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Sharing in the Context of Tobacco and E-Cigarette Communication: Determinants, Consequences, and Contingent Effects

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Abstract
Interpersonal communication has been shown to directly and indirectly influence various health behaviors, including smoking-related outcomes. However, the literature in this domain has mostly measured interpersonal communication as face-to-face conversations, and has treated such instances of communication as distinct from online forms of person-to-person communication. This dissertation is aimed at exploring sharing – an all-encompassing concept of person-to-person communication that covers both offline and online forms of communication – in the context of tobacco and e-cigarette communication, through three separate studies. Study 1 was a validation study that assessed the reliability and validity of a newly proposed sharing measure, providing a valid measure that could not only be used in the subsequent studies of this dissertation but also in future studies examining sharing in the tobacco and e-cigarette domain. In an effort to explore the nature of sharing, Study 2 examined the determinants of overall tobacco and e-cigarette sharing as well as sharing positive vs. negative tobacco and e-cigarette content. Findings showed that personal relevance and exposure to relevant information predicted sharing, and that personal relevance and normative perceptions interacted in their effects on the valence in which people shared. Study 3 was aimed at examining the consequences of sharing about tobacco and e-cigarettes. Specifically, it examined the direct effects of sharing on future intentions and behavior, as well as the contingent effects of sharing and pre-existing intentions on future behavior. Findings showed that sharing positive content predicted increased likelihood of intending to use and actually using tobacco and e-cigarettes. Furthermore, sharing consistently with intentions amplified the effect of those intentions on future behavior, while sharing inconsistently with intentions predicted reduced effects. Possible explanations for findings and potential areas for future research are discussed.

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SHARING IN THE CONTEXT OF TOBACCO AND E-CIGARETTE COMMUNICATION: DETERMINANTS, CONSEQUENCES, AND CONTINGENT EFFECTS

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ABSTRACT

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examined the direct effects of sharing on future intentions and behavior, as well as the contingent effects of sharing and pre-existing intentions on future behavior. Findings showed that sharing positive content predicted increased likelihood of intending to use and actually using tobacco and e-cigarettes. Furthermore, sharing consistently with intentions amplified the effect of those intentions on future behavior, while sharing inconsistently with intentions predicted reduced effects. Possible explanations for findings and potential areas for future research are discussed.

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CHAPTER ONE

Theoretical Foundations for Studying Sharing Behavior in the Context of Health Communication

Overview

This first chapter of the dissertation is aimed at conceptualizing the notion of sharing (as used in this dissertation), summarizing the empirical research surrounding the notion of sharing, and providing an overview of the theoretical foundations justifying the significance of studying sharing in the context of health communication. Because the literature regarding information sharing as conceptualized in this dissertation (to be specified below) and in the particular context of this dissertation (i.e., the sharing of health information in the context of health behavior change) is lacking, much of the literature review will be on closely related concepts, such as interpersonal communication, social influence, and word-of-mouth (WOM; the act of consumers providing information to other consumers).

Conceptualizing the Notion of Sharing

In the past, interpersonal communication almost always referred to actual face-to-face conversations or at the very least, phone conversations that still allowed for lengthy verbal exchange. Interpersonal communication, and particularly conversations, is usually defined by the interchange that occurs during these moments, such that at least two people (with the right to conversational participation and exchange) must be involved (Speier, 1973).

However, the emerging new media environment is continually offering new ways for people to communicate with one another. Technology such as email and instant

messaging allow for instantaneous conversations, just as face-to-face communication does, but also allows for more time to react to the information received and even anonymity. Social media such as Facebook and Twitter make instances of one-to-many communication quick and easy.

Accordingly, uses of online platforms such as email, instant messaging, and various social media outlets have been shown to be particularly prevalent among youth (Lenhart, 2015). In a survey of over 1000 teens (ages 13-17) administered by the Pew Research Center in 2014 and 2015, 56% reported going online several times a day, while an additional 24% reported going online almost constantly. Similar trends have been shown among young adults as well: not only were 18-29 year olds the most likely to use social media (among adults), but their use of social media jumped by 78% from 2005 to 2015 (Perrin, 2015).

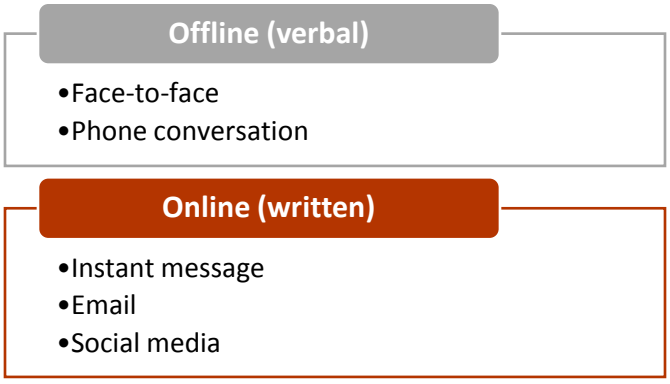
There is one particularly stark contrast between these online forms of interpersonal communication and regular offline conversations: the former does not always assume a reaction or response from the audience. Given the definition of conversations stated above, the fact that it is okay for these moments of communications to begin and end with the initiator without any actual forms of exchange makes these less "interpersonal." The terms "conversations" and "interpersonal communication" fail to capture such online forms of communication. With this regard, the rest of this dissertation will refer to this concept of person-to-person and person-to-people communication not as interpersonal communication, but as the act of "sharing content."

As defined in this dissertation, the behavior of sharing information includes what is regularly thought of as interpersonal communication and word-of-mouth exchanges (including face-to-face, as well as mediated exchanges such as phone conversations, text messages, or instant messages online). However, it also includes disseminating information to another person (such as by email) or to many other people (via forms of social media). It is certainly possible for an act of sharing to begin and end as one person having given out information without receiving any feedback in return. It is also possible for an act of sharing to evolve in a way that is or isn't intended, such that what begins as one person disclosing what he or she knows with another person becomes a full-blown conversation between two people.

The way this dissertation defines and conceptualizes sharing is restricted to instances in which someone *initiates* this act of sharing information with another person(s), such as when one strikes up a conversation about a certain topic with someone else, or when one posts something on social media. Excluded are instances in which someone *receives* an act of sharing, such as when another person tells one about a certain topic, or when another person sends one information via email or social media. Although the latter is definitely also a case of sharing information, the two are discrete behaviors such that they may be affected by different predictors and may have different effects on the person who is either initiating or receiving information. Future research would benefit from examining the differences between these two cases of sharing but it is beyond the scope of the current dissertation.

Within this broad realm of sharing information, there are multiple potential modes of sharing information: face-to-face, in a phone conversation, instant messaging (i.e., phone text messages or online), email, and social media (e.g., Facebook and Twitter posts, comments, and shares), to name a few. In a recent study of people's behaviors regarding e-cigarette-related information, Emery and colleagues showed that of 363 adults who reported that they had shared information in the past 30 days, 54% shared via word-of-mouth, while 33% shared via Facebook, 24% via text message, 22% via email, and 35% shared via some other form of social media (Emery, Vera, Huang, & Szczypka, 2014). Given that there is quite some variance in the types of platforms that people choose to utilize in their efforts to share, the different platforms can be grouped into two: offline (verbal) and online (written) (as shown in Figure 1.1).

Figure 1.1 Grouping Different Sharing Channels



However, more and more scholars are pointing to the evidence (or lack thereof) concerning differences between face-to-face communication and computer-mediated communication (Derks, Fischer, & Bos, 2008; Douglas & McGarty, 2001; Walther, 1992; Walther, Anderson, & Park, 1994). Notably, Walther's social information processing

theory suggests that people are motivated to overcome the challenges of computer-mediated communication and to develop interpersonal relationships both on- and offline, being driven by relational motives to affiliate with others, seek social rewards, engage in impression management, etc. (Walther, 1992). Such literature suggests that it seems to be more fruitful to examine sharing behavior on all of these different platforms as one behavior, rather than viewing them as distinct multiple behaviors. Thus, this dissertation put forth "sharing" as a holistic concept that captures all of the different forms of interpersonal communication processes.

The Nature of Sharing: What Affects Sharing Behavior?

In exploring potential determinants of sharing, the review of the literature is divided into three parts. The first section of this literature review will pertain to the question of who is more likely to share tobacco content or e-cigarette content. Is there a difference between sharers and non-sharers? The second section will review potential predictors of the valence of content shared: who is more likely to share negative vs. positive content with regards to tobacco or e-cigarettes?

Potential Determinants of Sharing

Demographics. Not many studies have examined sharing behavior with regard to tobacco-related information. As one of the few studies that have, Emery et al. (2014) examined several potential correlates of sharing e-cigarette-related information. In terms of demographics, they found that young adults (aged 18-24) were almost twice as likely as older adults, Hispanics were more likely than non-Hispanic whites, and those with the lowest educational attainment were more likely than others to share e-cigarette

information. This dissertation will also examine similar demographic variables that have been examined in the context of other communication variables in the past (e.g., age, sex, race, education), and see whether they are associated with sharing behavior overall, as well as specific tobacco-related and e-cigarette-related sharing.

Self-relevance. It is well-known that people tend to make more of an effort to talk about information that they deem relevant to themselves (Southwell, 2013). People tend to talk about identity-relevant topics, either as a way to manage and maintain one's impression (Berger, 2014) or simply because personally relevant topics are probably most frequently thought about and therefore, most salient (Leippe & Elkin, 1987; Sehulster, 2006; Southwell, 2005). Accordingly, those who share information about tobacco and e-cigarettes are more likely to be those who perceive tobacco and e-cigarettes as part of their identity. Given that self-identity essentially comprises one's view of and one's beliefs about oneself, it is reasonable to suggest that those who use or intend to use tobacco may perceive tobacco to be part of one's identity. In line with this conjecture, Emery and colleagues found that current tobacco users were five times as likely to share e-cigarette information as non-users (Emery et al., 2014). Thus, while this dissertation doesn't formally measure one's identity as a smoker or vaper, it proposes to examine whether current use and intentions with regards to tobacco and e-cigarettes are associated with tobacco-related and e-cigarette-related sharing, respectively.

Accessibility. It has been shown that easily accessible topics are more likely to be talked about or shared. Berger & Iyengar (2013) showed that this was especially the case when people are engaging in verbal conversations (which tend to be more immediate in

terms of conversational back-and-forth compared to written forms of communication). Recent exposure to tobacco or e-cigarette information in the general media may make similar or relevant information more accessible within a person's thoughts, leading to a higher likelihood of subsequent sharing of such information. This hypothesis is also supported by priming theory, which suggests that exposure to a message increases the accessibility of information presented in the message, and that increased accessibility is more likely to influence cognitions such as attitudes and efficacy beliefs (Iyengar & Kinder, 1987). Thus, this dissertation proposes examining exposure to information (as a result of deliberative seeking or of exposure resulting from routine use of media (scanning), exposure to ads, as well as use of general media and social media as a proxy for opportunity for exposure) as potential drivers of sharing.

Potential Determinants of Valenced Sharing

When people share information, it is possible that the information is completely neutral (e.g., facts), but it is also possible that the information is infused with the sharer's opinion. By examining the valence of the shared information (i.e., the degree of attraction or aversion to the topic/behavior at hand), it is possible to better predict the consequences of this sharing, rather than simply examining whether one has shared or not. As used in this dissertation, valence of sharing comprises two major categories: negative (i.e., anti-tobacco) sharing and non-negative (i.e., pro-tobacco or a mix of anti- and pro-tobacco)[1] sharing. This dissertation proposes that the valence of shared content is partly a function

[1] Though valence of tobacco sharing is divided into two categories (such that pro-tobacco and mix of anti- and pro-tobacco sharing are combined into one non-negative category), valence of e-cigarette sharing is left as it is and comprises three categories: negative, positive, and mixed sharing. The reasons for this decision are outlined in Chapter 4.

of self-relevance (which was also expected to influence overall sharing, as argued above) as well as the perception of descriptive and injunctive norms surrounding the behavior.

Impression management. Perceived norms and self-relevance are put forth as predictors of valence of sharing based on one particular key theory: that of self-presentation, and in particular, impression management, which refers to the process via which individuals control how others perceive them (Goffman, 1959; Leary & Kowalski, 1990). Given that one of the key motivators of impression management is self-esteem maintenance (Leary & Kowalski, 1990), it can be suggested that people make an effort to elicit reactions that enhance self-esteem (i.e., compliments) especially in cases like sharing where people expect feedback from others (Schneider, 1969). Another key motivator of impression management is the desire to adhere to other people's values (Leary & Kowalski, 1990) and to win the approval (i.e., acquisitive self-presentation) and avoid the disapproval of others (i.e., protective self-presentation) (Jellison & Gentry, 1978; Leary & Allen, 2011). Considering that perceived norms have long been acknowledged to be influential on people's behaviors (Cialdini, Reno, & Kallgren, 1990; Fishbein & Ajzen, 1975), it is feasible to imagine that in an effort to be seen as adhering to the majority norm, some people may even share information that may be contrary to their private beliefs for the sake of managing one's impression (Berger, 2014; Jellison & Gentry, 1978). Furthermore, people may be more motivated to manage impressions for people who they want to impress (Schlenker, 1980); e.g., if one's close friends were smokers, he or she may be more likely to speak about smoking positively in front of their friends even if he or she had no intentions of being a smoker. Thus, perceptions of

descriptive and injunctive norms with regards to tobacco or e-cigarettes are expected to influence the valence in which people share about tobacco or e-cigarettes, respectively.

And yet, the effect of norms may be undermined by a sense of self-relevance and self-concept. The proposition is that if one perceives a topic to be a part of one's identity, while it is more likely that one will share about it (as hypothesized above), it is less likely that one will share negatively about it (Berger, 2014). Going back to the idea that self-concept may override one's desire to adhere to norms, one possible reason for this is that for some, changing the self-concept in order to achieve the ideal self that is formed via impression management may be too difficult. For example, a smoker who perceives smoking as a big part of his identity may feel that quitting is too difficult; thus, the individual would talk positively about smoking, in order to maintain high self-esteem with regards to the real self (Tedeschi & Norman, 1985). A second potential reason is that sometimes, people prioritize accurately portraying themselves to others rather than constructing an inaccurate impression of themselves (Leary & Kowalski, 1990), particularly when people value certain aspects of themselves. If one is proud to be an e-cigarette user for various possible reasons (e.g., proud to be using e-cigarettes to quit smoking, or proud to be a trend-setter), one would share positively with regards to e-cigarettes. Lastly, a third potential reason is the idea that sharing about tobacco or e-cigarettes to others – whether offline or online – is an act of public self-presentation, and there is a social pressure to adhere to that self-presentation (Schlenker, 1975). Because of the risks of not being able to follow through with what he or she has just shared with others, people may be more likely to share consistently with the person's actual self-perceptions (Baumeister, 1982; Schlenker, 1975).

Thus both self-relevance (as measured by current use and intentions) and perception of descriptive and injunctive norms surrounding tobacco/e-cigarettes will be examined as potential predictors of valenced sharing, in an attempt to answer the question of who shares negatively vs. positively about tobacco and e-cigarettes, recognizing that these two constructs may sometimes be inconsistent with one another and it is possible that they may interact in their effects on valence.

The Effects of Sharing

What is the benefit of sharing health-related information with others and how might it impact future behavior? In other words, why might we predict that sharing would affect future outcomes?

At this point, it is well-documented in the literature that face-to-face interpersonal communication has meaningful effects on a variety of different health outcomes. Numerous studies have shown that conversations can contribute to the effects of general media use (e.g., Lee, 2009; Seo & Matsaganis, 2013) and health media campaigns (see Southwell & Yzer, 2007 for a review) in bringing about desired outcomes. For example, Lee (2009) found that not only did interpersonal communication directly lead to healthier lifestyle cognitions and behaviors, but also that conversations interacted with television and internet use in predicting healthy behaviors. Alternatively, while Seo & Matsaganis (2013) also found that interpersonal communication predicted a higher likelihood of health-enhancing behaviors, they additionally found that conversations mediated the effect of being exposed to health information in the media on those health behaviors. As noted in Southwell & Yzer's review, studies have found similar patterns of mediating and

moderating effects of interpersonal communication on health outcomes in the context of health campaigns.

However, these studies have usually examined interpersonal communication as a two-way conversational exchange, rather than examining the broader concept of sharing information as used in this dissertation. Thus, the following are several propositions that attempt to explain how information sharing may affect the future behavior of those who share.

How Might Sharing Affect Behavior?

Knowledge gain. Interpersonal communication has long been seen as a venue for being exposed to new knowledge (Eveland, 2004; Katz & Lazarsfeld, 1955). Similarly, WOM has also been seen as a way for people to acquire information, especially at times of uncertainty (Berger, 2014). Regardless of who initiated the conversation, new information can arise as a result of the subsequent conversational exchanges that occur, and those who share may receive information as a result of sharing. This new piece of information can then affect the person's attitudes and intentions about the topic, as well as future behavior. In the health campaign literature, several studies showed evidence that supported this notion, finding that even among those who were not directly exposed to the campaign in question, greater intentions and behavior change were reported as a result of campaign-generated conversations (Boulay, Storey, & Sood, 2002; Shefner-Rogers & Sood, 2004; van den Putte, Yzer, Southwell, de Bruijn, & Willemsen, 2011). Thus, this dissertation suggests that sharing information may lead to behavior change, as

a result of acquiring more knowledge about the topic via the exchange of information that follows.

Anticipatory elaboration & discussion-generated elaboration. Another explanation for why sharing may lead to behavior change by the sharer is the occurrence of elaboration, or meaningful information processing, both prior to and during the sharing of information. The notion of anticipatory elaboration suggests that people tend to anticipate future conversations with others and that in preparation for those conversations, they actively seek out more information and are motivated to deeply process that information in order to perform well during those conversations (Eveland, 2004; Leippe & Elkin, 1987; Sehulter, 2006)[2]. Discussion-generated elaboration, on the other hand, which can be both self- and other-generated, suggests that such meaningful processing of information occurs during the act of conversing with others. Subsequently, deeper elaboration and processing of information has been shown to lead to attitude formation that is not only more accessible and more persistent over time, but also more predictive of behavior (Elaboration Likelihood Model; Petty & Cacioppo, 1986; Petty, Briñol, & Priester, 2009).

Norm awareness. Norms have long been recognized as a factor that affects people's behaviors (e.g., Berkowitz & Daniels, 1964; Cialdini, et al., 1990; Fishbein & Ajzen, 1975). Both the recognition that a particular behavior is prevalent among others

[2] At first glance, this explanation seems to suggest that it isn't the sharing that is affecting future behavior after all, but that it's the seeking of information and the central processing of previously exposed information that precedes the sharing behavior that is actually affecting future behavior. However, the idea that this elaboration occurs in anticipation of sharing information with others is what makes this explanation unique from the others.

(i.e., descriptive norms) and the realization that others approve or disapprove of a behavior (i.e., injunctive norms) can affect one's own judgment of the behavior and subsequently, the actual behavior itself (Berkman, Glass, Brissette, & Seeman, 2000; Cialdini, Reno & Kallgren, 1990). Along these lines, conversations have been seen as a vehicle through which people can realize what the norms surrounding a particular topic are (Hornik & Yanovitzky, 2003; Southwell, 2013). Sharing information with others can prompt the recipients of that information to share their own opinion of the matter in subsequent conversations or exchanges (Southwell, 2013). They may outwardly agree or disagree with the information shared, thereby expressing their approval or disapproval concerning the topic, subsequently affecting the initial sharer's beliefs, intentions, and behavior.

Public commitment. A different mechanism via which sharing may affect future behavior is the fact that it is an act of public commitment to the beliefs, attitudes, and/or intentions one has just shared. Historically, public commitment has been viewed as something that binds one to a particular action or principles (Schlenker, Dlugolecki, & Doherty, 1994) and has been found to strengthen any corresponding attitudes, subsequently allowing them to better guide future behavior. One of the key factors of commitment is whether it has been made *publicly* versus simply thinking it in one's head, such that studies have found public self-presentation to be more effective than private self-reflection in either changing or strengthening one's cognitions (Schlenker et al., 1994; Tice, 1992).

