest scores. However, these comparisons should be taken with a grain of salt and may not be generalizable beyond this video sample due to the small number of videos that were categorized as belonging to many of these categories.

Table 11. Summary Statistics for Overall Referent-Self Similarity Scores Assigned to Videos in Each Category

Video Category	<i>Overall Referent-Self Similarity</i>			
	N Videos	Range	Mean (SD)	Median
Anti-smoking videos	6	1.80, 2.48	2.14 (.28)	2.18
Celebrity gossip videos	3	1.46, 2.11	1.68 (.37)	1.47
Instructional videos	11	1.63, 2.22	1.89 (.16)	1.84
Movie/show scene(s)	7	1.58, 2.37	1.93 (.34)	1.94
Music videos	2	2.20, 2.40	2.30 (.14)	2.30
Personal testimonial videos	7	1.82, 2.68	2.20 (.32)	2.19
Prank/stunt videos	3	1.66, 2.22	1.87 (.30)	1.74
Review channel videos	61	1.13, 2.34	1.70 (.33)	1.77
Smoking fetish videos	40	1.24, 2.04	1.67 (.20)	1.68
Other	11	1.46, 2.35	1.92 (.27)	1.90

Table 12. Participants' Responses to Each Outcome Measure Item ($n = 290$)

Descriptive Norm Perceptions	
Item	% Agree or Strongly Agree
In the U.S. many people smoke cigarettes	81.0%
Most people my age smoke cigarettes	20.7%
Smoking cigarettes is not at all common in the U.S.	10.3%
Item	% About Half or Most
How many people your age would you guess smoke cigarettes?	27.6%
Smoking Stigma	
Item	% Agree or Strongly agree
Most people would not hire a smoker to take care of their children	80.0%
Most non-smokers would be reluctant to date someone who smokes	91.7%
Most people believe that smoking is a sign of personal failure	48.6%
Most people think less of a person who smokes	74.8%
General Injunctive Norm Perceptions	
Item	% Agree or Strongly Agree
Most people consider smoking cigarettes to be an appropriate behavior	21.7%
Society in general considers smoking cigarettes to be an appropriate behavior	28.6%
Local Injunctive Norm Perceptions	
Item	% Approve or Strongly Approve
How do you think your closest friends would feel about you smoking cigarettes every day?	7.2%

Note: All items that used the four-point strongly disagree to strongly agree Likert scale included the following stem: "How much do you agree or disagree with the following statement . . ." One of the descriptive norm items ("smoking cigarettes is not at all common in the U.S.") was reverse-coded when I created the descriptive norm scale.

The final set of analyses conducted using data from study 2c focused on the outcome measures of interest in study 2d: i.e., smoking-related norm perceptions and

smoking stigma. First, to get a sense of how participants in this study tended to respond to these items, I looked at participants' responses to each of the individual descriptive norm, general injunctive norm, local injunctive norm and stigma items. The majority of the items were asked using a four-point Likert scale with response options ranging from 'strongly disagree' to 'strongly agree.' For these items, I assessed how many people responded 'agree' or 'strongly agree' to each item. For one descriptive norm item and the local injunctive norm item, each of which used a different four-point scale, I assessed how many people selected the higher two response options rather than the lower two. These results are summarized in Table 12.

Then, I first looked at the Cronbach's alpha for the four-item smoking stigma scale and the four-item descriptive norm perceptions scale and looked at the correlation between the two-item general injunctive norm measures (see Table 13). The descriptive norm perceptions scale had an alpha of .73, while the stigma scale had an alpha of .62. The correlation between the two general injunctive norm measures was .59. These values suggested that the reliability of each scale was acceptable. Further, when I used principal components analyses to assess the reliability of the descriptive norm perceptions and stigma scales, in each analysis all variables loaded onto a single component with an Eigenvalue larger than one.

I then created scale measures for descriptive norm perceptions, general injunctive norm perceptions and smoking stigma by taking the averages of the relevant items. The means and standard deviations of each of these scale variables, as well as the single-item measure of local injunctive norm perceptions, are summarized in Table 13.

Table 13. Mean Values and Scale Reliability for Measures of Smoking-Related Norm Perceptions and Stigma (n = 290)

	Mean (<i>SD</i>)	Cronbach's alpha
Descriptive Norm Perceptions	2.61 (.47)	.73
General Injunctive Norm Perceptions	2.12 (.60)	-
Local Injunctive Norm Perceptions	1.53 (.64)	-
Smoking Stigma	2.92 (.47)	.62

Conclusions & Implications for Study 2d

Findings from this set of studies were intended to both advance our understanding of how young non-tobacco users perceive the similarity of different tobacco use behaviors and their own similarity to individuals depicted using tobacco in YouTube videos, and to directly inform the design of study 2d. Regarding behavioral similarity, findings from study 2b suggest that some but not all tobacco use behaviors vary from one another in how similar they are seen to be to smoking cigarettes. Specifically, smoking hookah tended to be rated as somewhat more similar while vaping e-cigarettes tended to be rated as somewhat less similar compared to other tobacco use behaviors.

Regarding referent similarity, findings from 2c suggest that YouTube videos depicting tobacco use do differ from one another in their perceived and desired referent similarity ratings, with some videos being assigned consistently higher or lower scores for each of these constructs, although the consistency of scores given to each video varied. However, all videos were assigned relatively low scores for referent similarity; indeed, virtually no videos could be appropriately classified as 'high referent similarity' videos. Further, videos in different categories and featuring different tobacco use behaviors differed from one another in their assigned referent similarity scores.

As a whole, findings from these studies suggest that, while it might be possible to manipulate both behavioral similarity and referent similarity when designing the experimental conditions in study 2d, doing so would not be advisable. First, excluding e-cigarettes, which were not featured in any of the YouTube videos available for use in study 2d, only two pairs of tobacco use behaviors asked about in study 2b were found to be significantly different from one another in their behavioral similarity scores: (1) smoking hookah and using smokeless tobacco products and (2) smoking hookah and smoking pipes. Given that very few videos available for use in study 2d featured either hookah or pipe use, it would be difficult to design experimental conditions focused on these behaviors. Additionally, findings from 2c demonstrate that the referent similarity scores assigned to videos differed significantly depending on the tobacco use behaviors featured. Because of this relationship, it would be difficult to find sufficient numbers of videos that shared the same referent similarity scores but featured tobacco use behaviors that differed in the behavioral similarity scores they had been given.

Two limitations in applying the behavioral similarity findings from study 2b to the design of study 2d should be noted. First, there was somewhat of a mismatch between how behavioral similarity was measured in study 2b and how it would potentially be operationalized in study 2d. Specifically, in study 2b participants were asked to rate the similarity of different tobacco use behaviors based only on brief written descriptions of those behaviors (e.g., “How similar do you think the following behavior is to smoking cigarettes: *smoking a cigar?*”). In contrast, had I chosen to manipulate behavioral similarity in study 2d, participants would have seen a visual rather than written description of this behavior (e.g., a person smoking a cigar). It is possible that the

additional visual and auditory information that is available when seeing a tobacco use behavior performed in a video, as opposed to reading a written description of it, could alter participants' perceptions of the similarity of that behavior to smoking cigarettes.

Additionally, the behavioral similarity score estimates assigned to each tobacco use behavior in study 2b were based on a relatively small number of responses ($n = 50$) and so were not as stable as they would have been had I included a larger sample of participants. Thus, it is possible that more differences between the behavioral similarity scores given to each behavior would have been found if I had recruited more respondents for study 2b. However, even had more differences been found among the behavioral similarity scores assigned to different tobacco use behaviors, it would still likely not have been advisable to manipulate behavioral similarity in study 2d given the relationship found between videos' referent similarity scores and the tobacco use behaviors they featured.

Thus, rather than manipulate behavioral similarity in study 2d, I focused solely on videos that included a single tobacco use behavior: smoking cigarettes. This behavior was selected because it eliminated the need to consider behavioral similarity at all (since the behavior featured in the videos shown to participants and the behavior they were asked about in the outcome measures was identical), and because more videos featured cigarette smoking than any other tobacco use behavior and those videos had a wider range of referent similarity scores than did the videos depicting any other tobacco use behavior. In addition, because of the differences found in referent similarity scores assigned to videos in different categories, I accounted for category when designing the experimental conditions used within study 2d. Specifically, I focused on categories that included

videos with a range of different referent similarity scores. More information about how this was accomplished in the design of study 2d is provided in the chapter that follows.

The relatively low referent similarity scores given to all videos in study 2c represented another challenge in designing the experimental conditions used in study 2d. It is possible that these low scores were due, in part, to the study protocol used in study 2c. Because each participant saw 10 videos in a row that featured referents using tobacco, it is possible that these referents' identities as tobacco users was more salient in participants' minds when they made their assessments of perceived and desired similarity to them than it would have been if they had encountered these videos in a different context (e.g., during their routine YouTube use). While participants certainly considered factors other than tobacco use when making their perceived and desired similarity judgments (indeed if they had not we would not have observed the amount of variation we did in the referent similarity scores assigned to videos), it is possible that the increased salience of referents' tobacco user identities in this research context caused participants, all of whom were non-tobacco users, to rate the referents as less similar to themselves than they otherwise would have. Nonetheless, given the range of referent similarity scores assigned to videos in study 2c, it was not possible to design experimental conditions in study 2d that could truly be thought of as 'high referent similarity' and 'low referent similarity'; rather, videos could only be separated into 'higher' and 'lower' referent similarity groups.

Overall, findings from studies 2b and 2c proved useful in informing the design of study 2d. In particular, they allowed me to determine that it would not be possible to experimentally manipulate both behavioral similarity and referent similarity. In addition,

they highlighted certain challenges that would come up when designing the experimental conditions used in study 2d due to the relationship between referent similarity and video category and the limited range of referent similarity scores assigned to the videos available for use in study 2d. The strategies used to address these challenges will be described in the chapter that follows. Finally, the study 2c data capturing participants' smoking-related injunctive and descriptive norm perceptions and smoking stigma allowed me to assess the reliability of the scales I will use to measure these variables and determine the sample size needed in study 2d in order to have sufficient power to be able to detect meaningful effects on these variables.

Chapter 5. Study 2d - Testing the Effects of Referent Similarity in YouTube Videos Featuring Cigarette-Related Individual Norms on Young Non-Tobacco Use

Introduction

The prior studies that comprise this dissertation have all, in a sense, led up to study 2d. Study 1 provided evidence that the effects of past-week prevalence of tobacco and e-cigarette-related individual use depictions on young people's descriptive and injunctive norm perceptions differed depending on the combination of media source, behavior and type of norm perception considered. There were two unexpected results regarding the effects of individual tobacco use depictions. Specifically, the more views of videos depicting individuals using tobacco occurred in a given week, the lower smoking-related descriptive norm perceptions were among young people interviewed at the end of that week. Likewise, the more tweets featuring depictions of individual tobacco use were posted in a given week, the lower young people's smoking-related injunctive norm perceptions were that week. Based on a review of the literature and some preliminary analyses conducted using data from study 1, I proposed two variables that might explain these unexpected results: behavioral similarity and referent similarity. Because I was not able to test the effects of these variables directly in study 1, I sought to do so in study 2.

In studies 2a, 2b and 2c, I identified a corpus of YouTube videos that could potentially be used to examine how behavioral similarity and group identity shape the effects of exposure to media depictions of individual tobacco use on norm perceptions. Next these videos were coded for relevant characteristics and I examined how members of the target population (young non-tobacco users) perceived the similarity of different tobacco products to cigarette smoking and how they rated their own perceived and

desired similarity to the exemplars featured in YouTube videos that depict individual tobacco use. These studies showed that the relationship observed between the specific tobacco product depicted in a YouTube video and the perceived and desired similarity ratings assigned to the exemplar featured using that product in the video were not independent. I determined that it would not be possible to manipulate behavioral similarity and referent similarity separately in an experiment that used this corpus of YouTube videos.