Relatedly, a particular line of studies found that participants in the condition in which they had to both 1) actively persuade others to implement a behavior (such as buying/using condoms or conserving water) that they themselves did not usually do and 2) think about their own actions in the past (in which they didn't implement these behaviors) experienced cognitive dissonance and eventually reported greater intentions and actual behavior change (compared to participants who didn't have to publicly commit to anything and/or who didn't have to think about their past actions) (Aronson, Fried, & Stone, 1991; Dickerson, Thibodeau, Aronson, & Miller, 1992; Stone, Aronson, Crain, Winslow, & Fried, 1994). These studies showed that talking about a behavior (that one did not usually engage in) induced feelings of dissonance, while at the same time, provoking one to reduce that dissonance in line with what he or she has shared.

However, these findings also suggest that the act of publicly committing to a particular intention may motivate people to go through with implementing those intentions in an effort to retain their integrity and save face. After all, sharing about tobacco or e-cigarettes to others – whether offline or online – is an act of public self-presentation, and there is a social pressure to adhere to that self-presentation (Schlenker, 1975). Thus, while the above studies have largely been focused on instances in which public commitment strengthens intentions to act on a certain behavior in the process of reducing any dissonance between cognitions, it is equally, if not more, conceivable that intentions strengthened by public commitment can better guide behavior when already consistent with previously held cognitions. In fact, the above studies by Schlenker and colleagues (1994) and Tice (1992) found the effect of public commitment was present in

a situation where neither dissonance nor consistency was a factor; it was simply that public commitment induced intentions to carry over into behavior.

Though the above studies have been in situations of face-to-face public commitment, more recent studies have examined the same phenomenon in computer-mediated communication settings. As mentioned above, computer-mediated forms of interaction may be perceived as less public because of the lack of social context cues (Short, Williams, & Christie, 1976), and yet, despite those cues, people still perceive themselves as being public online (Douglas & McGarty, 2001). This leads to questions of whether self-presentation online is still perceived as an act of public commitment. Studies have found that publicly acting out a trait online led to increased internalization of that trait (Gonzales & Hancock, 2008; Walther, Liang, DeAndrea, Tong, Carr, Spottswood, & Amichai-Hamburger, 2011), and publicly advocating a particular position online led to internal persuasion regarding that position (Walter, Van Der Heide, Tong, Carr, & Atkin, 2010), suggesting that the influence of publicly committing to future behaviors is present regardless of the platform through which that commitment is made. Furthermore, Johnson & Van Der Heide (2015) found that while the act of publicly sharing personal tastes in art online led to stronger future attitudes among those who shared often, compared to those who rarely shared, the presence of feedback did not affect the strength of attitudes, suggesting that the act of sharing itself is what potentially leads to actual long-term outcomes rather than any subsequent conversations or feedback that may possibly ensue.

The Role of Sharing in a Theory of Behavior Change

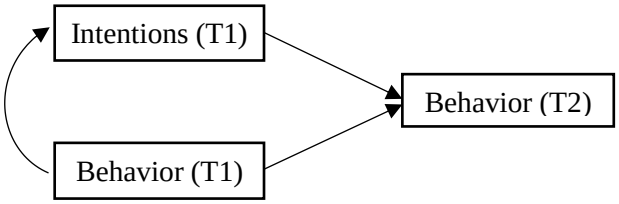
Models of behavior change often suggest that future behavior is the result of a rational decision-making process, including the health belief model (HBM; Becker, 1974; Rosenstock, 1974), social learning theory (Bandura, 1977), the stages-of-change model (Prochaska & Diclemente, 1983), the theory of reasoned action (TRA; Fishbein & Ajzen 1975), and the theory of planned behavior (TPB; Ajzen 1985), the latter two of which will serve as the main framework guiding the research questions and hypotheses of this dissertation. The following section will review the TRA and TPB, and situate sharing in these models.

The role of intentions and behavior. The TRA suggests that intentions lead to future behavior change, and that those intentions are driven by subjective normative beliefs and attitudes about the behavior; the TPB extends this theory by adding perceptions of volitional behavior control as another factor driving both intentions and actual future behavior (Ajzen, 1985; Fishbein & Ajzen, 1975). Studies have shown that the intention-behavior association put forth by these two theories is strong in several health and non-health contexts (see Sheppard, Hartwick, & Warshaw, 1988 for review).

What these theories do not explicitly acknowledge is the direct effect of past behavior on future behavior, suggesting its effects are simply mediated by the other constructs in the models (Ajzen, 1991). However, there have been studies showing that 1) prior behavior predicts future behavior, above and beyond intentions, norms, attitudes, and/or perceived behavioral control, and that 2) prior behavior predicts intentions above and beyond norms, attitudes, and/or perceived behavioral control (see Ouellette & Wood,

1998 for review). Though this association between past behavior and future behavior has been suggested to be simply an indicator of the stability of behaviors, or as being an indication of a more automatic variation of behavior (i.e., habit) (Ajzen, 1991), it seems that there is substantial evidence to acknowledge the predictive value of past behavior, whether directly or indirectly via other cognitions in the TRA and TPB.

Figure 1.2 The Role of Current Behavior and Intentions on Future Behavior.



The role of sharing. As mentioned above, the intention-behavior association has been found to be strong in several contexts: meta-analyses examining the relationship between intentions and future behavior showed that the average correlation between the two constructs was between 0.53-0.54 (Ouellette & Wood, 1998; Sheppard, Hartwick, & Warshaw, 1988). However, there is still room for improvement in terms of predicting future behavior.

There are two issues in particular that, if resolved, could improve the predictive power of intentions. This dissertation puts forth the act of information sharing as a potential partial solution to both issues.

For one, intentions are better able to predict behavior when there is temporal stability (Fishbein & Ajzen, 2010). In other words, when there is a significant time lag between the time of intention formulation and the actual behavior, it is less likely that

previous intentions are enacted as behaviors; however, it is desirable for intentions to have an influence on long-term behavior. Sharing may increase the chances of behaviorally following through on intentions in the long run for several reasons. As mentioned above, sharing leads to deeper elaboration and processing of information, which has been shown to lead to attitude formation that is not only more accessible and more persistent over time, but also more predictive of behavior (Petty & Cacioppo, 1986; Petty, Briñol, & Priester, 2009). Sharing may also lead to increased knowledge gain and norm awareness, which may then lead to increased intentions and increased chances of behavior change.

Second, addictive behaviors are acknowledged as slightly deviant from other behaviors, such that they are driven more so by addiction than by intention (Fishbein & Ajzen, 2010). Even if one has the intention to quit smoking, the act of quitting may be too difficult and one would find it easier to switch back to the intention to continue smoking. However, as aforementioned, because sharing represents a public commitment to one's intentions (Schlenker, Dlugolecki, Doherty, 1994), it increases the likelihood of one implementing that intention, despite pre-existing cognitions or other factors such as addiction. Thus, sharing may increase the predictive power of intentions on behavior, and is worth examining in conjunction with intentions when studying the likelihood of future behavior.

Summary

In sum, there is a sizable gap in the literature concerning the sharing of health-related content, and especially in the context of tobacco and e-cigarette communication,

such that a study of the contextual factors surrounding sharing behavior is warranted. At the same time, there is substantial evidence to justify studying the effect of sharing on future behavior, especially when viewed in the context of significant theories of behavior change such as the TRA and TPB. The next chapter builds on this review and proposes a conceptual model of effects, as well as providing an overview of the studies implemented in this dissertation as an effort to test the model.

CHAPTER TWO

The Current Study: Model of Effects and Research Overview

The main objective of this dissertation is to explore the role that health-related information sharing potentially plays in bringing about future health behavior change. For the purposes of this dissertation, the health behavior in question is tobacco use: what is the effect of sharing cigarette and/or tobacco-related information on future smoking behavior? In an effort to see what aspects of sharing are generalizable to other health behaviors and what aspects are specific to individual health behaviors, this dissertation also examines the same questions in the context of e-cigarette use, recognizing that while cigarettes and e-cigarettes do have their similarities, they're also surrounded by rather different perceptions and may be differentially affected by sharing.

In order to accomplish this goal, the dissertation will ask two broad questions. The first concerns the nature of sharing: What is the prevalence of sharing behavior among youth and young adults? What are the drivers of sharing behavior and in particular, what affects valence of sharing? The second question is with regards to the specific role of sharing in the context of other variables: What is the effect of sharing on future behavior, particularly when current behavior and intentions come into play?

Model of Effects

My final model of effect is as follows:

Figure 2.1 Model of Effects for Examining the Determinants of Sharing and Valence of Sharing

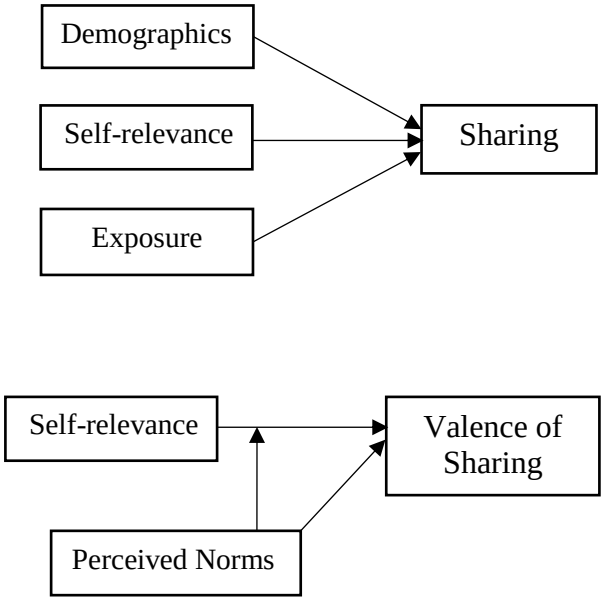


Figure 2.1 presents the model of effects for examining the determinants of sharing, and for valence of sharing. This dissertation posits that demographics, self-relevance (as defined by current use and intentions to use tobacco or e-cigarettes), and exposure to relevant information (via seeking or scanning, ad exposure, or use of general and social media) will predict the likelihood of sharing about tobacco or e-cigarettes. It further suggests that specifically sharing pro- or anti-tobacco or e-cigarette information will be determined by self-relevance and perceptions of descriptive and injunctive norms.

Figure 2.2 Model of Effects for Examining the Consequences of Sharing

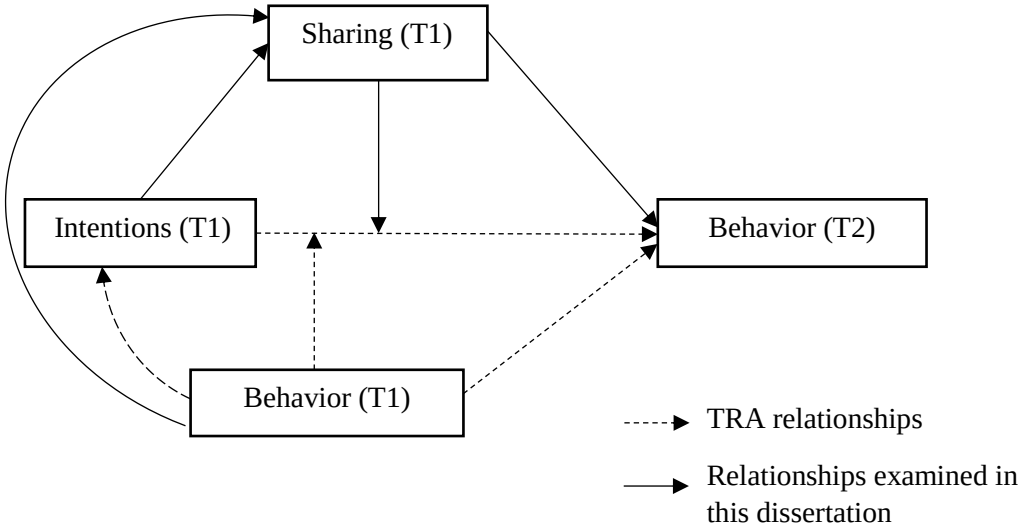


Figure 2.2 presents the final version of the proposed model of effects. The dashed lines in the figure reflect the relationships already put forth by the theory of reasoned action, as laid out in the previous chapter (Fishbein & Ajzen, 1975). The solid lines are the relationships being examined in this dissertation. This dissertation posits that information sharing partially shapes the way intentions develop into actual behaviors, by suggesting that while current intentions and current behavior each have main effects on future behavior, 1) they also directly affect information sharing, 2) sharing directly affects future behavior, and concurrently, 3) sharing acts as a moderator of the association between current intentions and future behavior.

Overview of the Current Research

The current dissertation is mainly interested in the notion of sharing health content, and particularly the role it plays in the context of health intentions and behaviors.

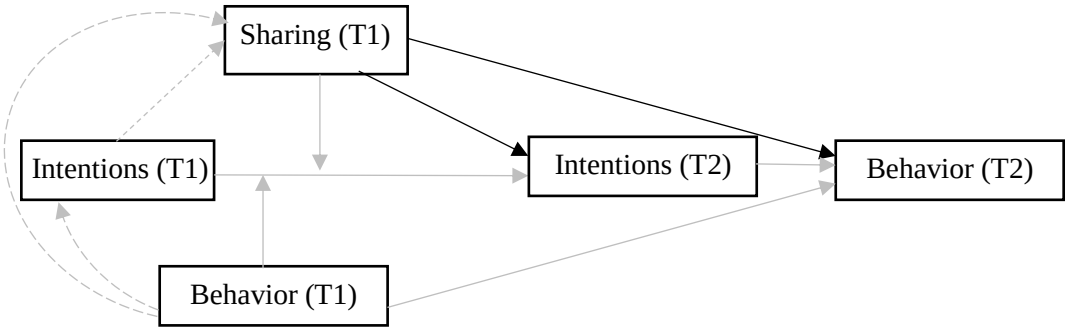
Sharing, as conceptualized in this dissertation, has not been examined extensively in the health communication area, though variations of it have been examined in other disciplines (as detailed in Chapter One). This dissertation attempts to make a first foray into examining sharing behavior, with three separate studies.

Because sharing is a phenomenon that hasn't been studied extensively, especially in the context of tobacco and e-cigarettes, there was a lack of previously validated sharing measures to which we could refer. Given that we had to develop a new measure of sharing, the necessary first step was to provide evidence for the reliability and validity of this newly proposed measure. Thus, Study 1 is a validation study, the results of which gave us confidence to move forward with using this measure in the subsequent studies. Study 1 is detailed in Chapter Three.

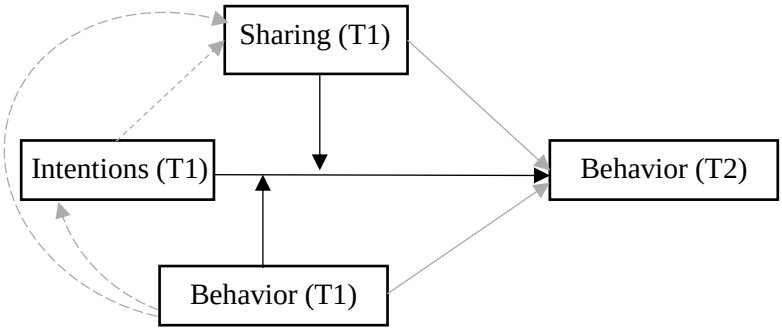
Study 2 is an examination of the different predictors of sharing. Given the scarcity of literature regarding sharing in the context of health communication (and in particular, tobacco research), this study aims to fill this gap by determining the correlates of overall sharing, as well as tobacco and e-cigarette sharing separately. In addition to examining who shares vs. who doesn't share, it also examines the different valences in which people share: who shares negative vs. positive content with regard to tobacco and e-cigarettes? Study 2 is detailed in Chapter Four.

Study 3 aims to test for the effects of tobacco-related and e-cigarette-related sharing on corresponding behaviors in the future. This study offers two main propositions. The first is a main effects hypothesis concerning the effects of sharing on outcomes of interest (mainly intentions and behavior). Specifically, it hypothesizes that

negative sharing will undermine, and non-negative sharing will increase the likelihood of engaging in the target behavior, adjusting for baseline intentions and behavior.



The second proposition is that sharing will interact with intentions to affect behavior. This moderation hypothesis suggests that sharing will affect the likelihood of implementing one's intentions, such that sharing with a valence consistent with intentions will increase follow through, and sharing with a valence inconsistent with intentions will decrease follow through.



Study 3 is detailed in Chapter Five.

CHAPTER THREE

Study 1 – Measuring Sharing Behavior in the Context of Tobacco and E-cigarette Communication: A Validation Study

Overview

There is a gap in the literature concerning the notion of sharing, particularly that of tobacco- and e-cigarette-related information, as conceptualized in this dissertation. The most recent study was published by Emery and colleagues, in which they examined people's behaviors regarding e-cigarette-related information, including sharing behavior (Emery, Vera, Huang, & Szczypka, 2014). However, while they relied on a measure of e-cigarette information sharing, they did not provide details as to how they operationalized the measure nor did they provide evidence of its validity. As no other studies have made any attempts at validating measures that could be used to examine sharing behavior in the context of tobacco and e-cigarettes, insofar as we are aware, this study aims to provide evidence for the validity of a measure that attempts to assess tobacco- and e-cigarette-related sharing behavior.

Criteria for Measure Validation

This study aimed to validate both the overall measures of tobacco and e-cigarette sharing, as well as the more specific measures of tobacco and e-cigarette sharing valence, primarily using two methods: tests of reliability and tests of validity.

First, in an effort to establish the reliability of the proposed measure for sharing, this study examined two different criteria: internal consistency and temporal stability

(i.e., test-retest reliability). *Internal consistency* is a test of how well a set of different items measures the same construct (based on the average correlation among items within a set), while *test-retest reliability* is concerned with whether repeated tests of a measure will produce highly correlated scores (Hayes, 2005, p.110; Nunnally & Bernstein, 1994, p.212-251).

Second, we attempted to examine the validity of the proposed sharing measure by testing for three different potential criteria: nomological validity, convergent validity, and discriminant validity. *Nomological validity* is used to assess whether a construct is associated with other relevant variables in the expected direction (Shadish, Cook, & Campbell, 2002). In other words, the study is testing to see whether the sharing measure is positively associated with variables that are expected to predict sharing behavior, or with variables that are expected to be affected by sharing. *Convergent validity* assesses whether the different measures of a construct that should be related are actually related. In contrast, *discriminant validity* assesses whether the different measures that should be less related, are actually distinct from each other, and is usually examined in conjunction with convergent validity.

Hypotheses

Reliability. First of all, for a measure to be considered reliable, it should correlate well with other items that aim to measure sharing behavior. Thus we hypothesized the following:

H1a: Different items measuring tobacco-related sharing will be strongly correlated with one another.

H1b: Different items measuring e-cigarette-related sharing will be strongly correlated with one another.

Furthermore, a reliable measure should produce similar scores when measured at different points in time. Thus, we hypothesized that those who shared at Time 1 were also very likely to share at a later date, recognizing that a six-month gap between measurement times will produce true inconsistency in sharing behaviors.

H2a: Sharing at Time 1 will be strongly correlated with sharing at Time 2.

H2b: Sharing tobacco-related information at Time 1 will be strongly correlated with sharing tobacco-related information at Time 2.

H2c: Sharing e-cigarette-related information at Time 1 will be strongly correlated with sharing e-cigarette-related information at Time 2.

The same hypotheses were put forth for the valence items.

H3a: Among those who shared about tobacco, negative tobacco sharing at Time 1 will be strongly correlated with negative tobacco sharing at Time 2.

H3b: Among those who shared about e-cigarettes, negative e-cigarette sharing at Time 1 will be strongly correlated with negative e-cigarette sharing at Time 2.