Therefore, study 2d focuses solely on referent similarity and includes only videos that depict cigarette smoking. Specifically, using the referent similarity ratings assigned to videos in study 2c, I designed experimental conditions in which participants were shown a series of videos that differed from one another in their overall referent-self similarity scores. As was mentioned in the prior chapter, virtually none of the YouTube videos depicting individual tobacco use were assigned overall referent-self similarity scores that could be thought of as high; in other words, there was no video that featured an individual tobacco user whom average (all non-smoking) participants perceived to be similar to themselves or to whom they wanted to be similar. Therefore, the two experimental conditions used in this study featured individual tobacco use videos that were assigned ‘higher’ and ‘lower’ overall referent-self similarity scores rather than ‘high’ and ‘low’ overall referent-self similarity scores. I assessed how participants in the higher referent similarity condition compared to participants in the lower referent similarity condition on my outcome measures of interest. I also compared participants in each experimental condition to participants in the control condition, who did not watch any videos and just completed the outcome measures.

Hypotheses

The main hypotheses I tested in this study were pre-registered in advance; the pre-registration can be seen at <https://aspredicted.org/v7zs7.pdf>. The first of these hypotheses involved comparisons between participants in the higher referent similarity condition and participants in the lower referent similarity condition, all of whom saw videos depicting tobacco use. Compared to participants in the lower referent similarity condition, I predicted that participants in the higher referent similarity condition would report higher (i.e., more pro-tobacco) smoking-related descriptive norm perceptions and general injunctive norm perceptions and lower levels of smoking stigma.

In addition, I tested whether participants in the higher referent similarity condition would report higher local injunctive norm perceptions (i.e., more approval of smoking among their friends) compared to participants in the lower referent similarity condition. I was interested to see how the effect of condition on this variable would differ from the effect of condition on their perceptions of smoking-related injunctive norms in society as a whole. One might expect that people's perceptions of their friend's injunctive norms around smoking might be more stable and less susceptible to influence by experimental manipulations than their perceptions of smoking-related injunctive norms in society as a whole given that they would likely have comparatively more direct information (e.g., conversations with their friends) about their friends' smoking-related injunctive norms. However, one might also expect that an individual's perceptions of their friends' approval of their own smoking might also be more influenced by their perceptions of how similar they are or want to be to individuals seen smoking in YouTube videos. Social identity theory argues that seeing members of an "out-group,"

such as exemplars in YouTube videos who an individual believes are not similar to them and to whom they don't want to be similar, engage in a behavior can make them believe that behavior is less normative within their "in-group" (Hogg & Turner, 1987; Turner et al., 1989). Individuals' perceptions of the norms around smoking among their friends can be thought of as an in-group norm.

I was also interested in comparing the two experimental conditions to the control condition. I predicted that participants in the lower referent similarity condition would report lower smoking-related descriptive norm perceptions and general injunctive norm perceptions and higher levels of smoking stigma compared to participants in the control condition. I also predicted that participants in the higher referent similarity condition would have lower descriptive norm and general injunctive norm perceptions and higher levels of smoking stigma compared to participants in the control condition, although I expected these differences to be smaller than the differences observed between participants in the lower referent condition and participants in the higher referent condition.

Methods

Selection of Experimental Stimuli. For previously explained reasons, I chose to limit the videos that would be included in study 2d to only videos that depicted cigarette smoking. This left me with a total of 67 videos that could potentially be used as experimental stimuli. I then used the overall referent-self similarity variable, which, for each video, represented the average of the mean score on the desired referent similarity scale and the mean score on the perceived referent similarity scale assigned to that video by the participants in study 2c who had watched it, to categorize videos into 'higher' and

‘lower’ referent similarity groups. I first sorted videos by their overall referent-self similarity scores and then removed videos that had scores between the 47.5th and 52.5th percentiles (i.e., the middle 5% of videos) in order to help amplify, albeit only slightly, the difference between the higher and lower referent similarity groups on this variable.⁶ Videos that had overall referent-self similarity scores higher than the 52.5th percentile value were categorized as higher referent similarity, while videos that had overall referent-self similarity scores lower than the 47.5th percentile were categorized as lower referent similarity. After removing these videos, 62 videos that depicted individual cigarette smoking remained.

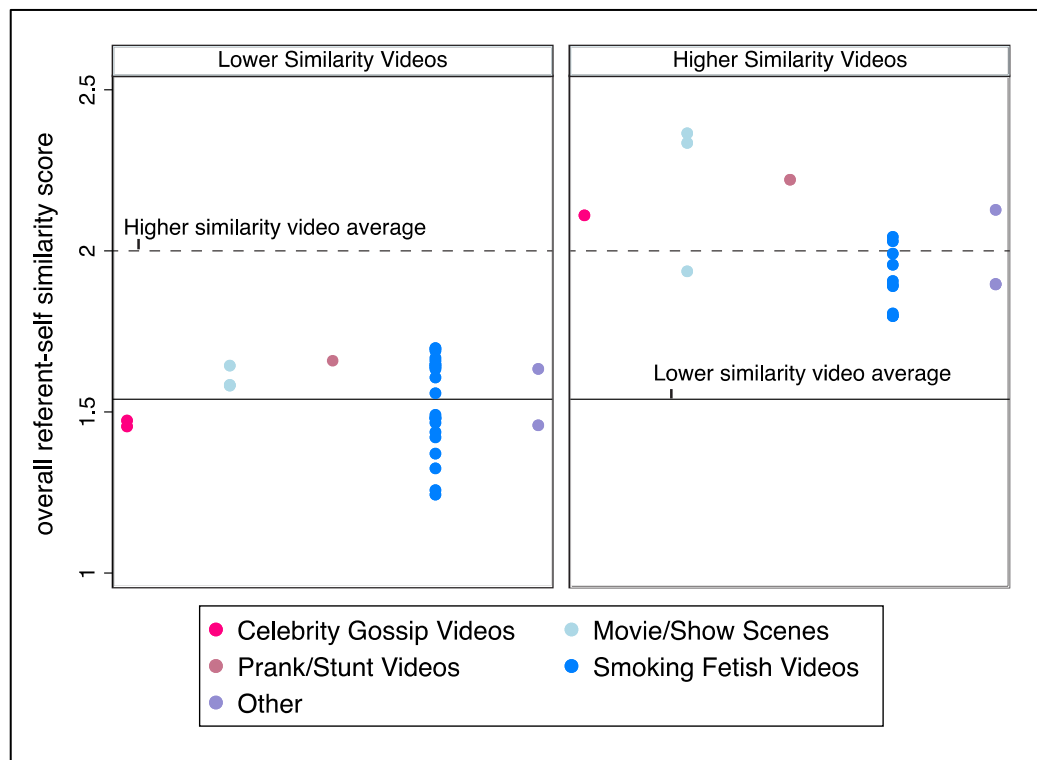


Figure 3. Distribution of Higher and Lower Referent Similarity Variables on Overall Referent-Self Similarity by Video Category

⁶ I had initially intended to remove videos with overall referent-self similarity scores between the 45th and 55th percentiles (i.e., the middle 10%) as well as remove videos with the largest ranges of referent similarity scores assigned to them by the participants who viewed them. However, because of the small number of videos available for use as study 2d stimuli I ultimately chose not to do so.

Results from study 2c indicated that overall referent-self similarity was related to video category; systematic differences were observed in the overall referent-self similarity scores given to videos in different categories. Due to this finding, I wanted to control for video category when designing the experimental conditions in study 2d to be sure that I could distinguish effects caused by overall referent-self similarity from effects caused by other variables that might be related to video category. I therefore eliminated videos that fell into categories for which there were not videos in both the higher and lower referent similarity groups. This led me to eliminate videos from four categories: anti-smoking videos, music videos, personal testimonial videos and review channel videos. Each of these categories only included videos featuring cigarette smoking that had been classified as higher referent similarity, although videos in the category featuring the use of other tobacco products, which were not included in study 2d, might have been given a wider range of referent similarity scores. For example, videos in the review channel category as a whole had a relatively wide range of overall referent-self similarity scores, but the videos within this category that featured cigarette smoking were all classified as higher referent similarity videos; therefore, this category of videos was not included in study 2d.

After removing these videos, I was left with a total of 49 videos, 31 of which were classified as lower referent similarity and 18 of which were classified as higher similarity. These videos fell into five categories: celebrity gossip videos, prank/stunt videos, movie/show scenes, smoking fetish videos, and ‘other’ videos. The distribution of higher and lower referent similarity videos by category is summarized in Table 14 and the distribution of overall referent-self similarity scores assigned to videos in each group is

depicted in Figure 3. It should be noted that there were not equal numbers of higher and lower referent similarity videos in each category, and some categories included very few videos. The stratified design that was used to deal with these issues is described in greater detail below.

Overall, the videos in the higher referent similarity condition had a mean overall referent-self similarity score of 2.00 ($SD = .17$) while the videos in the lower referent similarity condition had a mean overall referent-self similarity score of 1.54 ($SD = .13$). A univariate OLS regression model predicting overall referent-self similarity from a dummy variable representing whether videos had been assigned to the higher referent similarity condition (vs. the lower referent similarity condition) confirmed that videos in these two groups differed significantly from one another in their overall referent-self similarity scores ($Coef = .46, p < .001$). Thus, the difference in overall referent-similarity scores between videos in the two conditions was statistically significant as well as relatively large (representing approximately three standard deviations). However, while the overall referent similarity scores assigned to videos in the higher similarity condition were significantly higher than those assigned to videos in the lower similarity condition, they should still be thought of as low given the range of possible values (1- 4) that videos could have been assigned on the perceived and desired referent similarity scale. Therefore, in study 2d it was not possible to compare the effects of videos that had truly been scored high on referent similarity to the effects of videos that been given low scores. While this limitation was perhaps unavoidable, it certainly has implications for possible findings from this study, as discussed in greater detail below.

Table 14. Distribution of Higher and Lower Referent Similarity Videos by Category (total $N = 49$)

Video Category	Higher Referent Similarity ($N = 18$)	Lower Referent Similarity ($N = 31$)
Celebrity gossip videos	1	2
Movie/show scenes	3	3
Prank/stunt video	1	1
Smoking fetish video	10	23
Other	3	2

Note: Videos that fell into the ‘other’ category did not fit into any of the other categories included in the categorization schema described in Chapter 3. Among the ‘other’ videos included in the group of lower referent similarity videos used in study 2d, one was an edited news clip featuring a man smoking a cigarette after recently being shot and the other described a member of the terrorist organization ISIS who had allegedly been executed for smoking cigarettes. Among the ‘other’ videos included in the higher referent similarity videos used in study 2d, one was a video filmed by a bystander of a celebrity smoking a cigarette as he left their airport, one was a clip from a video blog featuring a father and two small children discussing smoking as they drove past a woman smoking a cigarette outside of a business, and the last was a video of a man using exhaust flames from a luxury car to light his cigarette.

I also checked whether videos in the higher and lower referent similarity conditions differed from one another in their pro- and anti-tobacco valence by making use of the fact that each of these videos had previously been coded for valence in an earlier study (Kwanho Kim et al., 2020). Overall, 74% of lower referent similarity videos ($n = 23$) and 61% ($n = 11$) of higher referent similarity videos were coded as pro-tobacco while 10% ($n = 3$) of lower referent similarity videos and 11% ($n = 2$) of higher referent similarity videos were coded as anti-tobacco. Only 3% ($n = 1$) of lower referent similarity videos and 6% ($n = 1$) of higher referent similarity videos contained both pro- and anti-tobacco (i.e., mixed) valence. An additional 13% of lower referent similarity videos ($n = 4$) and 22% ($n = 4$) of higher referent similarity videos were coded as containing neither pro- nor anti-tobacco valence. I used a Fisher’s Exact test to determine whether condition

was significantly associated with valence and results from this test confirmed that the two variables were not significantly related ($p = .81$).