Validity. The next set of hypotheses were based on the assumption that there is a general pattern of sharing that potentially holds true across different topic areas and different platforms of sharing, and a valid measure would capture such patterns. Thus, we predicted that those who shared about one topic were very likely to share about another

topic, and those who shared on one platform were very likely to share similar content on another platform.

H4: Sharing tobacco-related information will be strongly correlated with sharing e-cigarette-related information.

H5a: Sharing tobacco-related information online will be strongly correlated with sharing tobacco-related information offline.

H5b: Sharing e-cigarette-related information online will be strongly correlated with sharing e-cigarette-related information offline.

Second, use of a certain product was predicted to be positively associated with sharing information about that product. This hypothesis was in line with research that showed people tended to make more of an effort to talk about information that they deemed relevant to themselves (Berger, 2014; Southwell, 2005; 2013). Accordingly, we predicted that those who shared information about tobacco and e-cigarettes were more likely to be those who perceived tobacco and e-cigarettes as part of their identity, i.e., current tobacco and e-cigarette users. It may be that tobacco or e-cigarette use predicts more sharing of that product; it may also be that the sharing of information about tobacco or e-cigarettes predicts subsequent use of that product. Regardless of the causal direction, we predicted that those who smoked cigarettes would be more likely to share information about tobacco with others, and those who used e-cigarettes would be more likely to share information about e-cigarettes.

H6a: Cigarette use will be positively associated with tobacco-related sharing.

H6b: E-cigarette use will be positively associated with e-cigarette-related sharing.

We further predicted that those who perceived tobacco and e-cigarettes as part of their identity would be unlikely to share negatively about those topics because doing so would entail putting themselves at risk of being perceived negatively. Such possibilities directly contradict people's tendencies and constant attempts to present themselves to others in a favorable light (i.e., impression management; Leary & Kowalski, 1990; Schlenker, 1985). Thus, it can be projected that those who smoked cigarettes would be more likely to share positive tobacco-related content and less likely to share negative tobacco-related content, and that those who used e-cigarettes would also be more likely to share positive e-cigarette-related content and less likely to share negative e-cigarette-related content.

H7a: Cigarette use will be positively associated with positive tobacco-related sharing and negatively associated with negative tobacco-related sharing.

H7b: E-cigarette use will be positively associated with positive e-cigarette-related sharing and negatively associated with negative e-cigarette-related sharing.

Furthermore, those who were recently exposed to any tobacco or e-cigarette-related information – whether via one's own active searching (i.e., seeking) or via involuntary, routine encounters with information (i.e., scanning) – were thought to be more likely to share that information, compared to those who weren't exposed to any such information. This could be for several reasons. The first is simply that exposure to information provides them with more recently-acquired knowledge that they are then able to share with others (Eveland, 2004). The second is in line with priming theory, which suggests that exposure to a message increases the accessibility of information presented

in the message (Iyengar & Kinder, 1987). Given that easily accessible topics are more likely to be talked about or shared (Berger & Iyengar, 2013), it then follows that recent exposure to tobacco or e-cigarette information in the general media may make similar or relevant information more accessible within a person's thoughts, leading to a higher likelihood of subsequent sharing of such information.

H8a: Exposure to tobacco-related information (whether through seeking or scanning) will be positively associated with sharing tobacco-related information.

H8b: Exposure to e-cigarette-related information (whether through seeking or scanning) will be positively associated with sharing e-cigarette-related information.

Because seeking, scanning, and sharing are all behaviors that people engage in with regard to health information, it was deemed highly likely that they are all strongly related to each other (as posited in Hypotheses 8a-b). As suggested above, it could be that seeking and/or scanning predicts information sharing, but it could also be that increased sharing leads to more seeking or scanning of relevant information, or that the three behaviors have some mutual predictors.

However, sharing is not meant to be a proxy for media exposure, but rather, its own distinct behavior, with its own set of predictors and outcomes (separate from those shared with seeking and scanning). In order to ensure that the proposed sharing measure is distinct from the seeking and the scanning measures, findings should first indicate that the association between the sharing of two topics (which was hypothesized above to be strongly associated) is still significant, even after controlling for seeking and scanning as

confounders. If this association disappears after controlling for tobacco seeking and scanning and e-cigarette seeking and scanning, it would mean that tobacco sharing doesn't have any more influence on e-cigarette sharing (or vice versa) above and beyond the variance accounted for by seeking and scanning; in other words, sharing is essentially another way of measuring seeking and scanning.

> H9: The association between tobacco-related sharing and e-cigarette-related sharing will remain strong and positive, after controlling for tobacco seeking, e-cigarette seeking, tobacco scanning, and e-cigarette scanning.

Second, findings should indicate that the association between the sharing of two topics is stronger than the associations between the sharing of one topic and the seeking or scanning of another. This is based on two assumptions: 1) (as posited in Hypotheses 8a-b), seeking or scanning about one topic is probably associated with the sharing of the same topic, but not necessarily with the sharing of a different topic; however, 2) if sharing, seeking, and scanning are all discrete behaviors, the highest associations would exist between sharing about two different topics, seeking about two different topics, or scanning about two different topics (i.e., between identical behaviors). Thus:

> H10: The association between tobacco-related sharing and e-cigarette-related sharing will be greater than the association between a) tobacco-related sharing and e-cigarette-related seeking and b) e-cigarette-related sharing and tobacco-related seeking

> H11: The association between tobacco-related sharing and e-cigarette-related sharing will be greater than the association between a) tobacco-related sharing

and e-cigarette-related scanning and b) e-cigarette-related sharing and tobacco-related scanning.

Lastly, it is possible to imagine that sharing is actually just an indication of attitudes, given that both are hypothesized to affect intentions and behavior (Fishbein & Ajzen, 1975). However, while the two may be correlated, this study conceptualizes sharing as its own separate behavior. To show that sharing is not simply a proxy for attitudes, findings should show that sharing is still associated with behavior even after controlling for attitudes.

H12a: The association between tobacco sharing and cigarette use will remain significant after controlling for tobacco-related attitudes.

H12b: The association between e-cigarette sharing and e-cigarette use will remain significant after controlling for e-cigarette-related attitudes.

Method

Data

The majority of this study used data drawn from an ongoing nationally representative rolling cross-sectional and re-contact survey of youth (13-17) and young adults (18-25 year olds). Social Science Research Solutions (SSRS) obtained the desired samples through a partially list-assisted random digit dial process and conducted all surveys over both landline and cellular phones. The cross-sectional survey was administered to a fresh sample of about 300 respondents each month, while the re-contact survey was administered to about half of the original respondents six months later (re-

contact rate is approximately 40%). The survey was initiated in mid-June of 2014; at the time of this study, the sample size was N=7094 respondents (the cross-sectional sample acquired after 93 weeks of data accumulation), while the re-contact sample was n=1651 (after 67 weeks of data accumulation).

Part of this study also relied on data drawn from a separate online sample recruited through Amazon Mechanical Turk (MTurk). Because the overall SSRS survey included only single measures of online tobacco-related sharing, offline tobacco-related sharing, online e-cigarette-related sharing, and offline e-cigarette-related sharing, it didn't provide the data needed to test for internal consistency reliability. Thus, two revised versions of the overall survey (one tobacco version and one e-cigarette version) were administered to a sample of 551 young adults (18-25 year olds) living in the United States: the tobacco version was taken by a sample of 273 respondents, while the e-cigarette version was taken by a sample of 278 respondents. The demographics were similar to the sample obtained via SSRS, such that about half of the sample was female (49%), and more than half of the sample was either in college or a graduate program (64%).

Measures

Sharing behavior. Sharing behavior was asked of all survey respondents and was asked separately for tobacco-related and e-cigarette-related information:

> Tobacco-related sharing: *The next questions are about whether you personally shared information with others. In the past 30 days did you share information*

about cigarettes or tobacco via email or social media? How about in a conversation in-person or on the phone? (Yes/No for each modality)

E-cigarette-related sharing: *The next questions are about whether you personally shared information with others. In the past 30 days did you share information about vaping or e-cigarettes via email or social media? How about in a conversation in-person or on the phone?* (Yes/No for each modality)

Those who shared "via email or social media" were recorded as having shared "online," while those who shared "in a conversation in-person or on the phone" were recorded as having shared "offline." General tobacco-related sharing included sharing online and/or offline about tobacco; the same applied to e-cigarette-related sharing. Overall sharing included sharing about tobacco and/or e-cigarettes.

Valence of sharing. Valence of sharing was asked only of those who reported any sharing behavior and was worded as follows:

Tobacco-related sharing: *Think about the information you've shared with others in the past 30 days about cigarettes or other tobacco products. Was it mostly positive about using tobacco, mostly negative or a mix of positive and negative?* (Positive/Negative/Mix)

E-cigarette-related sharing: *Think about the information you've shared with others in the past 30 days about vaping or e-cigarettes. Was it mostly positive about vaping or using e-cigarettes, mostly negative, or a mix of positive and negative?* (Positive/Negative/Mix)

Additional sharing measures. The MTurk survey included additional sharing items that were used to test for internal consistency. Three measures asked about offline and online tobacco sharing each (see Table 3.1). The same six measures (albeit about e-cigarettes or vaping) were used to ask about offline and online e-cigarette sharing.

Table 3.1 Measures Used to Test for Internal Consistency Reliability.

Construct	Item Wording
Offline tobacco sharing	(Original measure): *The next questions are about whether you personally shared information with others. In the past 30 days did you share information about cigarettes or tobacco in a conversation in-person or on the phone?*
	While talking with other people, did you ever bring up cigarettes or tobacco as a topic of discussion in the past 30 days?
	In the past 30 days, did you tell others about cigarettes or tobacco… *a) In person? b) On the phone?*
	In the past month, how often did you start a conversation about cigarettes or tobacco with others?
Online tobacco sharing	(Original measure): *The next questions are about whether you personally shared information with others. In the past 30 days did you share information about cigarettes or tobacco via email or social media?*
	In the past 30 days, did you bring up cigarettes or tobacco in any of your online interactions (i.e., email or social media)?
	In the past 30 days, did you communicate any cigarette or tobacco-related content to others via… *a) Email? b) Facebook? c) Twitter? d) Instagram? e) YouTube? f) Instant message?*
	In the past month, how often did you send any cigarette or tobacco-related information to others via email or social media?

Tobacco- and e-cigarette-related behaviors. Tobacco-related behaviors were asked as follows: "*Have you ever tried smoking cigarettes, even one or two puffs?* (Binary: Yes/No); *During the past 30 days, on how many days did you smoke cigarettes?* (Continuous: 0-30)." These measures were then combined into a binary measure of current cigarette use: 0 (not a current smoker) or 1 (current smoker).

E-cigarette-related behaviors were asked as follows: "*Have you ever tried vaping or using e-cigarettes, even one or two puffs?* (Binary: Yes/No); *During the past 30 days, on how many days did you vape or use e-cigarettes?* (Continuous: 0-30)." These measures were then combined into a binary measure of current e-cigarette use: 0 (not a current vaper) or 1 (current vaper).

Exposure to Information. Exposure to relevant content can occur via two broad routes: seeking (i.e., deliberately looking for information) and scanning (involuntarily coming across relevant information in the media or in conversations with others). Seeking information was asked separately for tobacco and e-cigarette information, and was asked as follows: *Thinking about the past 30 days, did you actively look for information about (cigarettes or other tobacco products/ vaping or using e-cigarettes)?* Similarly, scanning information was also asked separately for tobacco and e-cigarette information: *In the past 30 days, did you come across information about (cigarettes or tobacco/ vaping or using e-cigarettes) online, in the media, or from other people even when you were not actively looking for it?* All measures were binary (responses were recorded as yes/no). In addition, when looking at overall "exposure" to information, the seeking and scanning measures within each topic area (i.e., tobacco and e-cigarettes)

were combined such that those who sought and/or scanned information about tobacco were regarded as having been exposed to tobacco information, and those who sought and/or scanned information about e-cigarettes were regarded as having been exposed to e-cigarette information.

Attitudes. The main survey measured 15 different beliefs related to tobacco and 13 different beliefs related to e-cigarettes[3]. These items were used to construct a tobacco-related attitudes scale (Cronbach's $\alpha = 0.86$) and an e-cigarette-related attitudes scale (Cronbach's $\alpha = 0.89$) (see Appendix A for a full list of all of the individual belief items that make up the scale). These scales were then reverse-coded so that the lower end of the scale reflected anti-tobacco/e-cigarette attitudes, and the higher end of the scale reflected pro-tobacco/e-cigarette attitudes.

Analytic Procedures

In order to test for internal consistency among items measuring each construct, Cronbach's alphas[4] and item-rest correlations were examined.

In order to test the hypothesized relationships, a series of logistic regressions were performed. Because logistic regressions do not make any assumptions about the normality of the dependent variables' distributions and the majority of our variables have

[3] The cross-sectional survey only measured four belief items related to e-cigarettes, whereas the re-contact survey measured 13 items. The latter was used because they were more comparable to the tobacco-related belief items included in the cross-sectional survey.

[4] Standardized Cronbach's alpha was used, which can be calculated as follows: $\alpha = \frac{k\bar{r}}{1+(k-1)\bar{r}}$) where k is the number of items and $\bar{r}$ is the average correlation between the items (Hayes, 2005 p.113).

skewed distributions, this was deemed the best method of analysis. All analyses were run on Stata 13.0 (StataCorp, 2013).

Results

The present sharing measure was shown to be reliable in terms of both test-retest reliability and internal consistency (Table 3.2). Test-retest analyses showed that there were strong positive associations between overall sharing at Time 1 and Time 2, tobacco-related sharing at Time 1 and Time 2, and e-cigarette-related sharing at Time 1 and Time 2. Test-retest analyses also showed that there were strong positive associations between negative tobacco sharing at Time 1 and Time 2, and between negative e-cigarette sharing at Time 2 and Time 2. Tests of internal consistency with the supplemental survey showed that there were strong correlations[5] among the four items measuring each of the following: offline tobacco sharing ($\alpha = 0.87$), online tobacco sharing ($\alpha = 0.91$), offline e-cigarette sharing ($\alpha = 0.89$), and online e-cigarette sharing ($\alpha = 0.91$) (Table 3.2).

[5] Based on the standard of Cronbach's alpha being at least 0.70 (Nunnally & Bernstein, 1994, p.265).

Table 3.2 Tests of Reliability

Internal Consistency	Cronbach's α	Item-rest Correlations
Items measuring offline tobacco sharing (4)	0.8663	0.5835
Items measuring online tobacco sharing (4)	0.9086	0.7343
Items measuring offline e-cigarette sharing (4)	0.8852	0.6252
Items measuring online e-cigarette sharing (4)	0.9068	0.7158
Test-Retest Reliability	**OR [95% CI]**	
Overall sharing at Time 1 & Time 2	5.01*** [3.92, 6.42]	
Tobacco sharing at Time 1 & Time 2	4.21*** [3.21, 5.52]	
E-cigarette sharing at Time 1 & Time 2	5.74*** [4.17, 7.92]	
Negative tobacco sharing at Time 1 & Time 2	8.06*** [2.88, 22.59]	
Negative e-cigarette sharing at Time 1 & Time 2	9.23*** [2.44, 34.88]	

*** $p < .001$

Note: α = Cronbach's alpha; OR = odds ratios; 95% CI = 95% confidence intervals. Item-rest correlations report the correlation of the original sharing measure with the other three items. The number in parentheses reflect the number of items in each set, on which α and item-rest correlations were calculated.
For tests of internal consistency, *n*=273 for items measuring tobacco sharing, and *n*=278 for items measuring e-cigarette sharing. For test-retest reliability analyses, *n*=1650 for overall, tobacco, and e-cigarette sharing; *n*=63-87 for negative tobacco and e-cigarette sharing.

Analyses also showed that the measure was valid, based on several criteria. First of all, it was predicted that sharing would prove to be a stable behavior across different topics and platforms, and that the sharing measure would capture this. As expected, findings showed a strong positive association between tobacco-related sharing and e-cigarette-related sharing, tobacco-related sharing online and offline, and e-cigarette-related sharing online and offline (See Table 3.3).

It was also predicted that if the sharing measure was valid, it would be highly correlated with measures of product use and exposure to related information. First, findings showed that use of a certain product was positively associated with sharing information about that topic, such that there were strong associations between cigarette use and tobacco-related sharing and between e-cigarette use and e-cigarette-related sharing. Subsequently, it was found that cigarette use and e-cigarette use was positively associated with positive tobacco sharing and positive e-cigarette sharing respectively, and negatively associated with negative tobacco sharing and negative e-cigarette sharing respectively. Second, exposure to information, including both active seeking of information and involuntary scanning of information, was positively associated with sharing of that information, such that there were strong associations between tobacco-related information exposure and tobacco-related sharing, and e-cigarette-related information exposure and e-cigarette-related sharing.

Table 3.3 Tests of Validity

Association between:		OR [95% CI]
Tobacco sharing	E-cigarette sharing	9.67*** [8.33, 11.23]
Tobacco sharing online	Tobacco sharing offline	11.38*** [8.82, 14.68]
E-cigarette sharing online	E-cigarette sharing offline	26.46*** [19.76, 35.44]
Cigarette use	Tobacco sharing	2.76*** [2.38, 3.20]
"	*Non-negative* tobacco sharing	4.90*** [3.65, 6.57]
"	*Negative* tobacco sharing	0.20*** [0.15, 0.27]
E-cigarette use	E-cigarette sharing	5.73*** [4.86, 6.76]
"	*Positive* e-cigarette sharing	5.00*** [3.56, 7.03]
"	*Negative* e-cigarette sharing	0.16*** [0.10, 0.25]
Exposure to tobacco information	Tobacco sharing	3.17*** [2.80, 3.59]
Exposure to e-cig information	E-cigarette sharing	8.23*** [7.03, 9.64]

*** $p < .001$
Note: OR = odds ratios; 95% CI = 95% confidence intervals.

Lastly, the aim was to show that sharing is a distinct behavior and isn't simply a proxy for other measures. The first attempt was to distinguish sharing from seeking and scanning. Results showed that the relation between tobacco-related sharing and e-cigarette-related sharing remained strong and significant after controlling for tobacco-related seeking and scanning and e-cigarette-related seeking and scanning. Second, the association between tobacco-related sharing and e-cigarette-related sharing (*OR*=9.67, 95% CI [8.33, 11.23] was greater than that between tobacco-related sharing and e-cigarette-related seeking (*OR*=5.44, 95% CI [4.37, 6.77]) and between e-cigarette-related sharing and tobacco-related seeking (*OR*=5.39, 95% CI [4.34, 6.68]). The association between tobacco-related sharing and e-cigarette-related sharing was also greater than that between tobacco-related sharing and e-cigarette-related scanning (*OR*=2.63, 95% CI [2.34, 2.95]) and between e-cigarette-related sharing and tobacco-related scanning (*OR*=3.04, 95% CI [2.62, 3.54]). These results showed that sharing was distinct from other information engagement behaviors (see Table 3.4).

Table 3.4 Distinguishing Sharing from Seeking and Scanning

Adjusted association between:		**Odds Ratios [95% CI]**
Tobacco-related sharing	E-cig-related sharing[a]	7.13*** [6.02, 8.45]
Unadjusted associations between:		
E-cig-related seeking	Tobacco-related sharing	5.44*** [4.37, 6.77]
Tobacco-related seeking	E-cig-related sharing	5.39*** [4.34, 6.68]
E-cig-related scanning	Tobacco-related sharing	2.63*** [2.34, 2.95]
Tobacco-related scanning	E-cig-related sharing	3.04*** [2.62, 3.54]

*** $p < .001$
Note: OR = odds ratios; 95% CI = 95% confidence intervals.
[a] Controlling for tobacco seeking, e-cigarette seeking, tobacco scanning, and e-cigarette scanning.