Study Protocol. Prior to starting study 2d, I conducted power analyses in Stata version 15 using the data available from study 2c to estimate how many participants should be included in study 2d. Through these analyses, I determined that including 117 people in each of the three experimental conditions (total $n = 351$) would give me sufficient power to detect a small effect on the three main outcome measures of interest – namely, the descriptive norm perceptions scale, general injunctive norm perceptions scale, and stigma scale – using $\alpha = .05$ and power = .80 (Cohen, 1988). Thus, I aimed to recruit at least 351 participants for study 2d.

Study 2d was launched in April 2021. Like for studies 2b and 2c, participants in study 2d were recruited from Amazon Mechanical Turk using the CloudResearch platform and first completed a screening survey administered through Qualtrics that was identical to the screening survey used to identify eligible participants for studies 2b and 2c. This survey included demographic questions as well as questions about participants' prior tobacco use (see Appendix 3 for the full instrument). Individuals who took part in study 2b or study 2c were not permitted to participate in study 2d. All individuals who completed the screening survey, which took about 3 minutes to complete, received \$1 in compensation and all eligible participants who went on to complete study 2d, which took about 12 minutes for participants in the two video conditions and about 2 minutes for participants in the control condition, received an additional \$4 in compensation.

Because the referent similarity ratings assigned to videos in study 2c and the behavioral similarity ratings assigned to different behaviors in study 2d were intended to

roughly capture how participants in study 2d would have responded to the same measures, I had intended to draw participants in all three studies from the same population. Therefore, I initially made the eligibility criteria used in study 2d identical to those used in studies 2b and 2c. Participants had to be located in the United States, be between the ages of 18 and 28, and have completed at least 100 prior tasks on MTurk and received at least a 70% approval rating for these tasks; CloudResearch functions were used to identify individuals who met these criteria (Litman et al., 2017). Additionally, participants could not be current tobacco users or ever have been regular tobacco users. Participants' responses to the screening survey questions about tobacco use were used to determine whether they met these criteria. Specifically, participants were deemed ineligible if they reported using any tobacco product other than e-cigarettes within the past 30 days, responded "yes" to the question that asked whether they were a current smoker, reported having ever used any tobacco product other than e-cigarettes "fairly regularly" or reported having smoked more than 100 cigarettes in their lifetime.

However, after experiencing difficulties early on in recruiting eligible participants, I ultimately chose to adjust the eligibility criteria used. Specifically, I expanded the eligible age range to include individuals between the ages of 18 and 30 and lowered the requirement for their percentage approval on prior MTurk tasks to 50%. Recognizing that making these changes to the eligibility criteria was not ideal, I planned to assess the extent to which they had affected study 2d results through analyses described in greater detail in the Data Analysis section.

As I identified eligible participants through the screening survey, I randomly assigned them to one of the three conditions on a rolling basis. Participants in each

condition were directed to a Qualtrics survey. For participants in the control condition, this survey was very brief. After agreeing to the informed consent statement, participants were asked the same set of questions that had been used in study 2c to measure smoking-related descriptive norm perceptions, general and local injunctive norm perceptions, and smoking related stigma (see Table 6). Both the order in which the blocks of questions used to measure each construct were presented and the order of questions within each block was randomized for each participant.

Participants in each of the two video conditions were also directed to a Qualtrics survey. After agreeing to an informed consent statement and viewing an introductory page that explained the task they would be completing, participants were then shown six short videos and asked questions about each. Participants in the higher referent similarity condition were shown a stratified random sample of higher referent similarity videos while participants assigned to the lower referent similarity condition were shown a stratified random sample of lower referent similarity videos.

As depicted in Figure 4, the samples of videos shown to participants in each condition were stratified by category. Three of the six videos shown to participants in the higher and lower referent similarity conditions were smoking fetish videos that were randomly selected from the pool of higher and lower referent similarity smoking fetish videos, respectively. These videos made up half of the videos shown to participants in each condition because smoking fetish videos constituted the largest category of both higher and lower referent similarity videos. Participants in each condition were also shown one randomly selected movie/show scene video and one randomly selected video from the ‘other’ category. Finally, participants were shown either a celebrity gossip video

or a prank/stunt video. Neither of these categories of videos was shown to all participants in either the higher or lower referent similarity conditions because there was only one example of a celebrity gossip video among the higher referent similarity videos and only one example of a prank/stunt video in each of the pools of higher and lower referent similarity videos. I wanted to avoid having any single video be shown to all participants in either the higher or lower referent similarity conditions. Therefore, I combined these categories and randomly assigned half of the participants in each condition to see a celebrity gossip video and half to see a prank/stunt video.

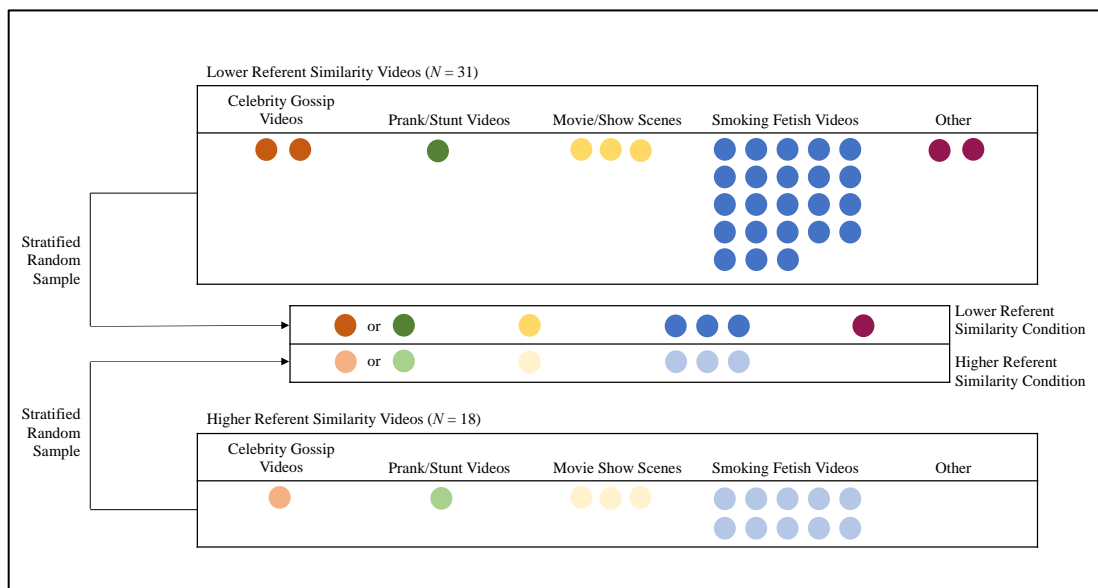


Figure 4. Overview of Stratified Random Selection Process Used to Select Videos to Be Shown to Participants in Each Video Condition

The order in which participants were shown each of their six assigned videos was randomized. After viewing each video, participants were asked two questions. As in study 2c, the first of these questions asked whether they had seen the video prior to the study. The second of these questions was an attention check measure. After each video,

participants were shown one randomly selected question from the three attention check measures, which asked: whether the video had featured any background music, whether more than one person had spoken during the video, and whether any text had appeared on the screen during the video. As described in the data analysis section below, participants' responses to these attention check measures were used to assess whether participants were generally paying attention to the task. After viewing their six videos and answering the questions asked about each, participants were then asked questions about their smoking-related descriptive and injunctive norm perceptions and smoking stigma. Like for the control condition, both the order in which the blocks of questions used to measure each construct were presented and the order of questions within each block was randomized for each participant.

Data Analysis. Analyses were conducted using R version 3.4 and Stata version 15. I first looked at descriptive statistics for the demographic variables included in the screening survey and assessed how participants who completed the screening survey and eligible participants who went on to complete study 2d compared on these variables. I also compared participants who completed study 2d to the participants who completed studies 2b and 2c. I then looked at how participants in the video conditions responded to the attention check questions described above. Participants who got fewer than half of the attention check measures correct were dropped from the study. Of note, only participants in the video conditions, and not participants in the control condition, were asked attention check questions and so it was only possible to drop participants in these conditions on the basis of their responses. This limitation is discussed later on in this chapter.

Next, I assessed whether the outcome measure items I intended to use to measure smoking-related descriptive norm perceptions and smoking stigma constituted reliable scales for these constructs using Cronbach's alpha and principal components analyses. I also assessed the reliability of the two-item general injunctive norm perceptions scale by looking at the correlation between the two items. I then created scales for each of these variables by first standardizing each item and then taking the average of the standardized responses to each of the items. So, to create the scale for smoking stigma, for example, I first standardized each of the four smoking stigma items and then took the average of these four standardized values.

I used a series of OLS regression models to test the effects of condition on each of the main outcome variables: smoking-related descriptive norm perceptions, general and local injunctive norm perceptions, and smoking stigma. For each of these outcome variables, I fit two models, the first of which included a binary variable indicating whether participants were in the higher referent similarity condition or the lower referent similarity condition (participants in the control condition were not included in these analyses). The second model I fit for each outcome variable treated condition as a three-category categorical variable (i.e., lower referent similarity condition, higher referent similarity condition, and control condition).

In addition to these main analyses, I also conducted three additional sets of analyses. The first of these tested the effects of a continuous variable representing the overall referent-self similarity scores assigned to the videos seen by each participant. Because the videos within each condition also varied in their overall referent-self similarity scores and each participant was assigned to see only a subset of the videos in

their condition, participants within each condition also differed from one another in the average overall referent-self similarity score for the six videos they had been assigned to view. Therefore, in addition to testing the effects of participants' conditions on the outcome variables, I also tested the effects of a continuous version of the overall referent-self similarity variable in order to assess the effects of both between-condition and within-condition variation in this variable. I computed, for each participant in both video conditions, the mean overall referent-self similarity score for the six videos that they had been assigned to view. I then fit OLS linear regression models to test whether this continuous variable predicted each of the outcome variables.

I also conducted analyses to test whether the changes made to the eligibility criteria used in study 2d affected results. I created two variables for these analyses. The first (*over28*) was a binary variable representing whether participants were between the ages of 18 and 28 (i.e., in the initial age range considered eligible before the eligibility criteria were changed) or between the ages of 29 and 30. Approximately 12% of participants were 29-30 years old. The second (*aftereligibilitychange*) was a binary variable representing whether participants completed the screening survey before or after the date on which I changed the eligibility criteria. Because MTurk does not allow researchers to see individual MTurkers' approval ratings on prior tasks that they had completed, this latter variable was used to represent whether participants were recruited to the study when the initial approval rating criterion was still in place (which required participants to have at least a 70% approval rating on prior tasks) or if they had been recruited after the approval rating requirement had been lowered to 50%. Participants recruited after the approval rating criterion had been loosened, who made up

approximately 33 percent of the sample, could potentially have had lower approval ratings on their prior tasks. I assessed the correlations between each of these variables and the outcome measures. Then I fit a series of multivariate OLS regression models predicting each outcome variable from condition, one of these new variables (either over28 or aftereligibilitychange) and the interaction between condition and this variable.

Results

A total of 877 participants completed the screening survey. Of those, 447 met the eligibility criteria and were invited to participate in study 2d and 357 of the invited participants went on to complete study 2d. Table 15 summarizes demographic information about the participants who completed the screening survey and went on to complete study 2d. This table also presents demographic information about the participants who completed studies 2b and 2c for comparison purposes.

As was the case for studies 2b and 2c, both the group of participants who completed the screening survey and the group of participants who went on to complete study 2d were geographically diverse. People from 47 states and the District of Columbia participated in the screening survey, and people from 42 states completed study 2d. Overall, the participants who completed study 2d did not differ very much on demographic characteristics from either the participants who completed the screening survey or the participants who were found to be eligible (whose data was analyzed but is not included in Table 15).

Table 15. Demographic Characteristics for Participants who Completed the Screening Survey Prior to Study 2d or Participated in Study 2b, 2c or 2d

	Study 2b (n = 52)	Study 2c (n = 304)	Pre-2d Screening Survey (n = 877)	Study 2d (n = 357)
Age in years (Mean (SD))	22.8 (2.2)	23.3 (2.5)	25.8 (2.9)	25.0 (3.0)
<i>Gender</i>				
Male	32.7%	42.8%	44.1%	39.1%
Female	63.5%	54.9%	53.5%	57.8%
Transgender or non-binary	3.8%	2.0%	1.6%	2.5%
Prefer not to answer / to self-describe	0.0%	0.3%	0.8%	0.6%
<i>Race</i>				
American Indian or Alaskan Native	0.0%	0.0%	0.5%	0.0%
Asian	13.5%	18.4%	11.6%	15.6%
Black or African American	11.5%	10.5%	11.4%	6.5%
Native Hawaiian or Pacific Islander	0.0%	0.3%	0.1%	0.0%
White	63.5%	63.5%	67.6%	72.8%
More than one	7.7%	4.3%	4.7%	2.8%
Prefer not to answer/ to self-describe	3.8%	3.3%	4.1%	2.3%
<i>Ethnicity</i>				
Latinx / Hispanic	13.5%	9.2%	12.9%	10.2%
Not Latinx / Hispanic	86.5%	90.5%	86.1%	89.5%
Prefer not to answer	0.0%	0.3%	1.0%	0.3%
<i>Highest level of education</i>				
Less than high school degree	1.9%	1.0%	0.6%	1.1%
High school graduate or GED	9.6%	10.2%	9.9%	9.1%
Some college but no degree	34.6%	29.6%	20.2%	21.2%
Associate degree in college	1.9%	8.9%	9.7%	8.5%
Bachelor's degree in college	46.2%	42.4%	48.0%	48.7%
More than a bachelor's degree	5.8%	7.9%	11.6%	11.3%
<i>Type of residential area</i>				
A large city	19.2%	24.7%	30.9%	25.8%
A rural area	0.0%	10.5%	7.6%	7.1%
A small city or town	21.2%	27.0%	22.8%	24.9%
A suburb near a large city	59.6%	37.8%	38.7%	42.2%

While the participants who completed study 2d resembled those who completed studies 2b and 2c, there did appear to be a few differences so I conducted further analyses to test whether any differences between participants in each study were significant. To assess whether participants differed from one another on age, I used a linear regression model predicting age from a binary variable reflecting whether participants were in study 2d or one of the prior studies. As might be expected given that, after the eligibility criteria were expanded, participants between the ages of 18 and 30 were considered eligible for study 2d while only those aged 18-28 were considered eligible for the earlier studies, participants in study 2d were significantly older than those in studies 2b and 2d ($Coef = 1.68, p < .001$).

I used chi-squared tests to assess whether participants in the three different studies differed from one another on every other measured demographic variable. These analyses showed that participants in the three studies did not differ from one another on gender ($Chi-squared = 2.99, p = .81$), ethnicity ($Chi-squared = 1.22, p = .87$), or education ($Chi-squared = 12.54, p = .25$). There was a marginally significant difference in the type of residential area participants in each study lived in ($Chi-squared = 12.55, p = .05$), likely due to the lack of participants from rural areas in study 2b. Additionally, there was a difference in the racial makeup of participants in each study; there were proportionately more white participants in study 2d compared to the other two studies ($Chi-square = 7.44, p = .02$). These differences between the participants in each condition is a limitation that will be discussed later on in this chapter.

Among the 447 participants who were determined to be eligible, roughly a third were assigned to each of the three conditions. Of the 357 participants who chose to

participate in study 2d, 121 were randomly assigned to the lower referent similarity group, 118 were randomly assigned to the higher referent similarity group and 118 were randomly assigned to the control group. I then assessed participants' responses to the attention check measures, which were asked of all participants in the two video conditions. Overall, I found that the vast majority of participants had responded correctly to most of the attention check measures. The mean score for the number of correct responses to the six attention check questions was 5.24, the median score was 5, and the vast majority (95%) responded correctly to four or more of the questions. Only four participants got fewer than half the attention check measures correct (three in the lower similarity condition and one in the higher similarity condition). These participants were dropped from the study and their data was not included in any of the other analyses presented below.

I then turned to assessing participants' responses to the outcome variables of interest in this study. First, to get a general sense of how people in each condition were responding to the outcome measures, I looked at participants' responses to each descriptive norm, general injunctive norm, local injunctive norm and stigma item by condition. For the majority of these items, which were asked using a four-point Likert scale with response options ranging from 'strongly disagree' to 'strongly agree', I assessed how many people responded 'agree' or 'strongly agree'. For one descriptive norm item and the local injunctive norm item, each of which used a different four-point scale than the other items, I assessed how many people selected the higher two response options rather than the lower two. These results are summarized in Table 15.

Table 16. Participants' Responses to Each Outcome Measure Item by Condition

Type of Outcome Measure	Item	Lower Similarity (n = 118)	Higher Similarity (n = 117)	Control (n = 118)
		<i>% Agree or Strongly Agree</i>		
Descriptive Norms	In the U.S. many people smoke cigarettes	82.2%	83.8%	76.3%
	Most people my age smoke cigarettes	27.1%	20.5%	23.7%
	Smoking cigarettes is not at all common in the U.S.	11.9%	13.7%	14.4%
		<i>% About Half or Most</i>		
	How many people your age would you guess smoke cigarettes?	32.2%	34.2%	31.4%
		<i>% Agree or Strongly Agree</i>		
Smoking Stigma	Most people would not hire a smoker to take care of their children	82.2%	89.7%	75.4%
	Most non-smokers would be reluctant to date someone who smokes	88.1%	92.3%	85.6%
	Most people believe that smoking is a sign of personal failure	45.8%	32.5%	48.3%
	Most people think less of a person who smokes	68.6%	75.2%	69.5%
		<i>% Agree or Strongly Agree</i>		
General Injunctive Norms	Most people consider smoking cigarettes to be an appropriate behavior	33.1%	23.1%	22.0%
	Society in general considers smoking cigarettes to be an appropriate behavior	40.7%	28.2%	23.7%
		<i>% Approve or Strongly Approve</i>		
Local Injunctive Norms	How do you think your closest friends would feel about you smoking cigarettes every day?	4.2%	3.4%	10.2%

Note: All items that used the four-point strongly disagree to strongly agree Likert scale included the stem: "How much do you agree or disagree with the following statement . . ." One descriptive norm item ("smoking cigarettes is not at all common in the U.S.") was reverse-coded to create the scale.

Prior to creating the scale measures for smoking-related descriptive norm perceptions, general injunctive norm perceptions, and smoking-related stigma, I first reverse-coded the one descriptive norm item that was initially negatively worded and then created standardized versions of all of the items that would be included in any of these scales. I also created a standardized version of the single-item local injunctive norm perceptions item. I then assessed the reliability of the descriptive norm perceptions and stigma scales using Cronbach's alpha and principal components analyses (see Table 16). The Cronbach's alpha for the four standardized descriptive norm perception items was .76 and a principal component analysis showed that all four items loaded onto a single component with one Eigenvalue greater than one. The Cronbach's alpha for the four standardized stigma items (.60) was lower but still acceptable, and these items also loaded onto a single component with only one Eigenvalue larger than one in a principal components analysis. I also checked the reliability of the general injunctive norm perceptions scale by looking at the correlation between these two items; this correlation was .63. After determining that each scale's reliability was acceptable, I created scales for descriptive norm perceptions, general injunctive norm perceptions and smoking-related stigma by taking the average of the standardized items used to measure each construct. Table 17 includes the mean values for each of these outcome variables by condition.

Table 17. Mean Values and Scale Reliability for Standardized Measures of Smoking-Related Norm Perceptions and Stigma (total $n = 353$)

	Cronbach's alpha	<u>Mean Scores (<i>SD</i>)</u>		
		Lower Similarity Condition ($n = 118$)	Higher Similarity Condition ($n = 117$)	Control Condition ($n = 118$)
Descriptive Norm Perceptions	.76	.05 (.80)	-.02 (.71)	-.03 (.78)
General Injunctive Norm Perceptions	-	.12 (.97)	-.004 (.87)	-.12 (.85)
Local Injunctive Norm Perceptions	-	-.14 (.90)	-.02 (.94)	.16 (1.14)
Smoking Stigma	.60	.04 (.73)	.03 (.60)	-.07 (.69)

Using these newly created outcome variables, I fit a series of OLS regression models to test my hypotheses. The first set of models I fit compared participants in the two experimental groups to one another on each outcome variable; these models included a single binary predictor variable indicating whether participants were in the higher referent similarity condition vs. the lower referent similarity condition (participants in the control condition were not included in these models). Results from these models are summarized in Table 17. Overall, I did not find any significant effects. Participants in the higher similarity condition did not differ from those in the lower similarity condition in their smoking-related descriptive norm perceptions, general or local injunctive norm perceptions or smoking stigma. Thus, I did not find evidence to support any of my hypotheses about differences between these conditions.

Table 18. Results from OLS Regression Models Used to Test for Differences Between the Two Video Conditions on Each Outcome Measure ($n = 235$)

Variable	Descriptive Norm Perceptions Model		General Injunctive Norm Perceptions Model		Smoking Stigma Model		Local Injunctive Norm Perceptions Model	
	B	SE	B	SE	B	SE	B	SE
Higher Similarity Condition	-.08	.10	-.13	.12	-.02	.09	.13	.12
Constant	-.13	.16	.25	.19	.06	.14	-.27	.19
R ²	.003		.005		.0002		.005	

* $p < .05$, ** $p < .01$, *** $p < .001$

Note: Because 118 participants were in the lower referent similarity condition and 117 were in the higher referent similarity condition, $n = 235$ for each model.

I then fit a second set of models to be able to compare participants in each of the video conditions to participants in the control condition. In these models, condition was treated as a three-category categorical variable with dummy variables for the lower referent similarity and higher referent similarity conditions with the control condition as the reference. Results from these models are summarized in Table 19. The model used to test the effects of condition on participants' smoking-related descriptive norm perceptions showed that neither participants in the lower referent similarity nor participants in the higher referent similarity condition differed significantly from participants in the control condition. Likewise, neither participants in the lower referent similarity condition nor participants in the higher referent similarity condition differed significantly from participants in the control condition in their levels of smoking stigma. In contrast, participants in the lower referent similarity condition did differ significantly from those in

the control condition in their general injunctive norm perceptions ($B = .24, p = .04$); however, this effect was not in the expected direction. Contrary to my hypothesis, participants in the lower referent similarity condition had more pro-tobacco general injunctive norm perceptions than did participants in the control condition. Participants in the higher referent similarity condition did not differ significantly from participants in the control condition in their general injunctive norm perceptions.

Table 19. Results from OLS Regression Models Used to Test for Differences Between the Two Video Conditions and the Control Condition on Outcome Measures (n = 353)

<i>Variable</i>	<i>Descriptive Norm Perceptions Model</i>		<i>General Injunctive Norm Perceptions Model</i>		<i>Smoking Stigma Model</i>		<i>Local Injunctive Norm Perceptions Model</i>	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Condition								
Lower Similarity	.09	.10	.24*	.12	.11	.09	-.31*	.13
Higher Similarity	.01	.10	.11	.12	.09	.09	-.18	.13
Constant	-.03	.07	-.12	.08	-.07	.06	.16	.09
R ²	.003		.01		.001		.02	

* $p < .05$, ** $p < .01$, *** $p < .001$

The lower referent similarity condition also had a significant effect on local injunctive norm perceptions and this effect was in the hypothesized direction. Compared to participants in the control condition, participants in the lower referent similarity condition reported more anti-tobacco local injunctive norm perceptions (i.e., less approval of their smoking among their close friends) ($B = -.30, p = .02$). Participants in the higher referent similarity condition did not differ significantly from participants in the

control condition in their local injunctive norm perceptions ($B = -.18, p = .17$) although they did also tend to have more anti-tobacco local injunctive norm perceptions than did participants in the control condition.