The second attempt was to distinguish sharing from attitudes. Bivariate correlations between tobacco sharing and the tobacco attitudes scale provided evidence for a very small association, especially compared to associations between tobacco sharing and cigarette use, and tobacco attitudes and cigarette use (Table 3.5). Furthermore, the association between tobacco sharing and cigarette use, which had already been shown to be significant in the previous analyses, remained significant, even after controlling for tobacco attitudes (Table 3.6).

Likewise, though e-cigarette sharing and e-cigarette attitudes showed a larger correlation than their tobacco counterparts, the association between e-cigarette sharing and e-cigarette use (*OR*=9.63; 95% CI [6.68, 13.90] when both variables are at Time 2) also remained significant, even after controlling for e-cigarette attitudes (Table 3.6), providing evidence for the notion that sharing is not simply an alternative measure for attitudes, but a separate behavior worth measuring.

Table 3.5 Zero-order Correlations between Sharing, Attitudes, and Behavior Variables

		1	2	3
1	Tobacco sharing	1.000		
2	Tobacco attitudes	0.0267*	1.000	
3	Cigarette use	0.1634***	0.2744***	1.000
1	E-cigarette sharing	1.000		
2	E-cigarette attitudes	0.2022***	1.000	
3	E-cigarette use	0.3441***	0.3032***	1.000

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

Note. $N = 7094$ for tobacco correlations; $n = 1650$ for e-cigarette correlations.
Pairwise Spearman's correlation coefficients (rho) are presented.

Table 3.6 Distinguishing Sharing from Attitudes

(DV: Cigarette use)	*Model 1* OR [95% CI]	*Model 2* OR [95% CI]
Tobacco sharing	2.75*** [2.38, 3.20]	2.83*** [2.42, 3.32]
Tobacco attitudes	--	7.44*** [6.18, 8.94]
(DV: E-cigarette use)		
E-cigarette sharing	9.63*** [6.68, 13.90]	6.45*** [4.33, 9.62]
E-cigarette attitudes	--	10.08*** [6.22, 16.35]

*** $p <$ .001

Note. DV = dependent variable; OR = odds ratios; 95% CI = 95% confidence intervals.
The ORs represent the bivariate cross-sectional associations between sharing and the DV (Model 1) and the cross-sectional associations between sharing and the DV controlling for attitudes (Model 2). N = 7070 for tobacco analyses; n = 1649 for e-cigarette analyses.

Discussion

The results of this study support the claim that the proposed measure of sharing is a reliable and valid measure, in terms of capturing instances of person-to-person and person-to-people communication in the domain of tobacco and e-cigarette content. Not only were we successful in providing evidence for strong relationships between sharing of different topics, on different platforms, and at different time points, but we were also successful in finding the expected associations between sharing and behavior and between sharing and exposure to information. A portion of these findings extended to more specific sharing valences, providing evidence for the validity of our measure of sharing valence as well.

Importantly, this study was able to provide evidence for the fact that sharing is not simply a proxy for other constructs. Sharing could very well be conceived as an alternative measure of information engagement that isn't all that substantively different from seeking or scanning. It could also possibly be conceived as a mere indication of pre-existing attitudes. However, the present study was able to provide substantial evidence to show that in fact, sharing is its own behavior, distinct from other forms of information engagement behaviors and from attitudes.

At first glance, the study seems to be limited because the main survey only included one measure of tobacco sharing and one measure of e-cigarette sharing that could be tested for validity (which was a result of time constraints on the survey). However, given that the main concern was the inability to test for internal consistency with other items that measured sharing, we conducted a separate online sub-study that

included multiple sharing items and were able to examine (and find evidence for) internal consistency reliability.

Another limitation is the fact that all measures relied on self-reports, which is heavily dependent on the ability to recall one's behavior. In an effort to reduce potential recall bias, all measures placed time-frame references to lessen memory confusion. Certainly, there still remain questions of spuriousness and potential third variables that might affect the relationships seen. However, the aim of this sub-study wasn't to test for causality, but to ensure that the measure of sharing behavior actually measured what it was expected to measure, rather than something else.

It may be that the results of this study may not be extended to other contexts, given that the sharing measure being tested was specifically about sharing tobacco content and sharing e-cigarette content. However, tobacco and e-cigarettes are also arguably very different: the latter is much more novel (meaning that it is less familiar to the general population) and is surrounded by a much more ambivalent normative and legal context compared to regular combustible cigarettes. However, despite these differences, the present sharing measure was found to be equally reliable and valid in both contexts. Thus, it may be that these results will at least be generalizable to other health issues, and that this sharing measure may be used to examine instances of sharing about other health content.

In conclusion, after various tests of reliability and validity, it is fair to suggest that the proposed sharing measures reliably and accurately measure instances of offline and

online person-to-person communication, at least in the tobacco and e-cigarette domains, and have the potential to be used as measures of sharing in other health contexts as well.

CHAPTER FOUR

Study 2 – The Determinants of Sharing in the Context of Tobacco and E-cigarette Communication

Overview

In the past, interpersonal communication almost always referred to actual face-to-face conversations or at the very least, phone conversations that still allowed for lengthy verbal exchange. In the general field of communication studies, but also specifically within the health communication domain, such forms of interpersonal communication were often viewed as potential ways of delivering messages, often in conjunction with messages delivered via mass media channels (Southwell & Yzer, 2007).

However, interpersonal communication in the present has begun to include other means of communication. Uses of online platforms such as email, instant messaging, and various social media outlets have been shown to be particularly prevalent among youth (Lenhart, 2015). In a survey of over 1000 teens (ages 13-17) administered by the Pew Research Center in 2014 and 2015, 56% reported going online several times a day, while an additional 24% reported going online almost constantly. Similar trends have been shown among young adults as well: not only were 18-29 year olds the most likely to use social media (among adults), but their use of social media jumped by 78% from 2005 to 2015 (Perrin, 2015).

Given that there is now a wider array of platforms available for what used to be simply called "interpersonal communication" and that these platforms allow for different

forms of person-to-person and person-to-people communication, there is a need for a more holistic concept that captures such communication processes. This study put forth "sharing" as such a concept and examined it in the context of health behaviors, specifically in the tobacco and e-cigarette domains.

Though "sharing" is not a concept that has been examined widely especially in the present context, there has been one cross-sectional study examining people's sharing behaviors regarding e-cigarette-related information (Emery, Vera, Huang, & Szczypka, 2014), albeit in the context of a broader study looking at people's engagement with e-cigarette-related information. Though there was a lack of clarity as to how they operationalized "sharing," it was one of the first studies on sharing behaviors with regard to health content that took into consideration sharing on platforms other than word-of-mouth. Given the lack of other such similar studies, this study aimed to fill the gap in the literature by examining the prevalence of sharing behavior among youth and young adults, and exploring potential predictors of sharing behavior, using data from a population-based survey.

Current Study

Given the scarcity of the literature on sharing behavior with regard to health content, the aim of this study was to explore potential predictors of sharing behavior. Thus the main research question driving this study was the following:

RQ1: What affects sharing behavior?

The present study examined who was more likely to share content overall, and specifically, who was more likely to share tobacco-related content and e-cigarette-related content, by examining several potential predictors.

As one of the few studies that have examined sharing behavior with regard to e-cigarette-related information, Emery et al. (2014) found that young adults (aged 18-24) were almost twice as likely as older adults, Hispanics were more likely than non-Hispanic whites, and those with the lowest educational attainment were more likely than others to share e-cigarette information. This study also examined similar demographic variables, mostly those that have been examined in the context of other communication variables in the past (e.g., age, sex, race, education), and saw whether they were associated with sharing behavior overall, as well as specific tobacco-related and e-cigarette-related sharing.

RQ2: Which demographic factors are associated with sharing?

Research has consistently shown that people tend to make more of an effort to talk about information that they deem relevant to themselves (Southwell, 2013). People tend to talk about identity-relevant topics, either as a way to manage and maintain one's impression (Berger, 2014) or simply because personally relevant topics are probably most frequently thought about and therefore, most salient (Leippe & Elkin, 1987; Sehulster, 2006; Southwell, 2005). Accordingly, those who share information about tobacco and e-cigarettes are more likely to be those who perceive tobacco and e-cigarettes as part of their identity – former or current tobacco users, or those who have intentions to use tobacco. In line with this conjecture, Emery and colleagues found that current tobacco

users were five times as likely to share e-cigarette information as non-users (Emery et al., 2014). Thus, this study posited that those who either have tobacco-related intentions or engage in tobacco-related behaviors are more likely to share such information, compared to those who don't have such intentions or behaviors. The same hypotheses were extended to those who have e-cigarette-related intentions and/or behaviors.

H1a: Current smokers are more likely to share about tobacco than non-smokers.

H1b: Current vapers are more likely to share about e-cigarettes than non-vapers.

H2a: Those who have intentions to smoke cigarettes are more likely to share about tobacco than those with no intentions.

H2b: Those who have intentions to use e-cigarettes are more likely to share about e-cigarettes than those with no intentions.

It has been shown that easily accessible topics are more likely to be talked about or shared. Berger & Iyengar (2013) showed that this was especially the case when people are engaging in verbal conversations (which tend to be more immediate in terms of conversational back-and-forth compared to written forms of communication). Recent exposure to tobacco or e-cigarette information in the general media may make similar or relevant information more accessible within a person's thoughts, leading to a higher likelihood of subsequent sharing of such information. This hypothesis is also supported by priming theory, which suggests that exposure to a message increases the accessibility of information presented in the message, and that increased accessibility is more likely to influence cognitions such as attitudes and efficacy beliefs (Iyengar & Kinder, 1987). In

line with this notion, it was found that 16% of those who searched for e-cigarette information also shared about it, suggesting that recent exposure to relevant information leads to a higher likelihood of sharing (Emery et al., 2014). The following hypotheses put forth exposure to information (as a result of deliberative seeking or involuntary scanning), exposure to ads, as well as use of general media and social media (as proxies for opportunity for exposure to relevant information) as potential drivers of sharing.

H3a: Those who sought or scanned tobacco information are more likely to share about tobacco than those who did not seek or scan such information.

H3b: Those who sought or scanned e-cigarette information are more likely to share e-cigarette information than those who did not seek or scan such information.

H4a: Those who were exposed to tobacco ads are more likely to share about tobacco than those who were not exposed to such ads.

H4b: Those who were exposed to e-cigarette ads are more likely to share about e-cigarettes than those who were not exposed to such ads.

H5: More frequent use of general media is associated with a higher likelihood of sharing.

H6: More frequent use of social media is associated with a higher likelihood of sharing.

The valence of sharing. When people share content, it is possible that the information is completely neutral (e.g., facts), but it is also possible that the information

is infused with the sharer's opinion. By examining the valence of the shared information (i.e., the degree of attraction or aversion to the topic/behavior at hand), it is possible to better predict the consequences of this sharing, rather than simply examining whether one has shared or not. Valence of information shared can be, in part, a function of two factors: self-relevance and perceived norms. As outlined above, the notion of self-relevance suggests that people tend to talk about topics related to them. Going one step further, it can be suggested that if one perceives a topic to be a part of one's identity, it is unlikely that one shares negative things about it (Berger, 2014) in an effort to maintain a positive self-image among others (Leary & Kowalski, 1990). Thus, it can be projected that those who currently use or intend to use tobacco are more likely to share non-negative information, compared to non-users. However, the sense of personal relevance may or may not be undermined by what one perceives to be the norms surrounding a topic, the latter of which has long been acknowledged to be influential on people's behaviors (Cialdini, Reno, & Kallgren, 1990; Fishbein & Ajzen, 1975), including self-presentation. In an effort to be seen as adhering to the majority norm, some people may even share information that may be contrary to their private beliefs for the sake of managing others' impressions of them (Berger, 2014). If one perceives that the majority norm (as defined by the friends and peers around them) is pro-cigarette, one may be more likely to share pro-cigarette information regardless of what their current status or intentions are, and regardless of what they actually believe. Thus, this study puts forth the following hypotheses in an effort to examine the predictors of sharing valence:

H7a: 1) Current intentions to smoke will have a positive effect on valence of tobacco sharing; 2) this effect will be moderated by perceptions of injunctive and

descriptive norms surrounding cigarettes such that the effect of current intentions will be reduced as perceptions of normative approval increase.

H7b: 1) Current intentions to vape will have a positive effect on valence of e-cigarette sharing; 2) this effect will be moderated by perceptions of injunctive and descriptive norms surrounding e-cigarettes such that the effect of current intentions will be reduced as perceptions of normative approval increase.

H8a: 1) Current cigarette use will have a positive effect on valence of tobacco sharing; 2) this effect will be moderated by perceptions of injunctive and descriptive norms surrounding cigarettes such that the effect of current use will be reduced as perceptions of normative approval increase.

H8b: 1) Current e-cigarette use will have a positive effect on valence of e-cigarette sharing; 2) this effect will be moderated by perceptions of injunctive and descriptive norms surrounding e-cigarettes such that the effect of current use will be reduced as perceptions of normative approval increase.

Method

Participants

This study used data drawn from an ongoing nationally representative rolling cross-sectional and re-contact survey of youth (13-17) and young adults (18-25 year olds), implemented as part of a larger study originally aiming to examine young people's tobacco product-related attitudes and behaviors as a result of exposure to tobacco product-related content in the media environment. Social Science Research Solutions

(SSRS) recruited and interviewed participants via a partially list-assisted random digit dialing of landline and cellular phones. The cross-sectional survey was initiated in mid-June of 2014 and administered to a fresh sample of approximately 300 respondents each month (American Association of Public Opinion Research response rate 3 = 20%) while the re-contact survey was administered to less than half of the original respondents six months later (response rate=37%). At the time of these analyses, we had acquired 93 weeks of cross-sectional data (total n = 7094) and 67 weeks of re-contact data (total n = 1651).

Measures

Sharing. Several versions of sharing were examined as the main outcome measure(s), depending on the research question being asked. Tobacco sharing was measured in two parts: whether in the past 30 days, one shared information about cigarettes or tobacco 1) via email or social media (Yes/No), or 2) in a conversation in-person or on the phone (Yes/No). These two measures were combined to form an overall measure of tobacco sharing, as well as examined separately. E-cigarette-related sharing was measured in the same way, albeit about sharing information about vaping or e-cigarettes. Research Questions 1 and 2 asked about the predictors of sharing behavior; thus, the main outcomes were overall sharing of tobacco and/or e-cigarette content as well as tobacco-related sharing and e-cigarette-related sharing separately. All outcome measures were binary.

Valenced sharing. Valence of tobacco sharing was asked as follows: Think about the information you've shared with others in the past 30 days about cigarettes or other

tobacco products. Was it mostly positive about using tobacco, mostly negative, or a mix of positive and negative? The same wording was used to ask about valence of e-cigarette sharing.

Upon examination of the different valence categories reported among tobacco-related sharers, we found that the data was skewed toward the "mostly negative" category, with very few respondents reporting only positive sharing of tobacco-related information. On the other hand, the distribution across the different valence categories for e-cigarette-related sharing was quite even, especially when compared to tobacco-related sharing. Thus, for both conceptual and statistical reasons, the decision was made to collapse the "mostly positive" and the "mix of positive and negative" categories into a "non-negative" category only for tobacco-related sharing, and to keep the categories as they were for e-cigarette-related sharing.[6]

[6] Conceptually, the expectation was that most people shared negative information about tobacco, given the norms surrounding smoking and the fact that even smokers acknowledge that smoking is a detrimental habit. It was reasonable to assume that those who weren't necessarily only sharing negative information but also sharing some positive information about tobacco were more likely to engage in tobacco-related behaviors than those who were sharing only negative information, giving us good reason to treat those in the "mostly negative" category as distinct from those in the "mixed" and "mostly positive" categories. Statistically, combining the "mix" and "mostly positive" categories resulted in a larger sample size that not only made it more comparable with the "mostly negative" category, but also provided more statistical power to detect effects. However, when it came to e-cigarette-related sharing, it was expected that most people shared mixed information about e-cigarettes, as there is still a lack of consensus as to whether e-cigarettes are beneficial (for helping people quit regular cigarettes) or harmful (for acting as a gateway drug that leads to regular smoking). Therefore, the decision was to keep the categories the way they are for e-cigarette-related sharing, allowing for a distinction between those who shared mostly positive information and those who shared a mix of positive and negative information about e-cigarettes.

Predictors. Different potential predictors of tobacco-related and e-cigarette-related sharing were examined to test each hypothesis under Research Question 1. Current cigarette use (H1) was measured in two parts: whether one had ever tried smoking cigarettes, even one or two puffs? (Yes/No); and if yes, during the past 30 days, on how many days did one smoke cigarettes? (0-30 days) These measures were then combined into a binary measure of current cigarette use: 0 (not a current smoker) and 1 (current smoker).[7] Current e-cigarette use was measured the same way.

Current tobacco intentions and current e-cigarette intentions (H2) were measured slightly differently. The former was measured in two parts: intentions to quit smoking completely in the next 6 months was asked of current smokers, and intentions to smoke tobacco cigarettes, even one or two puffs, at any time in the next 6 months was asked of non-smokers (0-4 scale: Definitely will not – Definitely will). On the other hand, e-cigarette-related intentions were assessed using only one measure of likelihood of vaping, even one or two puffs, at any time in the next 6 months (0-4 scale: Definitely will not – Definitely will) and was asked of everyone regardless of past smoking or vaping status. In order to make the cigarette intentions and e-cigarette intentions comparable, the two cigarette intention questions were combined into an overall measure of intention to smoke, such that the entire sample was included in the measure. The final intention

[7]The reasoned action model suggests that for intentions to best predict future behavior, the intention must be compatible with the particular behavior in question in terms of target, action, context and time elements (Fishbein & Ajzen, 1975). Therefore, although the current survey contains specific behavioral measures with regard to individual tobacco products that may be more compatible with the idea of sharing about tobacco, because the intention measure is specific to the smoking (or quitting) of tobacco cigarettes, all analyses will use the particular behavior measure pertinent to smoking tobacco cigarettes.

measures for both cigarettes and e-cigarettes were recoded into binary measures: 0 (definitely or probably will not) and 1 (probably or definitely will).

Exposure to tobacco information (H3) was a combined measure of seeking (whether one actively looked for information about cigarettes or tobacco products) and scanning (whether one came across information about cigarettes or tobacco even when not actively looking for it). Exposure to tobacco ads (H4) asked how many times one had seen (in the past 30 days) ads promoting cigarettes or other tobacco products, as well as various anti-smoking ads. Measures of use of individual media platforms were combined (according to whether platforms were general media or social media), to create one composite measure of general media use (H5) and a separate composite measure of social media use (H6), both recoded into binary measures of low users vs. high users. The e-cigarette counterparts of these predictors (with the exception of general and social media use) were used to examine e-cigarette-related sharing. Full wordings of the measures used are provided in Appendix B.

The demographic variables being examined as correlates of sharing (under Research Question 2) were as follows: age (13-17/18-25), sex (male/female), race (white, black, Hispanic, and other/more than one race), and education (i.e., highest level of schooling completed: less than high school, high school degree, some college, and more than a college degree). Of course, for younger respondents, education was often incomplete

The main predictors being used to examine valence of sharing (H7-8) were 1) current tobacco or e-cigarette use, 2) current tobacco or e-cigarette intentions, 3)

perceived injunctive norms surrounding tobacco or e-cigarettes (whether one's closest friends would approve or disapprove of one's smoking or vaping, respectively), and 4) perceived descriptive norms surrounding tobacco or e-cigarettes (for which measures of how many of one's closest friends smoked and how many peers were perceived to smoke were combined to create a composite measure of descriptive normative perceptions, recoded into perceptions of low, middle, or high prevalence; an e-cigarette counterpart was also created).

All independent variables were derived from the Time 1 cross-sectional data. See Appendix B for fully worded survey items.