In addition to these analyses, I also fit a series of univariate OLS regression models predicting each outcome variable from a continuous variable that represented, for each participant in the two video conditions, the average overall referent-self similarity score for the six videos that participant had been assigned to see. Participants in the control condition were not included in these analyses because they had not seen any videos; thus the n included in each of these models was 235. Results from these models showed that this variable did not have a significant effect on any of the outcome measures. It did not significantly affect descriptive norm perceptions ($B = -.15, p = .47$), general injunctive norm perceptions ($B = -.21, p = .41$), smoking stigma ($B = -.02, p = .93$) or local injunctive norm perceptions ($B = .31, p = .23$).

I then checked whether the variables I created to represent whether participants were over the age of 28 (*over28*) and whether participants were recruited after I had changed the eligibility criteria used in this study (*aftereligibilitychange*) were correlated with the outcome variables in this study. The correlations between *over28* and general injunctive norm perceptions ($R = .07, p = .20$), smoking stigma ($R = -.02, p = .76$) and local injunctive norm perceptions ($R = .05, p = .35$) were all small and not statistically significant. However, the correlation between *over28* and smoking-related descriptive norm perceptions was larger and marginally significant ($R = .10, p = .06$).

Aftereligibilitychange was not significantly related to any of the outcome variables including descriptive norm perceptions ($R = .07, p = .18$), general injunctive norm

perceptions ($R = .07, p = .17$), smoking stigma ($R = -.06, p = .22$) or local injunctive norm perceptions ($R = -.05, p = .33$).

I then fit a series of OLS regression models predicting each outcome variable from the following predictor variables: condition (represented by dummy variables for each of the two video conditions), over28 or aftereligibilitychange, and the interaction between condition and over28 or aftereligibilitychange, respectively. Results from these regression models are summarized in tables 1 and 2 in Appendix 4. As can be seen from these tables, neither over28 nor aftereligibilitychange had a significant main effect in any of the models. There were also no significant interaction effects between over28 and condition, and only one significant interaction effect between aftereligibilitychange and condition. Specifically, in the model predicting smoking stigma there was a significant negative interaction between the higher referent similarity dummy variable and aftereligibilitychange ($B = -.48, p = .01$). However, because there were no significant main effects of this variable in any of the models I fit and only one significant interaction effect, I did not take additional steps to control for its effects such as including aftereligibilitychange as a covariate in the analyses I used to test my main hypotheses.

Discussion

This study tested how exposing young non-tobacco users to YouTube videos depicting smokers who differed in the referent similarity ratings that had been assigned to them by a sample of young adult non-tobacco users in a prior study affected their smoking-related descriptive norm perceptions, injunctive norm perceptions and smoking-related stigma. Through doing so, it was intended to help expand our understanding of how group identity perceptions influence whether and how tobacco use depictions in

media affect norm perceptions and stigma. As will be described in the chapter that follows, findings from this study can also help us better understand young people's tobacco-related norm perceptions and stigma, which is important given that each of these variables can affect young people's tobacco use and widespread stigma may also have reverberating consequences for the health and well-being of tobacco users.

Overall, the study did not find any differences in descriptive or injunctive norm perceptions or smoking stigma between participants assigned to the higher referent similarity condition and participants assigned to the lower referent similarity condition. Participants in the higher referent similarity condition also did not differ from participants in the control condition on any of these outcomes. However, participants in the lower referent similarity condition did differ from participants in the control condition, who had not seen any videos, in both their general and local injunctive norm perceptions (no differences were found in their descriptive norm perceptions or smoking stigma). As expected, participants in the lower referent similarity condition reported more anti-tobacco injunctive norm perceptions (i.e., more disapproval of their smoking) among their friends. However, contrary to my predictions, participants in the lower referent similarity condition reported more pro-tobacco general injunctive norm perceptions. In other words, while participants in the lower referent similarity reported higher levels of friend disapproval of their own smoking compared to participants in the control condition, they were more likely to report that smoking was a behavior that was generally socially approved.

It is important to note that the differences in injunctive norm perceptions observed between participants in the lower referent similarity condition and participants in the

control condition cannot be specifically attributed to the effects of the referent similarity manipulation. While these findings do allow us to say that being exposed to videos that had been assigned low referent similarity scores caused participants to differ on measures of injunctive norm perceptions compared to participants in the control condition, who did not see any videos, we cannot say that these effects were shaped by referent similarity considerations and not by other characteristics of the videos in question. If these differences were indeed driven by referent similarity, it is possible that the contrasting results seen for local and general injunctive norm perceptions could be due to differences in how group identity judgments related to smoking depictions in media affect each type of norm perception. Viewing instances of smoking performed by exemplars who were seen as dissimilar to themselves and not people to whom they would like to be similar might have caused participants to develop more anti-smoking *in-group* norm perceptions. These perceptions might have been captured in their responses to the local injunctive norms measure but might not have generalized to their responses to questions about the injunctive norms around smoking in society as a whole. Instead, their responses to the latter questions might have been impacted by exposure to the stimuli through a different pathway; for example, seeing repeated instances of people who smoke and who, one might assume, approve of smoking, might have caused participants to believe smoking approval was more common. However, while these results are intriguing, any interpretation of them must be taken with a grain of salt given that they were unexpected, and the two inconsistent results occurred in a context of ten other non-significant tests of the hypotheses.

Limitations. Some limitations must be acknowledged that influence both the interpretation of results in this study and our ability to generalize findings from it beyond this particular research context. First, findings from studies 2b and 2c constrained both the extent to which I was able to manipulate referent similarity in the videos used in this study as well as which videos I was able to include. No videos were given high overall referent-self similarity scores in study 2c and thus no videos that could appropriately be thought of as high in referent similarity could be included in study 2d. I was also not able to include videos featuring other tobacco use behaviors besides cigarette smoking and was only able to include videos from certain categories. It is possible that findings would have been different had videos featuring different tobacco use behaviors or falling into different categories had been included.

Further, while I was able to control for the effects of video category through using a stratified design, the number of videos included from each category was very small. It is possible that these videos differed in consequential ways from other videos in the same category as well as from videos in different categories. While I did check whether videos differed from one another in their anti- or pro-tobacco valence and did not find differences between the valence of videos in each condition, I was not able to control for other video-level characteristics that might have differed between the two conditions and affected participants.

Additionally, only participants in the two video conditions were asked attention check measures and eliminated based on how they responded to them; participants in the control condition were not. This decision was made when designing the study because I was particularly concerned about participants in the video conditions not paying close

attention given the longer amount of time required of them to complete the study and the number of videos they were asked to watch. In practice, this difference between the video conditions and the control condition did not have any substantial effects on the study results as only four participants in the video conditions were eliminated for failing the attention check assessment by answering fewer than half of the attention check questions incorrectly. However, had more participants in the video conditions failed this attention check assessment, I would not have been able to exclude them from the study without risking biasing the results. It is also possible that participants in the control condition were not paying careful attention to the questions they were being asked and would have failed an attention check assessment if they had been given one. However, this seems unlikely given the brief length of the survey that participants in the control condition were asked to complete.

Finally, it is possible that the ways in which participants in study 2d differed from participants in study 2c affected my results. While some of these differences may have been due to chance, some were certainly caused by having to change the eligibility criteria used in study 2d so that it no longer matched the criteria used in study 2c.

Chapter 6. General Discussion

Summary of Results

This dissertation set out to explore how two variables – behavioral similarity and group identity, i.e., perceived and desired referent similarity – shape the effects of exposure to media depictions of individuals using tobacco on young people’s smoking-related norm perceptions and smoking stigma. Study 1 provided evidence of heterogeneity in the effects of such exposures; specifically, it showed that the direction and significance of the effects of changes in the weekly prevalence of individual tobacco use depictions in media on young people’s norm perceptions differed depending on the combination of media source and type of norm perception considered. The more individual tobacco use depictions were featured in traditional long-form media sources (the AP newswires, broadcast news, newspapers, and popular websites) within a given week, the higher (i.e., more pro-tobacco) young people’s smoking-related descriptive and injunctive norm perceptions were at the end of that week. In contrast, the more individual tobacco use depictions were featured in tweets within a given week, the lower (i.e., more anti-tobacco) young people’s injunctive norm perceptions were, and the more views of YouTube videos featuring individual tobacco use depictions occurred within a given week, the lower young people’s descriptive norm perceptions were. Without a clear explanation for these contrasting results, I hypothesized that behavioral similarity and referent similarity might have contributed to the observed heterogeneity and sought to test the effects of these variables through study 2.

In study 2, I limited my focus to the effects of YouTube videos featuring individual tobacco use depictions on young non-tobacco users. In study 2a, I drew a

sample of YouTube videos from the corpus used in study 1 that had previously been coded using supervised machine learning classifiers (see Liu et al., 2019 for more details) as containing individual tobacco use depictions. Another coder and I coded these videos for characteristics relevant to their suitability for use as experimental stimuli in an experiment testing the effects of behavioral similarity and referent similarity. Ultimately, we identified 152 videos that could be used in such a study. These videos featured a variety of different tobacco use behaviors and fell into a variety of different categories, indicating that they might feature a range of different referents.

Studies 2b, 2c and 2d all involved young non-tobacco user participants recruited from Amazon Mechanical Turk. In study 2b, I had participants ($n = 50$) rate different tobacco use behaviors for their similarity to cigarette smoking in order to test for differences in their perceived behavioral similarity. Results from this study demonstrated that there were some differences in how young non-tobacco users perceived the similarity of different tobacco use behaviors. Specifically, participants rated using e-cigarettes as less similar to smoking cigarettes compared to most other tobacco use behaviors. Participants also rated smoking hookah as more similar to smoking cigarettes compared to both using smokeless tobacco products and smoking pipes. However, while differences were observed, I ultimately decided that it would not be possible to manipulate behavioral similarity and referent similarity in the same experiment, as discussed below.

In study 2c, I had each participant ($n = 290$) watch 10 randomly selected videos from the 152 selected through study 2a and answer questions about their perceived and desired similarity to the individual depicted using tobacco in each video. I assessed whether there was consistency in how participants, who represented a diverse group of

young adult non-tobacco users, rated their similarity to each referent. I then used participants' responses to the perceived and desired similarity questions to create, for each video, a measure of overall referent-self similarity that represented how the average study 2c participant rated their similarity to the referent in that video. I determined that videos did differ from one another in their overall referent-self similarity scores; however, all videos were given somewhat low scores. No video featured a referent who the average study 2c participant viewed as similar to them or to whom they wanted to be similar. Additionally, overall referent-self similarity was related to both tobacco use behavior and category such that videos' overall referent-self similarity scores differed depending on the behavior it featured and the category it fell into. The association between overall referent-self similarity and behavior led me to decide that it would not be possible to manipulate both behavioral similarity and referent similarity in study 2d, while the association between overall referent-self similarity and category led me to determine that it would be necessary to control for the effects of category in study 2d.

In study 2d, I limited the videos to be used as stimuli to those that featured cigarette smoking and came from categories that included videos given a range of referent similarity scores. I then divided the videos into two groups: lower referent similarity videos ($n = 31$) and higher referent similarity videos ($n = 18$). I randomly assigned participants (all of whom were young non-tobacco users) to one of three conditions: a lower referent similarity group, a higher referent similarity group, or a control group. Participants in the former two groups were each shown a stratified (by category) random sample of six lower or higher referent similarity videos and then asked questions about their smoking-related norm perceptions and smoking stigma. Participants

in the control condition did not watch any videos and were just asked the same questions asked of participants in the other two conditions.