Confounders. All regression analyses adjusted for the following potential demographic and smoking-related confounders: age (in years), sex, race (non-Hispanic white, non-Hispanic black, Hispanic, other/more than one), own education (less than high school, high school degree, some college, college degree or more), employment (no job, part-time, full-time), parental education (less than high school, high school degree, some college, college degree, completed graduate school), whether other people in the household smoked tobacco cigarettes, whether other people in the household used e-cigarettes, and whether use of e-cigarettes was allowed at home. Additionally, lagged analyses adjusted for the respective sharing behavior measured at Time 1.

Analytical Procedure

When examining Research Question 1 (predictors of tobacco and e-cigarette sharing), bivariate analyses were first performed to examine cross-sectional associations between each potential predictor variable and the different sharing outcomes. For those

associations that were significantly correlated at the bivariate level, multivariate logistic regressions were conducted to examine the effect of each predictor variable on each sharing outcome at the cross-sectional level, controlling for confounders. In order to establish the causal order of effects (and to further provide evidence for our independent variables as actual predictors of sharing, rather than mere covariates), lagged analyses were performed, examining the effect of each potential predictor (at Time 1) on each sharing outcome (measured at Time 2), again controlling for confounders as well as the corresponding sharing outcome measured at Time 1.

When examining different demographic variables as correlates of sharing (Research Question 2), chi-square tests of independence were used to examine the overall relation between each potential demographic variable and each outcome [i.e., the different types of sharing]; for those that showed significant relations, subsequent logistic regressions were performed at the cross-sectional level, treating each demographic variable as a categorical variable.

When exploring the predictors of valenced sharing under Research Question 3, multinomial logistic regressions were performed to examine the effect of each predictor variable on non-negative and negative tobacco sharing (as compared to no sharing), and on positive, mixed, and negative e-cigarette sharing (as compared to no e-cigarette sharing). Additionally, multinomial logistic regressions with interaction terms were used to assess the moderating effect of descriptive and injunctive norms on the relationship between current use and intentions on valence of sharing. Analyses were run at both the cross-sectional and lagged level.

All tests were run on Stata 13.0 (StataCorp,2013). All analyses were weighted separately for the cross-sectional and re-contact samples, and reflected Current Population Survey distributions on important demographics, as well as sampling procedures and non-response patterns. Missing data was minimal (less than 1% on the majority of variables) and were listwise deleted.

In this chapter and the next, the language used to describe associations may sometimes appear to make stronger causal claims than observational data – even longitudinal observational data – may permit. The use of terms such as 'affected,' 'effect,' 'increased,' or 'reduced' does not reflect an unchallengeable causal claim; rather, it is shorthand for "the data are consistent with a claim of influence even though it is possible that there are alternative explanations for the results which support the hypothesis." The issue of such alternative explanations is revisited in the limitations section in Chapter 6.

Results

Table 4.1 shows the descriptive statistics for both the cross-sectional (N=7094) and re-contact samples (n=1651), and includes prevalence rates for different sharing behaviors. Among the cross-sectional sample, the average age of the study participants was about 19 years, 47% was female and 52% was white. 13% reported being current cigarette smokers and 12% reported being current e-cigarette users.

At Time 1, more people shared offline (20% and 12% for tobacco and e-cigarette content, respectively) than online (about 4% for both tobacco and e-cigarette content); similar rates were reported at follow-up. Figure 4.1 displays the breakdown of the

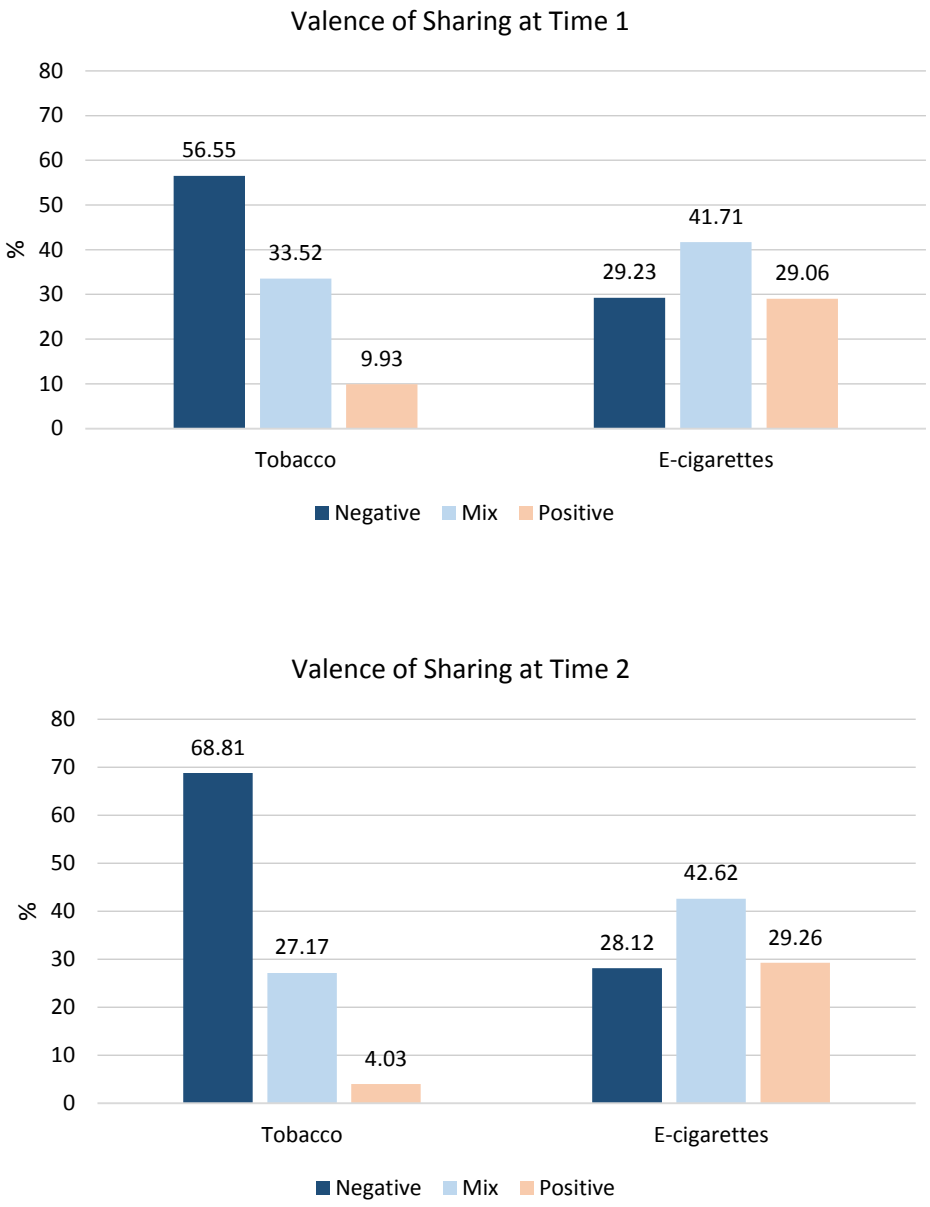
different valences in which people shared tobacco and e-cigarette content, at first interview and at re-contact. Among those who shared, the majority tended to share negative content with regards to tobacco, and a mix of negative and positive content with regards to e-cigarettes.

Table 4.1 Descriptive Statistics of the Cross-Sectional and Re-contact Samples

Demographics	**Cross-sectional** *%*	**Re-contact** *%*
Age (mean years ± SD)	18.5 ± 3.6	17.9 ± 3.6
Female	48.1	--
Race/Ethnicity		
Non-Hispanic White	51.5	--
Non-Hispanic Black	14.6	--
Hispanic	22.5	--
Other/ More than one	11.4	--
Education		
< High school degree	41.2	50.2
High school degree	22.8	18.7
Some college	23.9	18.7
≥ College degree	12.1	12.3
Employment		
No job	48.6	54.3
Part-time	25.1	26.7
Full-time	26.3	19.1
Parental Education		
≤ High school degree	27.8	--
Some college	16.8	--
College degree	31.0	--
Completed graduate school	24.5	--
Smoker in household	23.1	21.9
Vaper in household	9.9	9.3
Vaping allowed at home	22.6	17.6
Current cigarette user	12.7	8.0
Current e-cigarette user	11.1	8.9
Some intention to smoke	9.37	6.43
Some intention to vape	11.38	8.67
Tobacco sharing offline	19.8	17.8
Tobacco sharing online	4.3	3.6
E-cigarette sharing offline	12.4	12.7
E-cigarette sharing online	3.6	2.5

Note. The results presented here are unweighted, and are all percentages, unless specified otherwise. Cross-sectional N = 7089; Recontact n = 1651. The recontact sample was not asked their sex, race/ethnicity, and parents' education as these are variables that are unlikely to change within 6 months.

Figure 4.1 Distributions of Valence of Tobacco and E-cigarette Sharing at Time 1 and Time 2



Note. Percentages are calculated, based on the following total *N*s: Tobacco sharing (Time 1) = 1186; E-cigarette sharing (Time 1) = 768; Tobacco sharing (Time 2) = 300; E-cigarette sharing (Time 2) = 217. All data are weighted, separately for Time 1 and Time 2 data.

Demographics.

Table 4.2 shows the results of examining different demographic variables as predictors of sharing at Time 1. Sex was not significantly associated with any of the sharing measures. Age, race, and education were all significantly correlated with overall sharing. 18-25 year olds were significantly more likely to share than 13-17 year olds, and, relatedly, those with at least a high school degree were significantly more likely to share than those who still hadn't received a high school degree. Those who reported either being of more than one race or a race other than white, black or Hispanic were more likely to share than whites.

When it came to sharing specific tobacco-related and e-cigarette-related content, the demographic correlates slightly differed. 18-25 year olds and those with at least a high school degree continued to be significantly more likely to share both tobacco and e-cigarette-related content than 13-17 year olds and those with less than a high school degree, respectively. Blacks were significantly less likely to share e-cigarette content than whites, while race had no effect on sharing tobacco content.

Table 4.2 Demographic Variables as Correlates of Sharing

IV	**DV (Type of Sharing) OR [95% CI]**		
	Total	Tobacco	E-cigarette
Age			
13-17	1	1	1
18-25	**1.53*** ** [1.34, 1.73]	**1.57*** ** [1.36, 1.80]	**1.35*** ** [1.14, 1.59]
Sex			
Male	--	--	--
Female	--	--	--
Race			
White	1	--	1
Black	0.91 [0.85, 1.17]	--	**0.63*** ** [0.48, 0.81]
Hispanic	1.00 [0.85, 1.17]	--	1.01 [0.82, 1.24]
Other/<1	**1.26*** [1.03, 1.54]	--	1.18 [0.92, 1.52]
Education			
<High school	1	1	1
HS degree	**1.55*** ** [1.31, 1.83]	**1.54*** ** [1.29, 1.84]	**1.33*** ** [1.08, 1.64]
Some college	**1.42*** ** [1.21, 1.66]	**1.43*** ** [1.20, 1.70]	**1.23*** [1.00, 1.52]
≥College degree	**1.41*** ** [1.16, 1.71]	**1.53*** ** [1.25, 1.88]	1.18 [0.92, 1.51]

$^{\dagger}p<.10$; $^{*}p<.05$; $^{**}p<.01$; $^{***}p<.001$

Note. IV = independent variable; DV = dependent variable; OR = odds ratio; 95% CI = 95% confidence intervals. The ORs reflect the bivariate association between the IV and DV at Time 1. Results presented only for demographics that showed significant (or marginally significant) overall relationships with the dependent variable.

Behavior and Intentions. Cigarette and e-cigarette use and intentions were all significantly correlated with the different sharing behaviors at the cross-sectional bivariate level (shown in Table 4.3). Cross-sectional logistic regression analyses showed that current cigarette smokers and those with intentions to smoke in the next six months were significantly more likely to share about tobacco, and that current e-cigarette users and those with intentions to use e-cigarettes in the next six months were significantly more likely to share about e-cigarettes, compared to non-users and those with no intentions (Table 4.4). Lagged analyses showed that while these associations didn't hold true for tobacco sharing, both e-cigarette use and intentions at Time 1 significantly predicted e-cigarette sharing at follow-up, providing evidence for Hypotheses 1b and 2b.

Table 4.3 Zero-order Correlations for Sharing Variables and Tobacco/E-cigarette Behaviors and Intentions at the Cross-sectional Level

		1	2	3	4	5	6	7	8
1	Tobacco sharing	1.000							
2	E-cig sharing	**0.400**	1.000						
3	Offline sharing	**0.849**	**0.647**	1.000					
4	Online sharing	**0.388**	**0.407**	**0.328**	1.000				
5	Cig use	**0.163**	**0.109**	**0.184**	**0.093**	1.000			
6	Cig intentions	**0.120**	**0.079**	**0.134**	**0.085**	**0.512**	1.000		
7	E-cig use	**0.158**	**0.268**	**0.234**	**0.170**	**0.321**	**0.241**	1.000	
8	E-cig intentions	**0.164**	**0.263**	**0.234**	**0.156**	**0.356**	**0.311**	**0.603**	1.000

Note. $N = 7018$. Pairwise Spearman's correlation coefficients (rho) are presented. All bolded results are significant at $p < .001$.

Table 4.4 Behavior, Intentions, and Exposure as Predictors of Sharing

IV	**DV**	Model 1 *OR [95% CI]*	Model 2 *OR [95% CI]*
Cigarette use	Tobacco sharing	**1.82*** [1.49, 2.22]**	1.17 [0.72, 1.91]
Cigarette intentions	Tobacco sharing	**1.50*** [1.20, 1.88]**	1.23 [0.72, 2.11]
Exposure to tobacco information	Tobacco sharing	**3.08*** [2.64, 3.60]**	**1.53* [1.05, 2.24]**
Exposure to tobacco ads	Tobacco sharing	**2.17*** [1.74, 2.71]**	1.58† [0.95, 2.62]
E-cigarette use	E-cigarette sharing	**4.47*** [3.60, 5.54]**	**2.02* [1.13, 3.61]**
E-cigarette intentions	E-cigarette sharing	**4.38*** [3.53, 5.43]**	**2.52*** [1.43, 4.46]**
Exposure to e-cigarette information	E-cigarette sharing	**8.04*** [6.59, 9.81]**	**2.70*** [1.77, 4.12]**
Exposure to e-cigarette ads	E-cigarette sharing	**2.72*** [2.23, 3.33]**	**2.32*** [1.48, 3.64]**
General media use	Overall sharing	**1.84*** [1.59, 2.11]**	1.29 [0.93, 1.80]
Social media use	Overall sharing	**1.25*** [1.09, 1.44]**	1.39† [1.00, 1.94]

†p<.10; *p<0.05; **p<0.01; ***p<0.001

Note. IV = independent variable; DV = dependent variable; OR = odds ratio; 95% CI = 95% confidence intervals. The ORs reflect the association between the IV at Time 1 and the DV at Time 1, adjusting for confounders (Model 1); and the DV at Time 2, adjusting for the DV at Time 1 and confounders (Model 2). The *N*s for cross-sectional analyses range from 6212-6262; the *n*s for lagged analyses range from 1414-1425.

Exposure. Exposure to tobacco and e-cigarette information (via seeking and scanning) and ads, as well as overall use of general media and social media, were all significantly correlated with the different sharing behaviors at the cross-sectional bivariate level (Table 4.5). The results of the cross-sectional analyses showed that those who reported exposure to both tobacco information and tobacco ads were more likely to share tobacco-related content, and that those who reported exposure to both e-cigarette information and e-cigarette ads were more likely to share e-cigarette-related content, than those who reported no exposure (Table 4.4). Lagged analyses showed that exposure to both e-cigarette information ($OR = 2.70$, $p < .001$) and ads ($OR = 2.32$, $p < .001$) predicted e-cigarette sharing six months later. To a lesser extent, exposure to tobacco information ($OR = 1.53$, $p < .05$) and exposure to tobacco ads ($OR = 1.58$, $p < .10$) predicted later tobacco-related sharing, providing support for Hypothesis 3 and Hypothesis 4.

Heavy users of general media and heavy users of social media were significantly more likely to share overall than light users, but only at the cross-sectional level, partially supporting Hypothesis 5 and 6.

Table 4.5 Zero-order Correlations for Sharing Variables and Media Use/Exposure Variables at the Cross-sectional Level

		1	2	3	4	5	6	7	8	9
1	Tobacco sharing	1.000								
2	E-cig sharing	**0.402**	1.000							
3	Overall sharing	**0.872**	**0.660**	1.000						
4	General media use	**0.137**	**0.101**	**0.148**	1.000					
5	Social media use	**0.059**	**0.083**	**0.084**	**0.185**	1.000				
6	Tobacco exposure	**0.223**	**0.198**	**0.250**	**0.169**	**0.096**	1.000			
7	Tobacco ads	**0.097**	**0.093**	**0.111**	**0.103**	**0.084**	**0.249**	1.000		
8	E-cig exposure	**0.214**	**0.349**	**0.296**	**0.156**	**0.089**	**0.410**	**0.197**	1.000	
9	E-cig ads	**0.156**	**0.160**	**0.179**	**0.148**	**0.114**	**0.271**	**0.361**	**0.361**	1.000

Note. $N = 6985$. Pairwise Spearman's correlation coefficients (rho) are presented. All bolded results are significant at $p < .001$.

Valenced sharing. We further examined the likelihood of sharing tobacco or e-cigarette-related content in a positive way. Results showed that at the cross-sectional level, those who reported smoking intentions and behavior were significantly more likely to share non-negative tobacco content (than not sharing at all), and less likely to share negative tobacco content (but only marginally significantly). Results also showed that higher perceptions of friends' and parents' disapproval of one's smoking predicted a higher likelihood of negative sharing and a lower likelihood of non-negative sharing, compared to no sharing. Descriptive norms had a significant positive effect on sharing, such that the more prevalent they perceived smoking to be among their friends and peers, the more likely one was to share non-negative tobacco content compared to negative tobacco content (Table 4.6).

Upon conducting moderation analyses, an omnibus test showed that there was a significant interaction between perceived descriptive norms and intentions (Wald F (4, 5964) = 3.88, $p < .01$), indicating that the effect of intentions on sharing valence significantly varied across different levels of perceived descriptive norms at the cross-sectional level (Table 4.7). Specifically, perceptions that smoking was highly prevalent among friends and peers reduced the effect of intentions on non-negative sharing, such that those with no intentions with high perceptions of descriptive norms were more likely to share non-negatively about tobacco, supporting Hypothesis 7a (see Figure 4.2). There was no significant interaction between perceived descriptive norms and current use (Wald F (4, 5963) = 1.94, $p = .101$), failing to support Hypothesis 8a (Table 4.8). Interactions could not be performed for perceived injunctive norms and intentions or use

because of those who were current smokers, nobody reported friends' approval of smoking *and* negative sharing or no sharing six months later.

At the lagged level, perceptions of friends' disapproval and descriptive norms predicted future sharing, such that higher perceptions of the former predicted reduced likelihood of non-negative sharing at follow-up, and higher perceptions of the former predicted an increased likelihood of non-negative sharing at follow-up (compared to no sharing) (Table 4.6). Current use or intentions had no long-term effect on the valence of tobacco sharing; consequently, there was no significant interaction between perceived descriptive norms and use or intentions on the valence of tobacco sharing six months later.

Similarly for e-cigarette sharing, those who reported intentions to vape and current e-cigarette use were cross-sectionally more likely to share positive or mixed content than not share at all, and more likely to share positive content (than not share at all) six months later. This was unsurprising, given the fact that at the cross-sectional level, the likelihood of sharing positive content was much higher than that of sharing mixed content. Furthermore, the higher one's perception that friends disapproved of one's e-cigarette use was, the less likely one was to share positive e-cigarette content or mixed content compared to not sharing or sharing negative content (both at the cross-sectional and lagged level) and the less likely one was to share mixed e-cigarette content compared to negative content (only at the cross-sectional level) (Table 4.6). Descriptive norms alone had a significant positive effect on the valence of e-cigarette sharing, such that the more prevalent they perceived e-cigarette use to be among their friends and

peers, the more likely one was to share positive and mixed e-cigarette content compared to negative e-cigarette content, both at the cross-sectional and lagged level (Table 4.6). Upon conducting moderation analyses, an omnibus test showed that the interaction between perceived descriptive norms and intentions was marginally significant at the cross-sectional level (Wald F (6, 6083) = 1.87, p = .081), and significant at the lagged level (Wald F (6, 1365) = 2.45, p < .05), indicating that the effect of intentions on sharing valence six months later significantly varied across different levels of perceived descriptive norms (Table 4.7). Specifically, perceptions that e-cigarette use was highly prevalent among friends and peers predicted a reduced effect of intentions on negative, mixed, and positive sharing at the cross-sectional level, and a reduced effect of intentions only on mixed sharing at the lagged level, providing some support for Hypothesis 7b (Figure 4.3). There was no significant interaction between current e-cigarette use and perceived descriptive norms on valence of sharing, either at the cross-sectional (Wald F (6, 6090) = 1.11, p = .35) or lagged level (Wald F (6, 1363) = 1.47, p = .186), failing to support Hypothesis 8b. Again, interactions could not be performed for perceived injunctive norms and intentions or use because of those who had intentions to vape, nobody reported both negative sharing six months later *and* friends' approval or strong disapproval of e-cigarette use.

Table 4.6 Predictors of Valenced Sharing

IV	DV	*Model 1* RRR [95% CI]	Model 2 *RRR [95% CI]*
Cigarette intentions	No sharing	1	1
	Negative	0.73† [0.50, 1.05]	0.81 [0.38, 1.75]
	Non-negative	**2.54*** [1.89, 3.43]**	1.95 [0.85, 4.51]
Cigarette use	No sharing	1	1
	Negative	0.84 [0.61, 1.15]	0.92 [0.47, 1.78]
	Non-negative	**3.76*** [2.84, 4.97]**	1.34 [0.60, 2.99]
Parental Disapproval	No sharing	1	1
	Negative	**1.39*** [1.14, 1.70]**	1.27 [0.77, 2.11]
	Non-negative	**0.72*** [0.60, 0.86]**	0.74 [0.39, 1.39]
Friends' Disapproval	No sharing	1	1
	Negative	**1.22* [1.01, 1.47]**	0.94 [0.63, 1.41]
	Non-negative	**0.57*** [0.45, 0.72]**	**0.37** [0.18, 0.75]**
Descriptive Norms (Pro-cigarette)	No sharing	1	1
	Negative	**1.22** [1.07, 1.39]**	1.20 [0.87, 1.66]
	Non-negative	**1.71*** [1.44, 2.03]**	**1.76* [1.07, 2.89]**

IV	DV	*Model 1* RRR [95% CI]	*Model 2* RRR [95% CI]
E-cigarette intentions	No sharing	1	1
	Negative	1.13 [0.62, 2.06]	0.96 [0.27, 3.42]
	Mixed	**3.76*** [2.66, 5.31]**	2.44† [0.99, 5.97]
	Positive	**10.49*** [7.21, 15.24]**	**6.54*** [2.72, 15.74]**
E-cigarette use	No sharing	1	1
	Negative	1.44 [0.81, 2.59]	1.18 [0.37, 3.74]
	Mixed	**4.16*** [2.97, 5.82]**	1.81 [0.72, 4.52]
	Positive	**10.42*** [7.25, 14.98]**	**5.39*** [2.24, 12.93]**
Friends' Disapproval	No sharing	1	1
	Negative	0.97 [0.76, 1.24]	1.24 [0.78, 1.99]
	Mixed	**0.57*** [0.48, 0.68]**	**0.46** [0.29, 0.74]**
	Positive	**0.31*** [0.24, 0.40]**	**0.36*** [0.22, 0.57]**
Descriptive Norms (Pro-e-cigarette)	No sharing	1	**1**
	Negative	**1.33* [1.06, 1.66]**	0.85 [0.50, 1.43]
	Mixed	**2.29*** [1.91, 2.74]**	**1.54* [1.03, 2.31]**
	Positive	**2.12*** [1.69, 2.66]**	**2.89*** [1.76, 4.73]**

†$p<.10$; *$p<0.05$; **$p<0.01$; ***$p<0.001$

Note. IV = independent variable; DV = dependent variable; RRR = relative risk ratio; 95% CI = 95% confidence intervals. The RRRs reflect the association between the IV at Time 1 and the DV at Time 1, adjusting for confounders (Model 1); and the DV at Time 2, adjusting for the DV at Time 1 and confounders (Model 2). The *N*s for cross-sectional analyses range from 5967-6107; the *n*s for lagged analyses range from 1323-1371.

Table 4.7 Interaction between Intentions and Level of Descriptive Norms on Valenced Sharing

		Tobacco RRR [95% CI]			**E-cigarettes** RRR [95% CI]	
IV	**DV**	*Model 1 (N=5968)*	*Model 2 (n=1330)*	**DV**	*Model 1 (N=6089)*	*Model 2 (n=1371)*
Intentions	Negative Sharing	0.38† [0.14, 1.05]	1.53 [0.35, 6.72]	Negative Sharing	1.93 [0.70, 5.37]	1.98 [0.28, 13.96]
Des. Norms						
Middle		**1.46*** [1.17, 1.82]**	1.09 [0.67, 1.77]		**1.63** [1.12, 2.37]**	0.95 [0.43, 2.12]
High		**1.50** [1.11, 2.03]**	1.58 [0.82, 3.03]		**2.07** [1.21, 3.54]**	1.00 [0.31, 3.17]
Intentions*Norms						
Middle		2.29 [0.72, 7.28]	0.23 [0.02, 2.29]		0.63 [0.17, 2.33]	0.24 [0.02, 3.34]
High		1.72 [0.56, 5.31]	0.59 [0.09, 3.66]		**0.16* [0.03, 0.90]**	0.24 [0.01. 5.40]
Intentions	Non-negative Sharing	**3.94*** [1.93, 8.03]**	1.25 [0.14, 11.40]	Mixed Sharing	**5.03*** [2.62, 9.68]**	**5.76* [1.48, 22.53]**
Des. Norms						
Middle		1.29 [0.92, 1.82]	1.09 [0.43, 2.74]		**2.40*** [1.68, 3.44]**	**2.22* [1.01, 4.86]**
High		**3.11*** [2.18, 4.44]**	**3.32* [1.14, 9.69]**		**5.11*** [3.34, 7.84]**	**4.52** [1.74, 11.73]**
Intentions*Norms						
Middle		0.97 [0.41, 2.29]	3.33 [0.29, 38.40]		0.48† [0.21, 1.10]	0.58 [0.10, 3.27]
High		**0.35* [0.16, 0.78]**	0.71 [0.06, 8.55]		**0.45* [0.20, 1.00]**	**0.09* [0.01, 0.61]**
Intentions	--			Positive Sharing	**12.84*** [6.89, 23.90]**	3.23 [0.64, 16.38]
Des. Norms						
Middle					1.59 [0.87, 2.90]	0.72 [0.22, 2.43]
High					**4.21*** [2.28, 7.75]**	**8.50*** [2.87, 25.28]**
Intentions*Norms						
Middle					0.73 [0.31, 1.72]	6.81† [0.88, 52.72]
High					**0.42* [0.18, 0.99]**	0.47 [0.07, 3.33]

†$p<.10$; *$p<0.05$; **$p<0.01$; ***$p<0.001$

Note. IV = independent variable; DV = dependent variable; RRR = relative risk ratio; 95% CI = 95% confidence intervals. The RRRs reflect the association between the IV at Time 1 and the DV at Time 1, adjusting for confounders (Model 1); and the DV at Time 2, adjusting for the DV at Time 1 and confounders (Model 2).

Figure 4.2 Interaction between Cigarette Intentions and Cigarette-related Descriptive Norms on Valenced Sharing about Tobacco

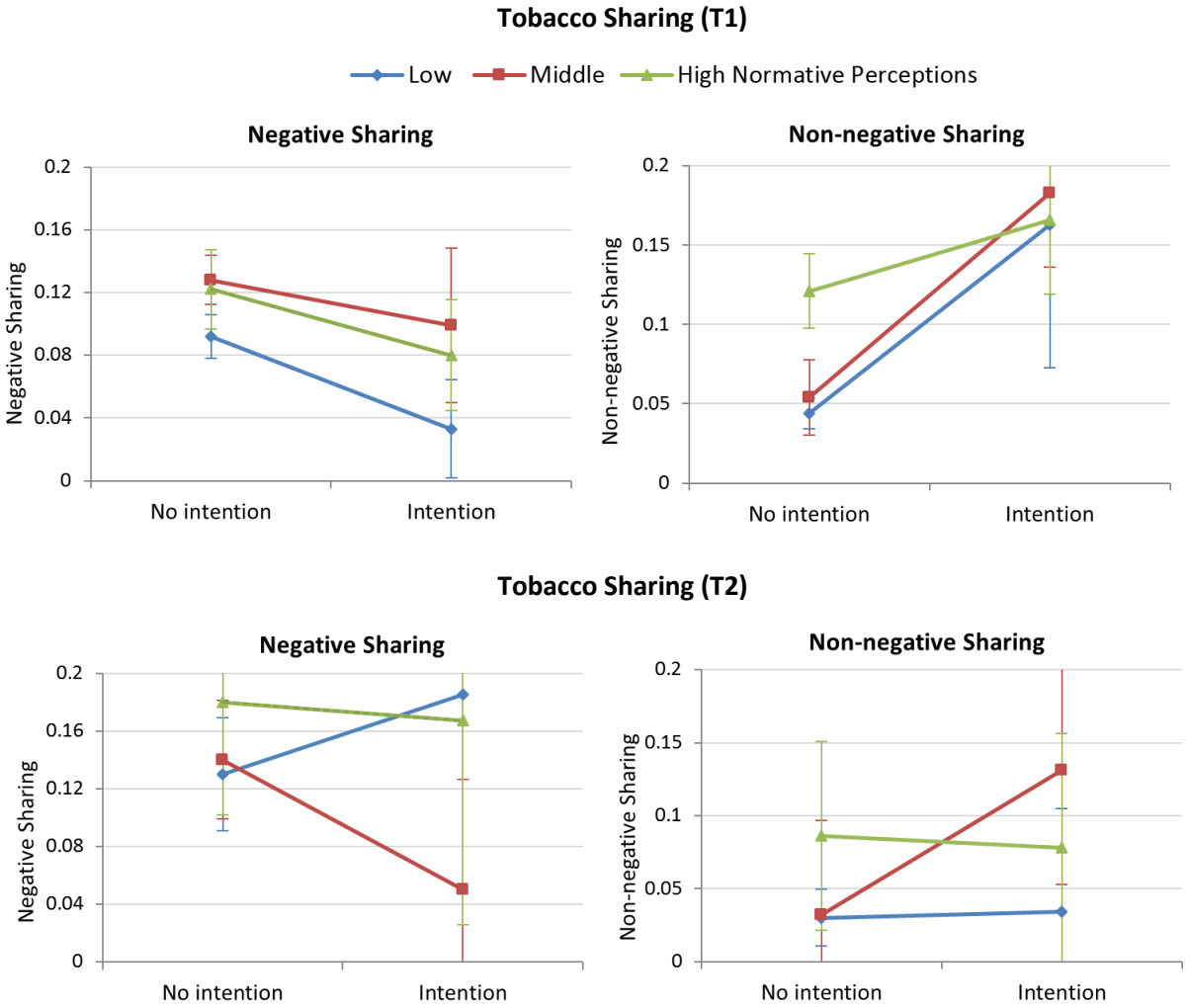


Figure 4.3 Interaction between E-cigarette Intentions and E-cigarette-related Descriptive Norms on Valenced Sharing about E-cigarette

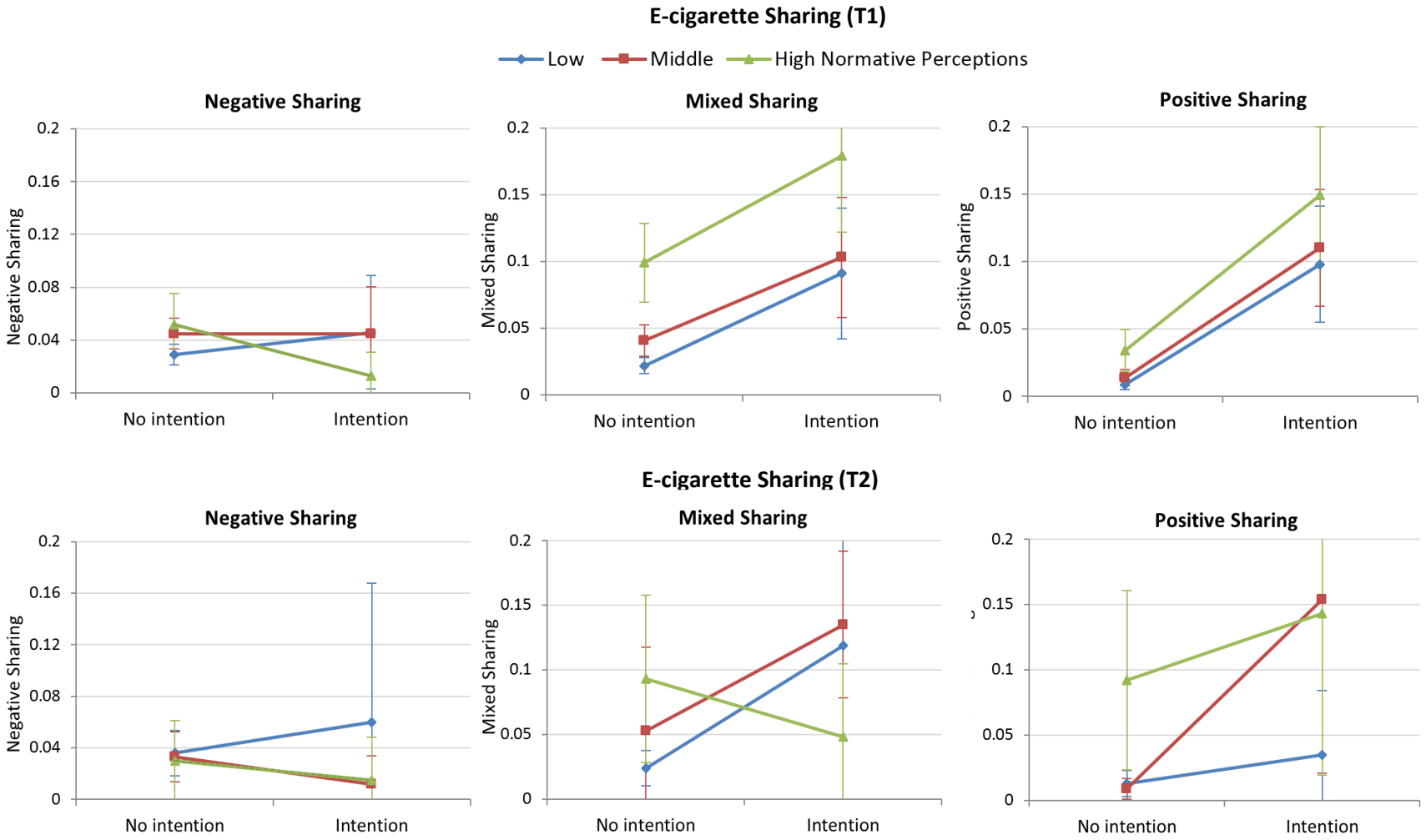


Table 4.8 Interaction between Current Use and Level of Descriptive Norms on Valenced Sharing

		Tobacco RRR [95% CI]			**E-cigarettes** RRR [95% CI]	
IV	**DV**	*Model 1 (N=5967)*	*Model 2 (n=1418)*	**DV**	*Model 1 (N=6096)*	*Model 2 (n=1369)*
Current Use	Negative Sharing	0.93 [0.41, 2.10]	2.98 [0.65, 13.53]	Negative Sharing	**2.84* [1.10, 7.33]**	3.44 [0.63, 18.90]
Des. Norms						
Middle		**1.51*** [1.21, 1.89]**	1.23 [0.78, 1.94]		**1.76** [1.21, 2.55]**	1.03 [0.46, 2.28]
High		**1.59** [1.16, 2.17]**	1.81† [0.87, 3.38]		**1.83* [1.05, 3.19]**	1.21 [0.40, 3.70]
Use*Norms						
Middle		0.88 [0.34, 2.32]	**0.13* [0.02, 1.00]**		0.31† [0.08, 1.15]	0.13 [0.01, 1.58]
High		0.78 [0.31, 1.95]	0.38 [0.07, 2.18]		0.31 [0.08, 1.26]	0.12 [0.005, 2.71]
Current Use	Non-negative Sharing	**6.86*** [3.52, 13.36]**	0.64 [0.07, 5.95]	Mixed Sharing	**4.10*** [2.10, 8.00]**	2.53 [0.70, 9.17]
Des. Norms						
Middle		**1.41* [1.00, 2.00]**	1.18 [0.53, 2.66]		**2.10*** [1.45, 3.03]**	1.83 [0.81, 4.12]
High		**2.57*** [1.74, 3.79]**	**3.08* [1.16, 8.18]**		**4.72*** [3.11, 7.16]**	**3.48** [1.37, 8.85]**
Use*Norms						
Middle		0.48 [0.21, 1.03]	4.65 [0.40, 53.99]		0.82 [0.36, 1.87]	0.93 [0.17, 4.92]
High		**0.35** [0.17, 0.73]**	1.52 [0.13, 17.45]		0.59 [0.26, 1.36]	0.23 [0.04, 1.48]
Current Use				Positive Sharing	**12.37*** [6.55, 23.37]**	2.57 [0.45, 14.82]
Des. Norms						
Middle					**1.77* [1.00, 3.10]**	1.13 [0.40, 3.19]
High					**3.44*** [1.80, 6.55]**	**7.70*** [2.59, 22.90]**
Use*Norms						
Middle					0.61 [0.26, 1.45]	3.60 [0.33, 29.48]
High					0.55 [0.23, 1.34]	0.63 [0.08, 4.77]

†$p<.10$; *$p<0.05$; **$p<0.01$; ***$p<0.001$

Note. IV = independent variable; DV = dependent variable; RRR = relative risk ratio; 95% CI = 95% confidence intervals. The RRRs reflect the association between the IV at Time 1 and the DV at Time 1, adjusting for confounders (Model 1); and the DV at Time 2, adjusting for the DV at Time 1 and confounders (Model 2).

Discussion

Through various analyses, this study was able to provide some insight into the nature of sharing. First of all, this study found that sharing was overall, not a very prevalent behavior. Even when people did share, the majority of sharing (about both tobacco and e-cigarettes) occurred in an offline context. When examining the specific valences in which people shared, there was a stark contrast between tobacco and e-cigarette sharing. Among those who shared about tobacco, the clear majority shared anti-tobacco content, while very few people shared pro-tobacco content. In contrast, the majority of those who shared about e-cigarettes shared a mix of pro- and anti-e-cigarette content. Because e-cigarettes are relatively more novel compared to tobacco, there's still ambiguity concerning the benefits versus consequences of vaping, and societal ambivalence concerning approval or disapproval of e-cigarette use, and these differences seem to be reflected in the contrasting results regarding the direction in which people choose to share about tobacco and e-cigarettes.

When it came to examining the determinants of sharing behavior, the findings from this study provided support for most of the hypotheses put forth. First, unsurprisingly, personal relevance was a strong predictor of sharing behavior, both as measured by current use or intentions to use cigarettes or e-cigarettes. Specifically, there was a tendency for those who used or intended to use cigarettes or e-cigarettes to share in a direction that supported their current behavior or intentions. Furthermore, personal relevance predicted sharing in the long run, but only for e-cigarettes: given that more than two-thirds of e-cigarette sharers tended to share either positive or a mix of positive and

negative content, and considering that e-cigarettes are relatively novel products, it may be that current e-cigarette users and intenders are regularly sharing e-cigarette-related content in order to gain some validation of their vaping behavior or intentions, or to obtain more information about the benefits and/or consequences of vaping. On the other hand, given that most people are already familiar with the smoking and its effects, those who intend to smoke or are smokers may not feel the need to share about their smoking intentions or behavior for a long time.