Ultimately, I did not find evidence of differences between the two video conditions on any of the outcome measures. I also did not find evidence of differences between the higher similarity condition and the control condition. However, I did find evidence that participants in the lower referent similarity condition differed from those in the control condition in their smoking-related injunctive norm perceptions. As predicted, participants in the lower referent similarity reported that their friends would be less approving of their smoking every day (local injunctive norm perceptions) compared to participants in the control condition. In contrast and contrary to predictions, participants in the lower referent similarity condition reported that smoking was more socially approved of in society as a whole (general injunctive norm perceptions). However, these results cannot be specifically attributed to the effects of referent similarity as being exposed to the videos shown to lower referent similarity participants might have affected their injunctive norm perceptions through a different causal pathway. Additionally, they should be viewed with a degree of skepticism given that they were inconsistent with one another and all other between-condition comparisons were not significant.

Limitations

Ultimately, I was not able to test how manipulating behavioral similarity would have affected my outcomes of interest in study 2 and did not find strong evidence to support my hypotheses regarding the effects of referent similarity. There were multiple limitations in the design of this study that could have contributed to these null results. Some of these limitations were caused by my decision to limit my experimental stimuli to

a sample of YouTube videos drawn from the previously collected corpus used in study 1 rather than design my own experimental stimuli or collect new stimuli from another source. This decision was made to ensure that I was using stimuli that were naturalistic and to take advantage of an existing corpus that had already been coded for the presence of individual tobacco use depictions. However, it also substantially limited my ability to manipulate the variables in which I was interested. Because, within this sample of videos, referent similarity was related to the tobacco use behavior depicted, I was not able to manipulate the two variables at the same time. Additionally, because virtually all of these videos were given relatively low referent-self similarity scores by study 2c participants, I was only able to compare the effects of exposure to higher referent similarity videos to the effects of exposure to lower referent similarity videos. It is possible that the difference in overall referent-self similarity scores between these two video conditions was too small to result in a detectable difference in the outcome measures of interest.

It is also possible that differences between the participants used in study 2c and the participants used in study 2d contributed to the null results. The logic used in designing this sequence of studies relied on making the two groups of participants as equivalent as possible so that the average study 2c participant's referent similarity ratings would reflect the ratings that would have been given by an average study 2d participant, had they given such ratings. Some of these differences were caused by having to change the eligibility criteria used in study 2d by expanding the age range included and lowering the requirement for participants' approval ratings on prior MTurk tasks. These changes, while unfortunately necessary given the difficulties I faced in recruiting enough eligible participants, resulted in study 2d participants being older than study 2c participants and

may have also made the two groups of participants differ on other characteristics that were not measured. Other differences, such as the difference in the racial makeup of the two groups of participants, may have occurred by chance.

It is also possible that one of the fundamental assumptions on which the design of study 2 relied was faulty. This assumption was that it would be possible to observe how referent similarity shaped the effects of exposure to videos featuring individual tobacco use depictions using a brief one-time exposure. Participants in study 2d only watched six short YouTube videos featuring referents using tobacco and they did so in one sitting. It is possible that this brief exposure to referents given higher or lower ratings for perceived and desired similarity was not powerful enough to affect participants' norm perceptions and stigmatizing beliefs, but that effects might have been observed had a more prolonged exposure been used.

Finally, it is possible that the manipulation of referent similarity or the particular measures of norm perceptions used in study 2d contributed to its null results. Regarding the former, the overall referent-self similarity variable in study 2d was meant to reflect how the average participant in study 2c, and thus presumably the average participant in study 2d, would rate their perceived and desired similarity to the referent in each video. However, there was likely variation in the extent to which this average referent similarity rating actually reflected the true referent similarity rating that would have been assigned to a referent by any given study 2d participant. Study 2d participants might have rated themselves as more or less similar to a referent than the average participant due to the influence of individual-level characteristics. This variation may have made the effect of the referent similarity manipulation on participants smaller than it would have been had I

used a more precise manipulation that reflected, for each participant, that participant's own individual referent similarity perceptions. However, I wanted to avoid directly asking study 2d participants about their perceived and desired similarity to referents in order to avoid biasing their responses to the outcome measures and so accepted a less precise referent similarity manipulation as a trade-off for avoiding this bias.

Regarding the particular norm perception measures used in study 2d, it is possible that using measures that asked about norms among reference groups that varied in their proximity to each participant may have contributed to the null results. I had expected that exposing participants to depictions of dissimilar individuals smoking cigarettes would affect their perceptions of the norms around smoking among both members of their immediate social circles such as their close friends, as well as among more distal groups. For that reason, the measures of descriptive norm perceptions used in this study asked about norms among either people within the same age group as participants or people who lived in the same country (i.e., the U.S.) as participants, while the measures of general injunctive norm perceptions asked about either "society in general" or "most people." It is possible that the referent similarity manipulation used in study 2d only affected participants' perceptions of the norms around smoking within more proximal groups such as their immediate social circles or groups with whom they identified closely and either did not affect their norm perceptions pertaining to more distal groups or affected these perceptions through a different pathway. This would explain why the only significant effect of the lower referent similarity condition in study 2d that went in the hypothesized direction was its effect on participants' perceptions of their close friends' approval of smoking.

Implications and Future Directions

Given that this dissertation was unable to provide answers to many of the research questions it had sought to explore, additional research is needed to answer the questions that remain. Future research should test whether behavioral similarity does in fact shape the effects of exposure to individual tobacco use depictions on norm perceptions, given that it was not possible to test this in study 2d. Such research might benefit from including stimuli that feature e-cigarette use, as using e-cigarettes was assigned the lowest rating for behavioral similarity to smoking cigarettes by participants in study 2b. More broadly, researchers interested in studying the effects of norm information in media on health behaviors should consider taking into account both norm information directly pertaining to the behavior of interest as well as norm information pertaining to related behaviors as both findings from prior research (Cialdini et al., 1990) and predictions based on the concepts of spreading activation (Anderson, 1983) and goal contagion (Aarts et al., 2004; Loersch et al., 2008) suggest that both may have effects.

Future research is also needed to better understand how individuals' perceived and desired similarity to the referents depicted engaging in a behavior in media shape the effects of such depictions on norm perceptions. This research would benefit from including media depictions of referents who varied more in their perceived and desired similarity than did the referents featured in the videos used in study 2d. While the method of operationalizing and manipulating referent similarity used in this study, which relied on applying the average participant's overall referent-self similarity ratings to the whole group, might be useful, future studies might also want to take into individual-level variation in referent similarity.

One implication of the findings from study 2d is that exposure to media depictions of individual tobacco use may have differential effects on individuals' local and general injunctive norm perceptions pertaining to smoking. While, for previously described reasons, this finding should be interpreted with caution, researchers should still consider exploring the different pathways through which media depictions of behavior and other types of norm information found in media might affect individuals' proximal and distal norm perceptions. It is possible that message characteristics such as the types of exemplars depicted engaging in a behavior, and individuals' perceptions of those exemplars, might cause norm messages to have contrasting effects on norm perceptions pertaining to different groups. In the context of this study, for example, seeing media depictions of people smoking who an individual believes are dissimilar to her and to whom she would not want to be similar might make an individual more likely to believe others in her in-group, such as her close friends, disapprove of smoking (Hogg & Turner, 1987; Turner et al. 1989) but might not affect her perceptions of the extent to which society as a whole approves of smoking. Studying differences in how media norm information affects each type of norm perception could be valuable because both types of norm perceptions might affect other related attitudes and behaviors, although perhaps to different extents (Paek, 2009).

Although the studies that comprise this dissertation did not provide clear evidence demonstrating that either behavioral similarity or referent similarity shaped the effects of individual tobacco use depictions in media on smoking-related norm perceptions and smoking stigma, results do point to a need to better understand how media affects these variables. Findings from studies 2c and 2d indicate that many young non-tobacco users

have exaggerated perceptions about how common smoking is among people their age and hold stigmatizing beliefs about smoking. More than a quarter (27.6%) of participants in study 2c and about a third of participants (32.6%) in study 2d reported that about half or most people in their age group smoke cigarettes. In contrast, recent data suggest that only about 8% of 18-24-year-olds and about 17% of 25-44-year-olds are current smokers (Creamer et al., 2019). Holding such exaggerated descriptive norm perceptions might make young people more susceptible to smoking.

In addition, about 75% of participants in study 2c and 71% of participants in study 2d agreed with the statement “most people think less of a person who smokes,” while nearly half of participants in each study agreed with the statement “most people believe that smoking is a sign of personal failure.” The high prevalence of such stigmatizing beliefs about smoking among participants in these studies aligns with findings from other research documenting how common smoking stigma is in the U.S. (Evans-Polce et al., 2015). This evidence of prevalent smoking stigma is concerning considering that smoking stigma negatively affects smokers’ health and well-being and may exacerbate health inequalities (Bell et al., 2010; Stuber et al., 2008), particularly because disparities already exist in smoking behavior and cessation outcomes (Cambron et al., 2020; Hiscock et al., 2012). Thus, future research should investigate how media depictions of smoking contribute to both young people’s exaggerated descriptive norm perceptions and smoking stigma.

Conclusions

The current studies provide evidence that there is variation in how media depictions of individual tobacco use affect young people’s norm perceptions. They also

demonstrate that there is variation in how young people rate both the similarity of different tobacco use behaviors to cigarette smoking and their own perceived and desired similarity to individuals shown using tobacco in media. However, these studies do not provide clear evidence that referent similarity shapes the effects of exposure to media depictions of individual tobacco use on smoking-related norm perceptions and stigma, and did not permit us to test how behavioral similarity affects this same relationship. Nonetheless, given the limitations inherent in the design of these studies, future research is warranted to better understand the relationships among these variables. Such research is particularly called for in light of findings demonstrating that many young people hold stigmatizing beliefs about smoking and exaggerated views of how common smoking is among people their age.

APPENDICES

Appendix 1. Codebooks Used in Study 2a

Codebook Used in Round 1 Coding:

- Please only watch the first 3 minutes of each video and code what you saw based on the first 3 minutes

Explanations and definitions of each variable you will be coding

*Please note that I have included skip logic in the Qualtrics survey you will be using to code so that you may not have to answer questions about all of these variables for each video. For example, if you indicate that a video was removed you will not be asked any further questions about that video.

Question 1. Has the video been removed from YouTube?

- Please select 'yes' if you are not able to view the video and receive any error message from YouTube (e.g. the video has been removed for copyright reasons, the video is private, etc.)
- Please select 'no' if you are able to view the video and do not receive any YouTube error messages

Question 2. Is the video English language?

- Please select 'yes' if the majority of the audio content is in English. If there is no audio content, please select 'yes' if the title and description (if there is one) is in English
- Please select 'no' if the majority of the audio content is in another language other than English even if there are English subtitles. If there is no audio content, please select 'no' if the title and description (if there is one) is in another language other than English

Question 3. Is the video tobacco relevant?

- Please select 'yes' if the video mentions or shows any tobacco product or the use of any tobacco product (e.g. someone is chewing tobacco in the video)
 - For purposes of this study, tobacco products include cigarettes, cigars, cigarillos, little cigars, hookah, shisha or water pipes, tobacco pipes, and smokeless tobacco (e.g. chewing tobacco, snuff, snus, or dip)
 - For purposes of this study, tobacco products DO NOT include electronic cigarettes or smoking non-tobacco products including marijuana (e.g. blunts)

Question 4. Does the video contain a tobacco individual norm?

- Please select 'yes' if the video contains a tobacco individual norm. Tobacco individual norms include descriptions, mentions, or depictions of individuals' tobacco

use (e.g. smoking cigarettes, smoking hookah, chewing tobacco, etc.). This could include

- **Tobacco individual use norm** (e.g. using tobacco, or starting, continuing or increasing tobacco use)
 - This could include someone using tobacco products in the video, describing oneself or somebody else as a smoker or user of other tobacco products, or making statements that strongly insinuate that they are a tobacco user even if it is never explicitly stated (e.g. talking about their favorite cigar brands)
- **Tobacco individual non-use norm** (e.g. quit, or not starting tobacco use)
 - This could include somebody talking about their former use of tobacco or the quitting process, describing themselves as a ‘former smoker’ or non-smoker
- Please select ‘no’ if the video does not contain a tobacco individual norm

Question 5. Does the video contain a tobacco individual USE norm?