Also as predicted, being exposed to relevant content predicted sharing about it, whether that exposure was measured by 1) exposure to information as a result of deliberate seeking or scanning via routine use of the media, 2) ad exposure, or 3) general or social media use. These findings supported the notion set forth by priming theory that exposure to information makes it readily accessible in one's mind, increasing the likelihood of sharing it in the near future. As an alternative explanation, it could be argued that sharing about something increases one's sensitivity to related content, increasing one's awareness to and likelihood of reporting exposure to such information, but given that most of these effects were found also at the lagged level, it seems feasible to suggest exposure is predicting increased sharing.

Given that exposure to tobacco or e-cigarette-related information was a composite measure of having sought information and/or scanned information, we aimed to parse the effect of overall exposure by examining seeking and scanning separately as predictors of sharing. We found that while seeking and scanning tobacco information were significantly associated with sharing tobacco content at the cross-sectional level, only

seeking significantly predicted future tobacco sharing (Table 4.9). Furthermore, seeking was a significantly stronger predictor of sharing compared to scanning. Similarly, although both seeking and scanning e-cigarette information were significantly associated with sharing e-cigarette content at the cross-sectional and lagged levels, seeking was a significantly stronger predictor of e-cigarette sharing compared to scanning at the cross-sectional level. These results suggest that while any exposure to relevant information can immediately affect whether one shares, both the short-term and long-term association between exposure to information and sharing is mostly driven by the information one deliberately seeks, rather than the information one happens to come across. One possible explanation for this may be that like sharing, information seeking is a deliberate action, driven by some internal motivation (Johnson, 1997; Lambert & Loiselle, 2007); therefore, a common underlying motive (such as intentions to quit smoking) may be driving both seeking and sharing over a long period of time. Yet, it could simply be that people are sharing in an attempt to seek information, and that sharing occurs as a consequence of seeking because the former is the mode through which one attempts to accomplish the latter.

Table 4.9 Seeking and Scanning as Predictors of Sharing

IV	**DV**	*Model 1* OR [95% CI]	*Model* 2 OR [95% CI]
Exposure to tobacco information	Tobacco sharing	**3.08*** [2.64, 3.60]**	**1.53* [1.05, 2.24]**
Sought tobacco information	Tobacco sharing	**5.49*** [4.21, 7.16]**	**2.67** [1.40, 5.08]**
Scanned tobacco information	Tobacco sharing	**2.72*** [2.34, 3.17]**	1.30 [0.90, 1.89]
Exposure to e-cigarette information	E-cigarette sharing	**8.04*** [6.59, 9.81]**	**2.70*** [1.77, 4.12]**
Sought e-cigarette information	E-cigarette sharing	**13.87*** [10.43, 18.42]**	**5.26*** [2.56, 10.80]**
Scanned e-cigarette information	E-cigarette sharing	**6.39*** [5.28, 7.74]**	**2.36*** [1.59, 3.51]**

†$p<.10$; *$p<0.05$; **$p<0.01$; ***$p<0.001$

Note: The ORs reflect the association between the independent variable (IV) at Time 1 and the dependent variable (DV) at Time 1, adjusting for confounders (Model 1); and the DV at Time 2, adjusting for the DV at Time 1 and confounders (Model 2).

It was interesting to note that compared to e-cigarette ad exposure's effects on e-cigarette-related sharing, exposure to tobacco-related ads was less predictive of sharing tobacco-related content in the long-term. This difference in results may have been due to measurement differences, such that the measure for exposure to e-cigarette ads only captured exposure to ads promoting the use of e-cigarettes, while the measure for exposure to tobacco ads took into consideration exposure to both pro- and anti-tobacco ads. However, the results of conducting sensitivity analyses that examined the effects of exposure to pro-tobacco ads and anti-tobacco ads separately showed that neither were strongly predictive of tobacco sharing in the long-run. This suggests that in general, e-cigarette ads may be more readily accessible in people's heads, possibly because (due to the novelty of the product) they're more memorable or more abundant in quantity, leading to increased likelihood of sharing about e-cigarettes.

When it came to general media and social media use, Emery and colleagues had found that each additional hour of internet use was associated with a higher likelihood of immediate sharing while use of social media was not (Emery et al., 2014). In contrast, our results showed that both heavy general media use and social media use were associated with sharing. A possible explanation for the difference in findings is that our data examined the effect of heavy social media use among youth (compared to Emery and colleagues' analyses looking at any social media use among adults). Nevertheless, while both general and social media use seem to be worth examining as proxies for exposure to relevant information, reports of actual exposure to tobacco or e-cigarette information seem to be more predictive of both immediate and later sharing behavior,

potentially because reporting exposure to relevant information means people were aware of seeing the information and processed it, increasing the chances of sharing about it.

Upon examining the predictors of different valences of sharing, it was found that the effects of use and intentions on tobacco and e-cigarette sharing were all driven by findings related to non-negative tobacco sharing and positive e-cigarette sharing. Interestingly, perceptions of high prevalence of smoking/vaping among friends and peers was associated with increased positive *and* negative sharing about tobacco/e-cigarettes. Initial thoughts were that perhaps positive sharing occurs among those who are also users or intenders, while negative sharing occurs among non-users who want to help their friends quit smoking or vaping.

However, when intentions and descriptive norms were examined in conjunction, perceptions of descriptive norms seemed to weaken the effect of intentions on sharing valence, which ran true with our initial hypotheses. In particular, effects were seen for those with perceptions of high prevalence of smoking/vaping, which suggests that the urge to conform to the majority behavior (or at least appear to) outweighs one's pre-existing stance on tobacco use when it comes to deciding what to share, but not when the majority behavior is *not* smoking or vaping. Yet, the fact that descriptive norms did not seem to affect the influence of current use on valence of sharing suggests that, unsurprisingly, use status is a more stable predictor of sharing than intentions.

Still, given the interaction effects between intentions and norms, and considering that simple main effects showed that the influence of descriptive norms on sharing valence persisted for months, whereas intentions and use did not (at least for tobacco), it

seems likely that youths' decisions on what to talk about and share with other people are particularly subject to what they think is popular behavior. Descriptive norms are based on what people think are prevalent behaviors among their friends and peers, and these are the people to whom they are also likely to share with. It is thus unlikely that a teenager or young adult would share something that goes against the majority, even if that means talking about it in a way that isn't in line with what they actually believe. Along these lines, it would have been interesting to examine whether perceptions of friends' approval (i.e., injunctive norms) would have undermined the effect of use or intentions on sharing valence to a greater or lesser extent than descriptive norms, if at all. However, the sample size was limited such that there weren't enough people in the population of interest to conduct the necessary analyses.

In conclusion, this study finds that when sharing occurs, personal relevance and exposure to relevant information are both clear predictors of sharing behavior. Furthermore, this study finds that while intentions and descriptive normative perceptions are separately predictive of sharing valence, the latter undermines the influence of the former in determining the direction in which one chooses to share. Being that this study provided insight into what brings about sharing behavior, the following study next attempts to examine the consequences of sharing when it does occur.

CHAPTER FIVE

Study 3 – Sharing in the Context of Tobacco and E-cigarette Communication: Consequences and Contingent Effects

Overview

The previous study (Chapter 4) examined the prevalence of sharing and found that about a fifth of the youth and young adult population shared about tobacco and a little less shared about e-cigarettes. More importantly, it found that use and intentions, along with other predictors were found to be associated with sharing. But what are the consequences of this sharing? This chapter aimed to examine the effects of sharing on subsequent outcomes, namely future behavior.

As outlined in Chapter 1, there are several explanations as to why people might share with others and how that sharing may potentially affect future behavior, including the chance to gain new information, the opportunity to deeply elaborate on information, and norm awareness. However, the proposition that most contributes to the hypotheses driving this study is the notion that sharing represents an act of public commitment to the beliefs, attitudes, and/or intentions one has just shared.

Historically, public commitment has been viewed as something that binds one to a particular action or principles (Schlenker, Dlugolecki, & Doherty, 1994) and has been found to strengthen any corresponding attitudes, subsequently allowing them to better guide future behavior. One of the key factors of commitment is whether it has been made *publicly* versus simply thinking it in one's head, such that studies have found public self-

presentation to be more effective than private self-reflection in either changing or strengthening one's cognitions (Schlenker et al., 1994; Tice, 1992).

Studies found that the act of publicly committing to a particular intention seemed to motivate people to go through with implementing that intention in an effort to retain their integrity and save face (Aronson, Fried, & Stone, 1991; Dickerson, Thibodeau, Aronson, & Miller, 1992; Stone, Aronson, Crain, Winslow, & Fried, 1994). Furthermore, other studies showed that public commitment induced intentions to carry over into behavior, regardless of whether that commitment was dissonant or consistent with prior intentions (Schlenker et al., 1994; Tice, 1992). And while these studies only focused on acts of face-to-face public commitment, more recent studies found similar effects of public commitment in computer-mediated settings (Gonzales & Hancock, 2008; Walter, Van Der Heide, Tong, Carr, & Atkin, 2010).

Based on the above line of research, the current study aimed to answer a series of research questions, examining the effect of sharing on future behavior, by itself as well as in conjunction with current intentions.

Current Study

The effect of sharing on future behavior: main effects. The first step was to examine whether sharing affected any outcomes of interest, and if so, whether different valences of sharing had different consequences. The main outcome of interest was behavior, but effects on intentions were also examined[8]. Simply put:

[8] This decision was made given that 1) in order to change behavior, there needed to be a change in intentions (TRA; Fishbein & Ajzen, 1975), and 2) that the time lag between Time 1 (when sharing was

RQ1a: What is the effect of tobacco-related sharing on smoking intentions?

RQ1b: What is the effect of e-cigarette-related sharing on vaping intentions?

RQ2a: What is the effect of tobacco-related sharing on smoking behavior?

RQ2b: What is the effect of e-cigarette-related sharing on vaping behavior?

Hypotheses predicted that sharing would affect the likelihood of having intentions to or actually engaging in future behavior (i.e., cigarette or e-cigarette use), depending on whether the information shared was supportive or against the behavior.

H1a: Sharing negatively about tobacco will reduce the likelihood of future cigarette intentions, while sharing positively about tobacco will increase the likelihood of future cigarette intentions.

H1b: Sharing negatively about e-cigarettes will reduce the likelihood of future e-cigarette intentions, while sharing positively about e-cigarettes will increase the likelihood of future e-cigarette intentions.

H2a: Sharing negatively about tobacco will reduce the likelihood of future cigarette use, while sharing positively about tobacco will increase the likelihood of future cigarette use.

measured) and Time 2 (when the outcomes were measured) may not have been enough time for behaviors to change but sufficient for changes in intentions.

H2b: Sharing negatively about e-cigarettes will reduce the likelihood of future e-cigarette use, while sharing positively about e-cigarettes will increase the likelihood of future e-cigarette use.

Keeping in mind that the theory of reasoned action states that current behavior and intentions also affect future behavior independently (Fishbein & Ajzen, 1975), the following equation models the expected main effects leading to future behavior:

$$Behavior_{t2} = \alpha + \beta_1(Behavior_{t1}) + \beta_2(Intention_{t1}) + \beta_3(Sharing_{negt1}) + \beta_4(Sharing_{nonnegt1})$$

The effect of sharing on future behavior: contingent effects. Given that information sharing was found to be driven by both current behavior and intentions (see findings from Chapter 3), and taking into consideration the fact that current behavior and intentions also drive future behavior, how does sharing interact then with those current intentions and behaviors to affect future behavior? The first step was to examine the interactions between current intentions and sharing, and their effects on behavior.

RQ3a: What is the moderating role of tobacco-related sharing on the relationship between smoking intentions and behavior?

RQ3b: What is the moderating role of e-cigarette-related sharing on the relationship between vaping intentions and behavior?

For sharing to amplify the effect of current intentions on behavior, the valence of the information shared should be consistent with prior intentions. On the other hand, for

sharing to reduce the effect of current intentions on behavior, the valence of the information shared should be inconsistent with prior intentions.

H3a: Those who share about tobacco in ways that are consistent with their smoking intentions are more likely to follow through behaviorally on their intentions than those who do not share about tobacco.

H3b: Those who share about e-cigarettes in ways that are consistent with their vaping intentions are more likely to follow through behaviorally on their intentions than those who do not share about e-cigarettes.

H4a: Those who share about tobacco in ways that are *not* consistent with their smoking intentions are *less* likely to follow through behaviorally on their intentions than those who do not share about tobacco.

H4b: Those who share about e-cigarettes in ways that are *not* consistent with their vaping intentions are *less* likely to follow through behaviorally on their intentions than those who do not share about e-cigarettes.

Based on these hypotheses, the model equation was extended as follows:

$$Behavior_{t2} = \alpha + \beta_1(Behavior_{t1}) + \beta_2(Intention_{t1}) + \beta_3(Sharing_{neg}) + \beta_4(Sharing_{nonneg}) + \beta_5(Intention_{t1} * Sharing_{neg}) + \beta_6(Intention_{t1} * Sharing_{nonneg})$$

Method

Participants

This study used data drawn from an ongoing nationally representative rolling cross-sectional and re-contact survey of youth (13-17) and young adults (18-25 year olds), implemented as part of a larger study originally aiming to examine young people's tobacco product-related attitudes and behaviors as a result of exposure to tobacco product-related content in the media environment. Social Science Research Solutions (SSRS) recruited and interviewed participants via a partially list-assisted random digit dialing of landline and cellular phones. The cross-sectional survey was initiated in mid-June of 2014 and administered to a fresh sample of approximately 300 respondents each month (American Association of Public Opinion Research response rate 3 = 20%) while the re-contact survey was administered to approximately half of the original respondents six months later (response rate=37%). At the time of these analyses, we had acquired 93 weeks of cross-sectional data (total N = 7094) and 67 weeks of re-contact data (total n = 1651).

Measures

Predictors. Valenced sharing related to tobacco and e-cigarettes were the main predictors examined in this study. Tobacco sharing was measured as follows:

> *The next questions are about whether you personally shared information with others. In the past 30 days did you share information about cigarettes or tobacco a)*

via email or social media? b) How about in a conversation in-person or on the phone?[9]

The above measures were combined to form an overall dichotomous measure of tobacco sharing (Yes/No). Those who reported having shared about tobacco were subsequently asked about the valence in which they shared:

Think about the information you've shared with others in the past 30 days about cigarettes or other tobacco products. Was it mostly positive about using tobacco, mostly negative, or a mix of positive and negative?

E-cigarette-related sharing was measured in the same way, albeit about sharing information about vaping or e-cigarettes.

Because this study examined the effects of those who didn't share vs. those who shared with different valences, the binary tobacco-related sharing and e-cigarette-related sharing variables were combined with the respective valence variables to form final categorical sharing variables (as shown in Table 5.1). The reasons for combining positive and mixed tobacco sharing into a "non-negative" category are laid out in the previous chapter (Chapter 4).

[9] The order in which a) and b) were asked was randomized

Table 5.1 Category Breakdown of Sharing Variables

Tobacco-related Sharing	E-cigarette-related Sharing
No sharing	No sharing
Mostly negative sharing	Mostly negative sharing
Non-negative sharing (mostly a mix of positive and negative + positive)	A mix of positive and negative sharing
	Mostly positive sharing

Tobacco- and e-cigarette-related intentions. Tobacco- and e-cigarette-related intentions were dependent variables (in the main effects model) as well as predictors (in the interaction models). Two types of intentions were used to assess tobacco-related intentions: Intentions to quit smoking completely in the next 6 months was asked of current smokers, and intentions to smoke tobacco cigarettes, even one or two puffs, at any time in the next 6 months was asked of non-smokers (1-4 scale: Definitely will not – Definitely will). On the other hand, e-cigarette-related intentions were assessed using only one measure of likelihood of vaping, even one or two puffs, at any time in the next 6 months (1-4 scale: Definitely will not – Definitely will) and was asked of everyone regardless of past smoking or vaping status. In order to make the cigarette intentions and e-cigarette intentions comparable, the two cigarette intention questions were combined into an overall measure of intention to smoke, such that the entire sample was included in the measure. The final intention measures used (for both cigarette and e-cigarettes) were binary measures: 0 (No intention: definitely will not or probably will not) and 1 (Yes intention: probably will or definitely will). As dependent variables, these measures were examined at Time 1 for cross-sectional analyses and Time 2 for lagged analyses; as independent variables, these measures were examined only at Time 1.

Tobacco- and e-cigarette-related behavior. Tobacco- and e-cigarette-related behaviors were the main outcomes of interest. Tobacco-related behaviors were asked as follows: "*Have you ever tried smoking cigarettes, even one or two puffs?* (Binary: Yes/No); *During the past 30 days, on how many days did you smoke cigarettes?* (Continuous: 0-30)." These measures were then combined into a dichotomous measure of current cigarette use: 0 (not a current smoker) or 1 (current smoker). E-cigarette-related behaviors were asked as follows: "*Have you ever tried vaping or using e-cigarettes, even one or two puffs?* (Binary: Yes/No); *During the past 30 days, on how many days did you vape or use e-cigarettes?* (Continuous: 0-30)." These measures were then combined into a binary measure of current e-cigarette use: 0 (not a current vaper) or 1 (current vaper). These behavioral outcomes were examined at Time 1 for cross-sectional analyses and at Time 2 for lagged analyses. See Appendix B for fully worded survey items.

Confounders. All regression analyses adjusted for the following potential demographic and smoking-related confounders: age (in years), sex, race (non-Hispanic white, non-Hispanic black, Hispanic, other/more than one), education (less than high school, high school degree, some college, college degree or more), employment (no job, part-time, full-time), parental education (less than high school, high school degree, some college, college degree, completed graduate school), whether other people in the household smoked tobacco cigarettes, whether other people in the household used e-cigarettes, and whether use of e-cigarettes was allowed at home. Additionally, lagged analyses adjusted for the respective dependent variable measured at Time 1 (intentions or behavior).

Analytical Procedure

Main effects. Means analyses were first performed to examine the basic shape of the relationship between variables of interest. In examining the main effect of overall tobacco and e-cigarette sharing (i.e., whether one shared or didn't share), multivariate logistic regressions were conducted at both a) the cross-sectional level (the effect of sharing on outcomes at Time 1) and b) the lagged level (the effect of sharing at Time 1 on outcomes at Time 2), controlling for confounders. When examining the effect of the different valences in which people reported sharing, chi-square tests of independence were first performed to examine the overall relationship between the outcome variable and the categorical sharing variable. Subsequently, multivariate logistic regressions were conducted, again at both the cross-sectional and lagged levels.

Contingent effects. Multivariate logistic regressions with interaction terms were used to assess the moderating effect of sharing on the relationship between current intentions and behavior. Similar to the main effects analyses, the moderating effect of overall tobacco sharing (i.e., whether one shared or didn't share) was first examined, before subsequently assessing the moderating effect of different valences of tobacco sharing. Omnibus Wald F tests were performed to assess whether there was a significant overall moderation effect, before examining the individual interactions. Again, both cross-sectional (DV: behavior at Time 1) and lagged (DV: behavior at Time 2) analyses were performed, controlling for confounders (and, for the lagged analyses, also controlling for the corresponding outcome variable measured at Time 1).

The same analyses were done for e-cigarette sharing. However, the breakdown of the different valence categories of e-cigarette sharing had to be modified (see Table 5.2 for original and revised categories). This regrouping was due to the fact that among those who reported e-cigarette use at follow-up, there were no people who reported negative e-cigarette sharing *and* no intention to use e-cigarettes, leading to an inability to conduct lagged interaction analyses (see Appendix C for a full breakdown of sample sizes).