- Please select ‘yes’ if the video contains a tobacco individual use norm (defined above)
 - NOTE: Videos may contain both tobacco individual use norms AND tobacco individual non-use norms (e.g. a person in the video might describe themselves as a former cigarette smoker but mention that they now only smoke cigars). These videos should still be coded as ‘yes’
- Please select ‘no’ if the video does not contain a tobacco individual norm or only contains tobacco individual non-use norms

Question 6. What tobacco product(s) is the tobacco individual use norm in the video about?

- Please select all tobacco product(s) included in the tobacco individual use norm(s) in the video (response options: cigarettes, cigars, pipes, hookah, smokeless tobacco (chewing tobacco, dip, snus, etc.))
- Note that some videos may contain multiple tobacco individual use norms about multiple tobacco products. For example, an individual in a video may describe him or herself as both a cigarette smoker and a cigar smoker. Or the video may show the use of both hookah and chewing tobacco
- However, some videos may contain a tobacco individual use norm about one tobacco product and either (1) a tobacco individual non-use norm about another tobacco product or (2) a mention of another tobacco product that does not fit the definition of tobacco individual norm. For these videos, please only select the tobacco product that the tobacco individual use norm is about

REFERENT QUESTIONS

*Please note that these questions are only about the individual(s) depicted using tobacco or described as a tobacco user in the video. Any other people shown in the video should not be considered in your answers to these questions.

*Referent special cases

- For music videos in which the lyrics mention tobacco use and are written in the first person, the referent should be considered to be the protagonist(s) of the music video whether or not that is the musician(s) performing the song

Question 7. Is the referent(s) in the video a cartoon character?

- Please select 'yes' if the referent of the tobacco individual use norm in the video is a cartoon character or animation?
- Please select 'no' if the referent is not a character or animation

Question 8. What is your best guess of whether the referent(s) depicted in the video is a young adult?

- Please select 'yes' if you think the referent(s) depicted in the video could conceivably be 25 or younger
- Please select 'no' if you do not think the referent(s) depicted in the video could conceivably be 25 or younger
- Please select 'multiple' if there are multiple referents in the video and you think one of them is a young adult while the other is not
- Please select 'unknown' if you do not get enough information about the referent from the video to make a judgment about their age (e.g. if the referent is not shown in the video or if only part of the referent's body (e.g. their hands) is shown

Question 9. What is your best guess of the gender of the referent(s) in the video?

- Please select the gender that you think the referent(s) depicted in the video is most likely to identify with (response options: male, female, other, multiple, unknown)
- Please select 'other' if you think the referent(s) depicted in the video is most likely to identify as transgender, non-binary, or another gender identity
- Please select 'multiple' if there are multiple referent(s) with different genders in the video
- Please select 'unknown' if there is not enough information about the referent in the video to make a guess about their gender (e.g. if the video only shows their hands or another part of their body and their voice is never heard)

Question 10. What is your best guess of the race of the referent(s) in the video?

- Please select the race that you think is most likely to describe the referent(s) depicted in the video (response options: White, Black or African American, Hispanic/Latino, East Asian or Southeast Asian, South Asian, Native American or Alaskan Native, Multiple, Unknown)
- Please select 'multiple' if you think the referent in the video belongs to more than one racial category or if there are multiple referents in the video and you think each belongs to a different racial category
- Please select 'unknown' if there is not enough information about the referent in the video to make a guess about their race

Question 11. What category best describes the video?

- Please select the category that you think best describes the video:
 - Anti-smoking video (PSA or other): This includes videos intended to convince viewers not to smoke cigarettes or to educate viewers about possible negative effects of smoking cigarettes. These could be but do not need to be traditional anti-smoking PSAs (e.g. the CDC’s “Tips from Former Smokers” ads)
 - Celebrity gossip video: This includes videos that have the primary purpose of sharing gossip and news updates about celebrities, including entertainers, politicians, athletes and other public figures
 - Compilation video: This includes videos that consist of a compilation of scenes of movies or shows that depict individuals using tobacco. These are often, but not always, focused on a single actor
 - Instructional video: This includes videos that have the primary purpose of teaching viewers how to do something (e.g. make their own hookah at home)
 - Movie/show scene: This includes any single scene from a movie or show
 - Music video: This includes any music video, including official videos created for songs by the artists responsible for those songs, as well as unofficial music videos created to accompany songs by individuals other than the artists.
 - Personal testimonial video: This includes any video that does not fit the description of “anti-smoking video” (above) and was created by an individual(s) with the primary purpose of sharing their story or experience related to tobacco use
 - Prank/stunt video: This includes any video that features any sort of prank, stunt, magic trick, or “social experiment” (e.g. having a child approach adults asking for a cigarette lighter)
 - Review channel video: This includes any video published on a channel whose primary purpose is to review tobacco products (e.g. Outlaw, Cigar Obsession) regardless of whether the video itself actually includes a review of a tobacco product. You can usually tell this based on the description of the video and channel, and the presence of a set introduction (often a song)
 - Smoking fetish video: This includes videos intended for individuals with a sexual fetish related to smoking. Note that these videos are not always explicit (though they can be) and do not always feature revealing clothing, sexual content, etc. They typically feature very little dialogue and only one woman, though some do feature more than one woman. Some appear to be candid, while others are more obviously produced and feature a woman looking directly at the camera. If it is not clear from other features whether a video fits into this category, you can often times tell from the description, channel name, or from other videos that have been published on that channel
 - Other: Please use this category for any videos that do not fit the descriptions of any of the other categories above

Updated Codebook Used in Round 2 Coding (Updated in October 2020):

Accessing & watching videos

- Last round, we used YouTube to access the videos. For this round, I have saved each video as a .mp4 file in a DropBox folder, which I will share with you. Each video filename is the same as the video ID for that video
- Each video has been edited down to only a minute. For this round, you only have to watch the first minute of the video

Explanations and definitions of each variable you will be coding

*Please note that I have included skip logic in the Qualtrics survey you will be using to code so that you may not have to answer questions about all of these variables for each video. For example, if you indicate that a video was removed you will not be asked any further questions about that video.

Question 1. Is the video English language?

- Please select 'yes' if the majority of the audio content is in English. If there is no audio content, please select 'yes' if the title and description (if there is one) is in English
- Please select 'no' if the majority of the audio content is in another language other than English even if there are English subtitles. If there is no audio content, please select 'no' if the title and description (if there is one) is in another language other than English

Question 2. Is the video tobacco relevant?

- Please select 'yes' if the video mentions or shows any tobacco product or the use of any tobacco product (e.g. someone is chewing tobacco in the video)
 - For purposes of this study, tobacco products include cigarettes, cigars, cigarillos, little cigars, hookah, shisha or water pipes, tobacco pipes, and smokeless tobacco (e.g. chewing tobacco, snuff, snus, or dip)
 - For purposes of this study, tobacco products DO NOT include electronic cigarettes or smoking non-tobacco products including marijuana (e.g. blunts)

Question 3. Does the video contain a tobacco individual norm?

- Please select 'yes' if the video contains a tobacco individual norm. Tobacco individual norms include descriptions, mentions, or depictions of individuals' tobacco use (e.g. smoking cigarettes, smoking hookah, chewing tobacco, etc.). This could include
 - **Tobacco individual use norm** (e.g. using tobacco, or starting, continuing or increasing tobacco use)
 - This could include someone using tobacco products in the video, describing oneself or somebody else as a smoker or user of other tobacco products, or making statements that strongly insinuate that

they are a tobacco user even if it is never explicitly stated (e.g. talking about their favorite cigar brands)

- **Tobacco individual non-use norm** (e.g. quit, or not starting tobacco use)
 - This could include somebody talking about their former use of tobacco or the quitting process, describing themselves as a ‘former smoker’ or non-smoker
- Please select ‘no’ if the video does not contain a tobacco individual norm

Question 4. Does the video contain a tobacco individual USE norm?

- Please select ‘yes’ if the video contains a tobacco individual use norm (defined above)
 - NOTE: Videos may contain both tobacco individual use norms AND tobacco individual non-use norms (e.g. a person in the video might describe themselves as a former cigarette smoker but mention that they now only smoke cigars). These videos should still be coded as ‘yes’
- Please select ‘no’ if the video does not contain a tobacco individual norm or only contains tobacco individual non-use norms

Question 5. What tobacco product(s) is the tobacco individual use norm in the video about?

- Please select all tobacco product(s) included in the tobacco individual use norm(s) in the video
- Note that some videos may contain multiple tobacco individual use norms about multiple tobacco products. For example, an individual in a video may describe him or herself as both a cigarette smoker and a cigar smoker. Or the video may show the use of both hookah and chewing tobacco
- However, some videos may contain a tobacco individual use norm about one tobacco product and either (1) a tobacco individual non-use norm about another tobacco product or (2) a mention of another tobacco product that does not fit the definition of tobacco individual norm. For these videos, please only select the tobacco product that the tobacco individual use norm is about

REFERENT QUESTIONS

*Please note that these questions are only about the individual(s) depicted using tobacco or described as a tobacco user in the video. Any other people shown in the video should not be considered in your answers to these questions.

*Referent special cases

- For music videos in which the lyrics mention tobacco use and are written in the first person, the referent should be considered to be the protagonist(s) of the music video whether or not that is the musician(s) performing the song

Question 6. How many referent(s) are depicted using tobacco in the video?

- Please select the number of referent(s) (1 / 2/ more than 2) depicted using tobacco in the video
- Videos that feature more than one referent will not be eligible for inclusion in the study, and so you will not be asked additional questions about them

Question 7. Is the referent in the video a cartoon character?

- Please select ‘yes’ if the referent of the tobacco individual use norm in the video is a cartoon character or animation?
- Please select ‘no’ if the referent is not a character or animation

Question 8. What is your best guess of whether the referent depicted in the video is a young adult?

- Please select ‘yes’ if you think the referent depicted in the video could conceivably be 25 or younger
- Please select ‘no’ if you do not think the referent depicted in the video could conceivably be 25 or younger
- Please select ‘unknown’ if you do not get enough information about the referent from the video to make a judgment about their age (e.g. if the referent is not shown in the video or if only part of the referent’s body (e.g. their hands) is shown

Question 9. What is your best guess of the gender of the referent in the video?

- Please select the gender that you think the referent depicted in the video is most likely to identify with
- Please select ‘other’ if you think the referent depicted in the video is most likely to identify as transgender, non-binary, or another gender identity
- Please select ‘unknown’ if there is not enough information about the referent in the video to make a guess about their gender (e.g. if the video only shows their hands or another part of their body and their voice is never heard)

Question 10. What is your best guess of the race of the referent in the video?

- Please select the race that you think is most likely to describe the referent depicted in the video
- Please select ‘multiple’ if you think the referent in the video belongs to more than one racial category
- Please select ‘unknown’ if there is not enough information about the referent in the video to make a guess about their race

Question 11. What category best describes the video?

- Please select the category that you think best describes the video:
 - Anti-smoking video (PSA or other): This includes videos intended to convince viewers not to smoke cigarettes or to educate viewers about possible negative effects of smoking cigarettes. These could be but do not need to be traditional anti-smoking PSAs (e.g. the CDC’s “Tips from Former Smokers” ads)

- Celebrity gossip video: This includes videos that have the primary purpose of sharing gossip and news updates about celebrities, including entertainers, politicians, athletes and other public figures
- Compilation video: This includes videos that consist of a compilation of scenes of movies or shows that depict individuals using tobacco. These are often, but not always, focused on a single actor
- Instructional video: This includes videos that have the primary purpose of teaching viewers how to do something (e.g. make their own hookah at home)
- Movie/show scene: This includes any single scene from a movie or show
- Personal testimonial video: This includes any video that does not fit the description of “anti-smoking video” (above) and was created by an individual(s) with the primary purpose of sharing their story or experience related to tobacco use
- Prank/stunt video: This includes any video that features any sort of prank, stunt, magic trick, or “social experiment” (e.g. having a child approach adults asking for a cigarette lighter)
- Review channel video: This includes any video published on a channel whose primary purpose is to review tobacco products (e.g. Outlaw, Cigar Obsession) regardless of whether the video itself actually includes a review of a tobacco product. You can usually tell this based on the description of the video and channel, and the presence of a set introduction (often a song)
- Smoking fetish video: This includes videos intended for individuals with a sexual fetish related to smoking. Note that these videos are not always explicit (though they can be) and do not always feature revealing clothing, sexual content, etc. They typically feature very little dialogue and only one woman, though some do feature more than one woman. Some appear to be candid, while others are more obviously produced and feature a woman looking directly at the camera. If it is not clear from other features whether a video fits into this category, you can often times tell from the description, channel name, or from other videos that have been published on that channel
- Other: Please use this category for any videos that do not fit the descriptions of any of the other categories above

Appendix 2. Exemplar Characteristics Coded in Study 2a: Descriptive Statistics and Interrater Reliability

Distribution of Videos Coded in Study 2a by Exemplar Demographic Characteristics

Variable	Proportion of Round 1 Videos <i>n</i> = 82	Proportion of Round 2 Videos <i>n</i> = 85	Proportion Final Study 2d Videos <i>n</i> = 152
<i>Age Group</i>			
Young Adult	.65	.56	.59
Not Young Adult	.28	.34	.33
Unknown	.07	.09	.08
<i>Gender</i>			
Male	.55	.60	.61
Female	.40	.36	.36
Other / Unknown	.05	.04	.03
<i>Race/Ethnicity</i>			
White	.79	.79	.82
Black or African American	.06	.05	.04
Hispanic/Latino	.04	.00	.02
South Asian	.04	.01	.03
East Asian or Southeast Asian	.02	.01	.03
Multiple / Unknown	.05	.13	.07

Interrater Reliability: Coding for Referent Demographic Characteristics in Study 2a

Variable	N Categories	<i>Coding Round 1</i>			<i>Coding Round 2</i>		
		N Videos	% Agreement	Gwet's AC	N Videos	% Agreement	Gwet's AC
Referent age	3	82	.80 [.73, .87]	.75 [.66, .84]	85	.77 [.67, .86]	.73 [.62, .84]
Referent gender	4	82	.88 [.83, .94]	.85 [.78, .93]	85	.91 [.84, .97]	.89 [.81, .96]
Referent race	6	82	.84 [.77, .90]	.82 [.75, .89]	85	.87 [.80, .94]	.86 [.78, .94]

Appendix 3. Survey Questionnaires for Studies 2b, 2c & 2d

Screening Survey Measures:

- How old are you?

- What is your gender?
 - Woman
 - Man
 - Transgender
 - Non-binary
 - I prefer not to answer this question
 - I prefer to self-describe

- What is your race? Please select all that apply.
 - American Indian or Alaskan Native
 - Asian
 - Black or African American
 - Native Hawaiian or Other Pacific Islander
 - White
 - I prefer not to answer this question
 - I prefer to self-describe

- Are you of Hispanic or Latino/a/x origin?
 - Yes
 - No
 - I prefer not to answer this question

- In which state do you currently reside
 - *Response options included all 50 states, Washington D.C. and Puerto Rico*

- Which of the following best describes the place where you currently reside?
 - A large city
 - A suburb near a large city
 - A small city or town
 - A rural area

- What is the highest level of school you have completed or the highest degree you have received?
 - Less than high school degree
 - High school graduate (high school diploma or equivalent including GED)
 - Some college but no degree
 - Associate degree in college (2-year)
 - Bachelor's degree in college (4-year)
 - Master's degree

- Doctoral degree
- Professional degree (e.g., JD, MD)
- Have you ever used any of the following tobacco products, even if only on one occasion? (Select all that apply)
 - Tobacco cigarettes
 - Hookah, shisha or water pipes
 - Pipe tobacco
 - Cigars
 - Little cigars or cigarillos
 - Smokeless tobacco products like chewing tobacco, snuff, snus or dip
 - Electronic cigarettes (sometimes also called vape pens, e-hookah or e-cigarettes)
 - None of these
- Which of the following products have you used within the past 30 days? (Select all that apply)

Responses carried forward so that participants were only asked about tobacco products they had reported using in the previous question

 - Tobacco cigarettes
 - Hookah, shisha or water pipes
 - Pipe tobacco
 - Cigars
 - Little cigars or cigarillos
 - Smokeless tobacco products like chewing tobacco, snuff, snus or dip
 - Electronic cigarettes (sometimes also called vape pens, e-hookah or e-cigarettes)
 - None of these
- Have you smoked more than 100 cigarettes, or approximately 5 packs, in your lifetime?

Only asked of participants who reported that they had smoked cigarettes

 - Yes
 - No
- Are you a current smoker?

Only asked of participants who reported that they had smoked cigarettes

 - Yes
 - No
- Have you ever used hookah fairly regularly?

Only asked of participants who reported that they had smoked hookah

 - Yes
 - No

- Have you ever smoked pipe tobacco fairly regularly?
Only asked of participants who reported that they had smoked pipe tobacco
 - Yes
 - No

- Have you ever smoked cigars fairly regularly?
Only asked of participants who reported that they had smoked cigars
 - Yes
 - No

- Have you ever smoked little cigars or cigarillos fairly regularly?
Only asked of participants who reported that they had smoked little cigars/cigarillos
 - Yes
 - No

- Have you ever used smokeless tobacco products (e.g., chewing tobacco, snuff, snus, dip) fairly regularly?
Only asked of participants who reported that they had used smokeless tobacco
 - Yes
 - No

- Have you ever used electronic cigarettes fairly regularly?
Only asked of participants who reported that they had used electronic cigarettes
 - Yes
 - No

Study 2b Survey Measures:

Behavioral Similarity Measures

- How similar do you think the following behavior is to smoking a tobacco cigarette: (*target behavior*)?

Response options: (1) Extremely dissimilar; (2) quite dissimilar; (3) somewhat dissimilar; (4) somewhat similar; (5) quite similar; (6) extremely similar?

- Smoking tobacco from a hookah, shisha or water pipe, which is not electronic
- Smoking a pipe filled with tobacco
- Smoking a cigar
- Smoking a little cigar or cigarillo?
- Using a smokeless tobacco product such as chewing tobacco, snuff, snus or dip
- Vaping or using an electronic cigarette (sometimes also called vape pens, e-hookah, or e-cigarettes)
- Eating an orange

**The order in which these behaviors were shown to participants was randomized for each participant, and the question about each behavior was shown on a different screen.*

Study 2c Survey Measures:

Measures of Referent Similarity

Perceived Referent Similarity

- *The following questions are about the person who was shown using tobacco, discussing their tobacco use or who was described as a tobacco user in the video you just watched. When answering these questions, please use whatever criteria come to mind to make your judgments.*

Thinking about that person, do you agree or disagree that they . . .

Response options: (1) Strongly agree; (2) Agree; (3); Disagree; (4) Strongly Disagree

- Are like you
- Think like you
- Are similar to you
- Behave like you

Desired Referent Similarity

- *The following questions are about the person who was shown using tobacco, discussing their tobacco use or who was described as a tobacco user in the video you just watched. When answering these questions, please use whatever criteria come to mind to make your judgments.*

Thinking about that person, do you agree or disagree that they . . .

Response options: (1) Strongly agree; (2) Agree; (3); Disagree; (4) Strongly Disagree

- Are respectable
- Are inspiring
- Are someone you look up to
- Are someone you think highly of
- Are likeable

Referent Attractiveness

- *The following questions are about the person who was shown using tobacco, discussing their tobacco use or who was described as a tobacco user in the video you just watched. When answering these questions, please use whatever criteria come to mind to make your judgments.*

Thinking about that person, do you agree or disagree that they . . .

Response options: (1) Strongly agree; (2) Agree; (3); Disagree; (4) Strongly Disagree

- Are attractive

**The order in which the perceived and desired similarity items and attractiveness item were asked was randomized for each participant.*

Study 2c/2d Survey Measures:

Norm Perception Measures

Local Injunctive Norm Perceptions

- How do you think your closest friends feel or would feel about you vaping or using e-cigarettes every day?
 - Strongly disapprove
 - Disapprove
 - Approve

- Strongly approve

General Injunctive Norm Perceptions

- How much do you agree or disagree with the following statement . . .
Response options: (1) Strongly disagree; (2) Disagree; (3) Agree; (4) Strongly agree
 - Society in general considers smoking cigarettes to be an appropriate behavior
 - Most people consider smoking cigarettes to be an appropriate behavior

**The order in which these statements are shown was randomized for each participant.*

Descriptive Norm Perception Measures

- How many people your age would you guess smoke cigarettes?
 - None
 - A few
 - About half
 - Most
- How much do you agree or disagree with the following statement . . .
Response options: (1) Strongly disagree; (2) Disagree; (3) Agree; (4) Strongly agree
 - In the U.S. many people smoke cigarettes
 - Most people my age smoke cigarettes
 - Smoking cigarettes is not at all common in the U.S.

**The order in which these statements are shown was randomized for each participant.*

Measures of Stigmatizing Beliefs

- How much do you agree or disagree with the following statement . . .
Response options: (1) Strongly disagree; (2) Disagree; (3) Agree; (4) Strongly agree
 - Most people would not hire a smoker to take care of their children
 - Most non-smokers would be reluctant to date someone who smokes
 - Most people believe that smoking is a sign of personal failure
 - Most people think less of a person who smokes

**The order in which these statements are shown was randomized for each participant.*

Appendix 4. Supplemental Analyses from Study 2d

Table 1. Results from OLS Regression Models Used to Test the Effects of Video Conditions and Over28 on Each Outcome Measure ($n = 353$)

<i>Variable</i>	<i>Descriptive Norm Perceptions Model</i>		<i>General Injunctive Norm Perceptions Model</i>		<i>Smoking Stigma Model</i>		<i>Local Injunctive Norm Perceptions Model</i>	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Condition								
Lower Similarity	.03	.10	.22	.12	.14	.09	-.35*	.14
Higher Similarity	.07	.10	.15	.12	.12	.09	-.24	.14
Over28	.31	.23	.25	.27	.12	.21	-.13	.30
Over28*Condition								
Lower Similarity*Over28	.32	.31	.10	.37	-.21	.27	.35	.40
Higher Similarity*Over28	-.55	.31	-.32	.37	-.22	.28	.50	.41
Constant	-.06	.07	-.14	.09	-.09	.07	.18	.10
R ²	.04		.02		.008		.02	

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 2. Results from OLS Regression Models Used to Test the Effects of Video Conditions and Aftereligibilitychange on Each Outcome Measure ($n = 353$)

Variable	Descriptive Norm Perceptions Model		General Injunctive Norm Perceptions Model		Smoking Stigma Model		Local Injunctive Norm Perceptions Model	
	B	SE	B	SE	B	SE	B	SE
Condition								
Lower Similarity	.03	.12	.21	.14	.17	.11	-.39	.16
Higher Similarity	.01	.12	.13	.14	.25*	.11	-.25	.16
Aftereligibilitychange	.06	.15	.13	.18	.12	.13	-.27	.20
Aftereligibilitychange *Condition								
Lower Similarity* Aftereligibilitychange	.16	.21	.06	.25	-.18	.19	.27	.28
Higher Similarity* Aftereligibilitychange	-.004	.22	-.05	.25	-.48*	.19	.23	.28
Constant	-.05	.08	-.16	.10	-.11	.07	.24	.11
R ²	.01		.02		.03		.02	

* $p < .05$, ** $p < .01$, *** $p < .001$

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