Table 5.2 Old and New Valence Categories for E-cigarette Sharing

Original Categories	Modified Categories
No sharing	No sharing
Negative	Non-positive
A mix of positive and negative	(mostly negative + a mix of positive and negative)
Positive	Positive

Note. The highlighted rows represent the modified categories.

Before conducting the actual interaction analyses, the valence categories were further re-coded and re-labeled to better match the specific hypotheses of interest, which was whether sharing in a direction that was consistent vs. inconsistent to one's pre-existing intentions would lead to a higher or lower likelihood of following through behaviorally on their intentions (immediately and/or six months later). In other words, did it matter more whether one was sharing consistently or inconsistently to their intentions regardless of whether the valence of the sharing was positive or negative?

Sharing variable categories were relabeled according to their consistency with intentions (rather than by actual valence). Table 5.3 shows the relabeled categories, based on prior intentions.

Table 5.3 Relabeled Sharing Categories for Interaction and Subgroup Analyses

	New Variable Categories	*Corresponding Valence Categories*	
		No Intentions	**Yes Intentions**
Tobacco	No sharing	No sharing	No sharing
	Not consistent (with intentions)	Non-negative	Negative
	Consistent (with intentions)	Negative	Non-negative
E-cigarette	No sharing	No sharing	No sharing
	Not consistent (with intentions)	Positive	Non-positive
	Consistent (with intentions)	Non-positive	Positive

Subgroup analyses. Although including interaction terms is usually sufficient in examining the effect of a potential moderating variable, the present hypotheses were complex and warranted a subsequent analytical step that would enable an alternative, yet parallel examination of the hypothesized associations. Thus, subgroup analyses were performed, such that the effects of sharing (either consistently or inconsistently with intentions) on behavior were assessed separately for different levels of intention (i.e., those with intentions vs. those without intentions).

All analyses were weighted separately for the cross-sectional and re-contact samples, and reflected Current Population Survey distributions on important demographics, as well as sampling procedures and non-response patterns. Missing data was minimal (less than 1% on the majority of variables) and were listwise deleted.

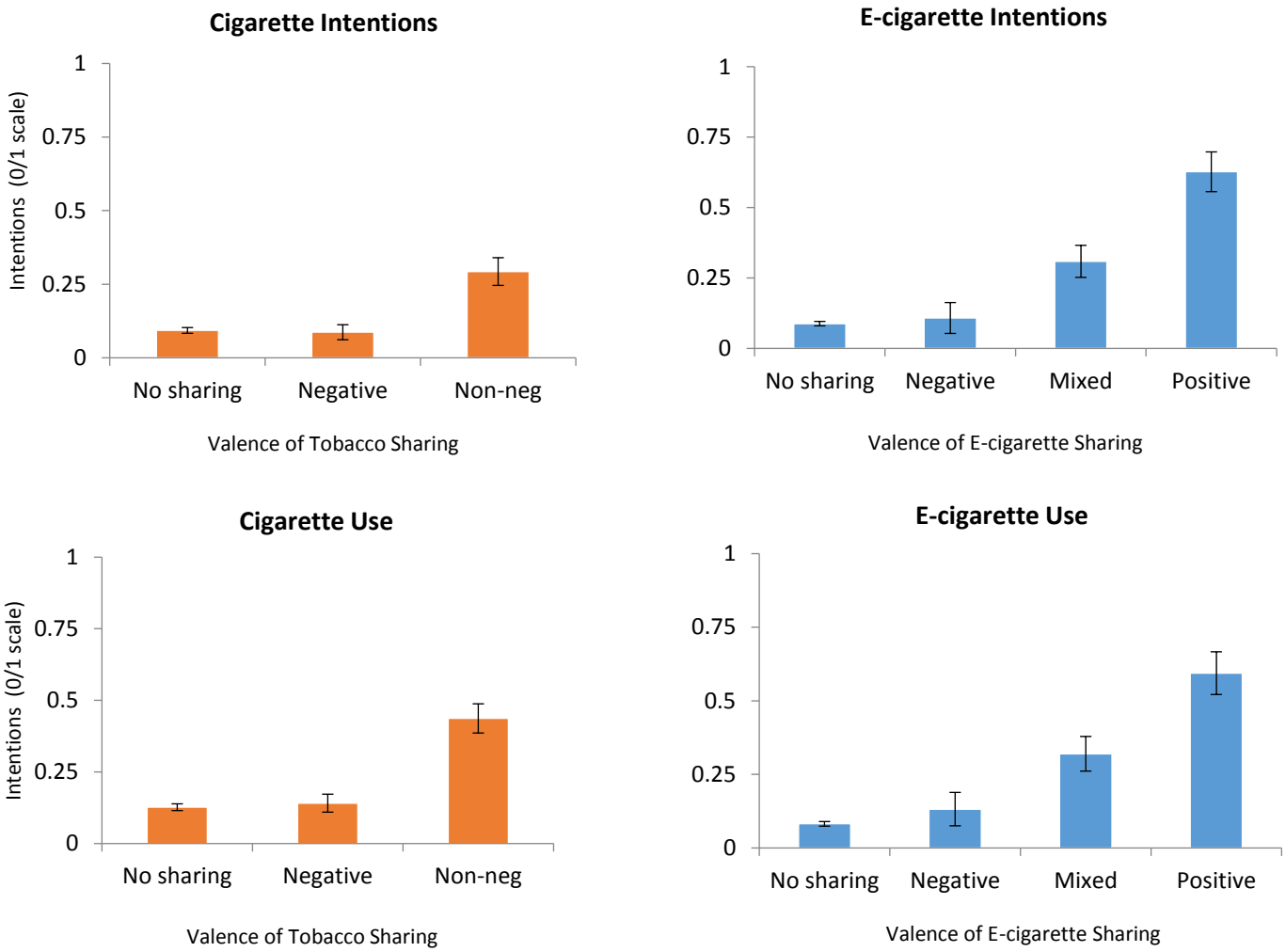
Results

The descriptive statistics for both the cross-sectional and re-contact samples, as well as the prevalence rates for sharing behavior and for the different valences in which people shared, are displayed in Table 4.1 in the previous chapter (Chapter 4).

Main Effects

Figure 5.1 presents the results of a means analysis, which explored the shape of the relationship between the constructs. Overall, people who reported no sharing or negative sharing about tobacco also reported lower intentions to smoke or vape, respectively. Likewise, people who reported no sharing or negative sharing about e-cigarettes also reported lower cigarette and e-cigarette use, respectively.

Figure 5.1 Means Analysis: Relationship between Intentions and Valence of Sharing



Tobacco-related sharing. Sharing about tobacco was significantly associated with higher likelihood of both intending to use cigarettes (at the cross-sectional and lagged level) and of actually using cigarettes (only at the cross-sectional level), compared to not sharing about tobacco (Table 5.4).

A closer look at the different valences in which people shared showed that both intentions and behavior varied significantly across the different valences: χ^2 (2, N = 6762) = 224.09, $p < .001$, and χ^2 (2, N = 6765) = 360.52, $p < .001$ respectively. Those who shared non-negative tobacco content were significantly more likely to report intentions to smoke and actual cigarette use than those who shared negative tobacco content or didn't share at all (partially supporting Hypothesis 1a and 2a). However, this difference was no longer evident at the lagged level (although non-negative sharing was marginally associated with a higher likelihood of having intentions to smoke six months later). It is worth recalling the small amount of change in cigarette use and e-cigarette use over time; among non-smokers at Time 1 re-measured at Time 2, only 2.8% (n = 43) initiated smoking. Among non-e-cigarette users at Time 1, only 4.7% (n = 70) initiated e-cigarette use 6 months later. While both lagged analyses show adjusted odds ratios in the range of 1.5, neither approaches statistical significance, possibly reflecting the lack of power. (See Table 5.5).

Table 5.4 Direct Effects of Sharing on Intentions and Behavior

IV	DV	Model 1 *Cross-sectional* OR [95% CI]	Model 2 *Lagged* OR [95% CI]
Tobacco sharing	Cigarette Intentions	**1.57*** ** [1.26, 1.96]	**1.84*** [1.00, 3.37]
	Cigarette Use	**1.91*** ** [1.56, 2.34]	1.42 [0.74, 2.74]
E-cigarette sharing	E-cigarette Intentions	**4.43*** ** [3.58, 5.50]	**1.98*** [1.10, 3.56]
	E-cigarette Use	**4.50*** ** [3.62, 5.58]	1.57 [0.90, 2.76]

*p<0.05; **p<0.01; ***p<0.001

Note: IV = independent variable; DV = dependent variable; OR = odds ratio; 95% CI = 95% confidence intervals. The ORs reflect the association between the IV at Time 1 and the DV at Time 1, adjusting for confounders (Model 1); and the DV at Time 2, adjusting for the DV at Time 1 and confounders (Model 2).

E-cigarette-related sharing. Similarly, sharing about e-cigarettes was significantly associated with a higher likelihood of both intending to use e-cigarettes (at the cross-sectional and lagged level), and of actually using e-cigarettes (only at the cross-sectional level), compared to not sharing anything about e-cigarettes.

Both intentions and behavior varied significantly across the different valences in which people shared: χ^2 (3, N = 6896) = 696.05, $p < .001$, and χ^2 (3, N = 6905) = 696.50, $p < .001$, respectively. At the cross-sectional level, while both mixed sharing and positive sharing about e-cigarettes was associated with a significantly higher likelihood of intending to use e-cigarettes and actually using e-cigarettes compared to negative sharing and not sharing at all, positive sharing had larger associations with intentions and behavior even compared to mixed sharing. Thus, it was not unexpected when results showed that the effects found at the cross-sectional level followed through at the lagged level only for positive sharing, such that positive sharing about e-cigarettes significantly predicted a higher likelihood of both intending to use and actually using e-cigarettes six months later (partially supporting Hypothesis 1b and 2b).

The finding that overall e-cigarette sharing didn't predict behavior at Time 2 while *positive* e-cigarette sharing significantly predicted e-cigarette use at Time 2 may initially seem contradictory; but the latter effect may not have been able to come through in the overall analyses due to the effect of positive sharing being undermined by the non-significant effects of negative and mixed sharing.

Table 5.5 Direct Effects of Valenced Sharing on Intentions and Behavior

		Model 1	**Model 2**
IV	**DV**	*Cross-sectional* OR [95% CI]	*Lagged* OR [95% CI]
Tobacco sharing	Cigarette Intentions		
No sharing		1	1
Negative		0.77 [0.54, 1.12]	1.42 [1.05, 2.98]
Non-negative		**2.64***** [1.96, 3.54]	2.30† [0.92, 5.74]
Tobacco sharing	Cigarette Use		
No sharing		1	1
Negative		0.90 [0.65, 1.24]	1.28 [0.44, 3.74]
Non-negative		**3.86***** [2.93, 5.08]	2.11 [0.84, 5.26]
E-cigarette sharing	E-cigarette Intentions		
No sharing		1	1
Negative		1.14 [0.63, 2.08]	2.33 [0.81, 6.73]
Mixed		**3.83***** [2.71, 5.40]	1.62 [0.60, 4.43]
Positive		**10.54***** [7.27, 15.28]	**4.39**** [1.66, 11.60]
E-cigarette sharing	E-cigarette Use		
No sharing		1	1
Negative		1.45 [0.80, 2.63]	0.83 [0.20, 3.41]
Mixed		**4.21***** [3.01, 5.88]	1.27 [0.56, 2.89]
Positive		**10.45***** [7.29, 14.98]	**4.52***** [1.79, 11.45]

†$p<.10$; *$p<0.05$; **$p<0.01$; ***$p<0.001$

Note: IV = independent variable; DV = dependent variable; OR = odds ratio; 95% CI = 95% confidence intervals. The ORs reflect the association between the IV at Time 1 and the DV at Time 1, adjusting for confounders (Model 1); and the DV at Time 2, adjusting for the DV at Time 1 and confounders (Model 2). The reference category is no sharing.

Contingent Effects on Cigarette Use

Interaction effects. Table 5.6 presents the results of the interaction models. At the cross-sectional level, sharing significantly moderated the association between intention and behavior (Wald F (1, 6222) = 4.42, p = .036). A closer look at the associations showed that sharing had no effect on those who already had intentions to smoke, but among those who had *no* intentions to smoke, those who shared were significantly more likely to report smoking behavior compared to those who didn't share (See Figure 5.2). In other words, sharing reduced the likelihood of people behaviorally following through on their intentions among those who had no intentions to smoke.

Upon examining the moderating effect of different valence categories, an omnibus test of the interaction between sharing and intentions was significant (Wald F (2, 5948) = 13.80, $p < .01$), indicating that the effect of intentions on behavior significantly varied across different valence categories at the cross-sectional level. As hypothesized, sharing inconsistently with one's intentions significantly reduced the likelihood of behaviorally following through on those intentions compared to sharing consistently with intentions. Additionally, sharing inconsistently with intentions significantly reduced the likelihood of behaviorally following through on intentions compared to not sharing at all, but only for those who had no prior intentions to smoke (see Figure 5.2).

None of the moderation effects remained significant at the lagged level. The omnibus tests of interaction between overall sharing and intentions (Wald F (1, 1418) = 0.23, p = .631) and between valenced sharing and intentions (Wald F (2, 1327) = 0.06, p = .943) were not significant (Figure 5.2).

Table 5.6 Multivariate Logistic Regression Models Examining the Interaction between Sharing and Intentions on Behavior at Time 1 and Time 2

		Cross-sectional Analyses OR [95% CI]		**Lagged Analyses** OR [95% CI]	
DV	IV (all at time 1)	Model 1a *(Overall sharing)*	Model 1b *(Valenced sharing)*	Model 2a *(Overall sharing)*	Model 2b *(Valenced sharing)*
Cigarette Use	Tobacco Sharing	**2.07*** [1.61, 2.65]**	--	1.75 [0.86, 3.54]	--
	Not consistent	--	**3.88*** [2.77, 5.44]**	--	2.93† [0.95, 9.04]
	Consistent	--	1.28 [0.89, 1.84]	--	1.37 [0.47, 3.98]
	Cigarette Intentions	**18.88*** [13.62, 26.18]**	**19.03*** [13.72, 26.38]**	**3.69* [1.31, 10.41]**	**3.69* [1.23, 11.05]**
	Intentions*Sharing	**0.57* [0.33, 0.96]**	--	0.69 [0.15, 3.18]	--
	Not consistent	--	**0.11*** [0.04, 0.26]**	--	1.57 [0.11, 21.47]
	Consistent	--	1.41 [0.71, 2.80]	--	1.01 [0.17, 5.97]
E-cigarette Use	E-cigarette Sharing	**3.17*** [2.24, 4.48]**	--	1.36 [0.63, 2.95]	--
	Not consistent	--	**4.42*** [2.25, 8.68]**	--	**6.72** [2.06, 21.95]**
	Consistent	--	**3.19*** [2.12, 4.78]**	--	0.57 [0.20, 1.68]
	E-cigarette Intentions	**23.10*** [17.30, 30.85]**	**23.23*** [17.41, 30.99]**	**4.99*** [2.07, 12.02]**	**4.95*** [2.03, 12.11]**
	Intentions*Sharing	0.68 [0.40, 1.13]	--	1.09 [0.34, 3.48]	--
	Not consistent	--	**0.31** [0.13, 0.74]**	--	0.40 [0.07, 2.29]
	Consistent	--	1.29 [0.63, 2.67]	--	**5.05* [1.01, 25.15]**

†p<.10; *p<0.05; **p<0.01; ***p<0.001

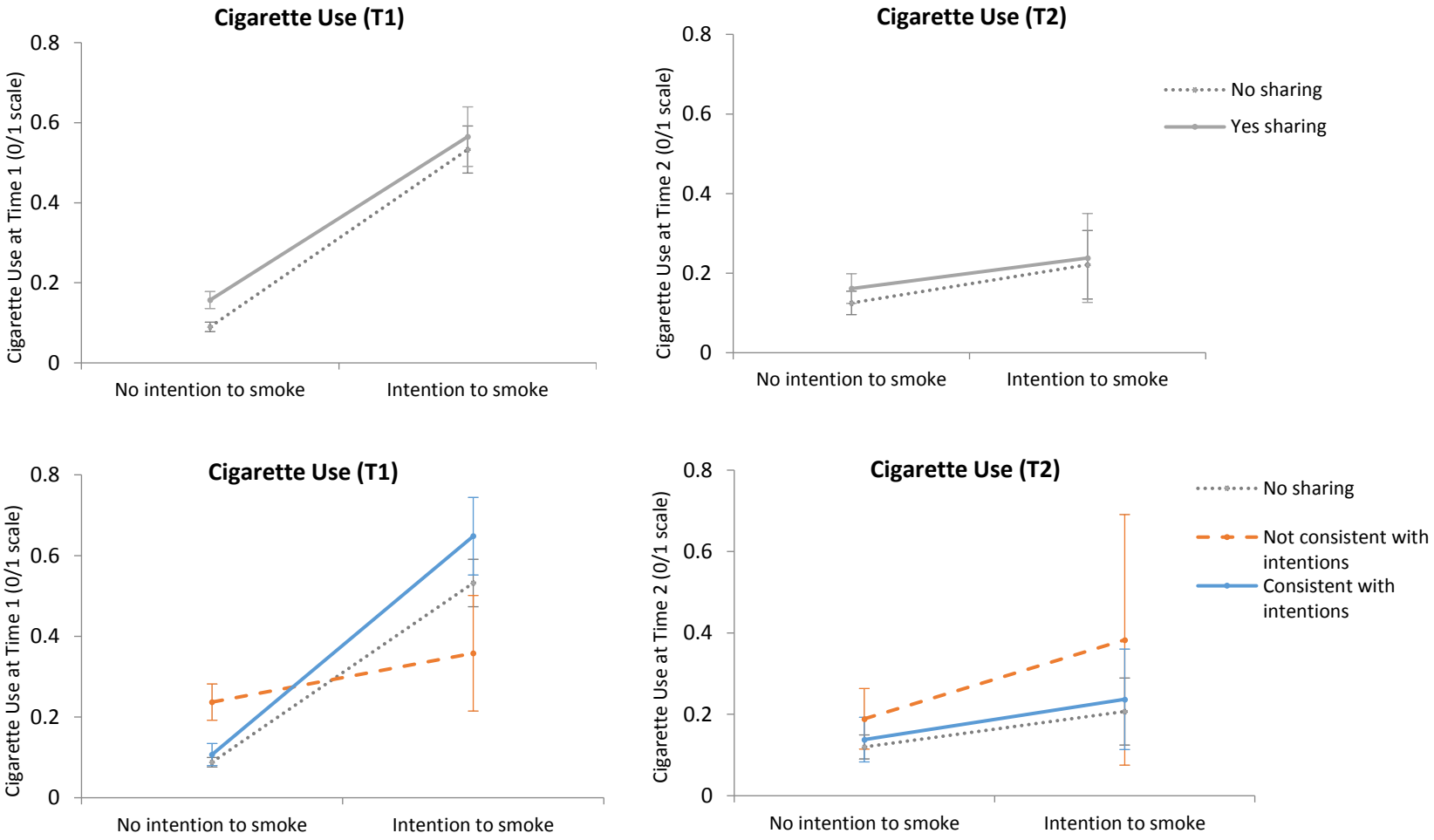
Note. DV = dependent variable; IV = independent variable; OR = odds ratio; 95% CI = 95% confidence intervals.

The ORs reflect the association between the IV at Time 1 and the DV at Time 1, adjusting for confounders (Models 1a and 1b); and the DV at Time 2, adjusting for the DV at Time 1 and confounders (Models 2a and 2b).

Models 1a & 2a examine the overall effect of sharing, while Models 1b & 2b examine the effect of different valences of sharing (reference category: no sharing).

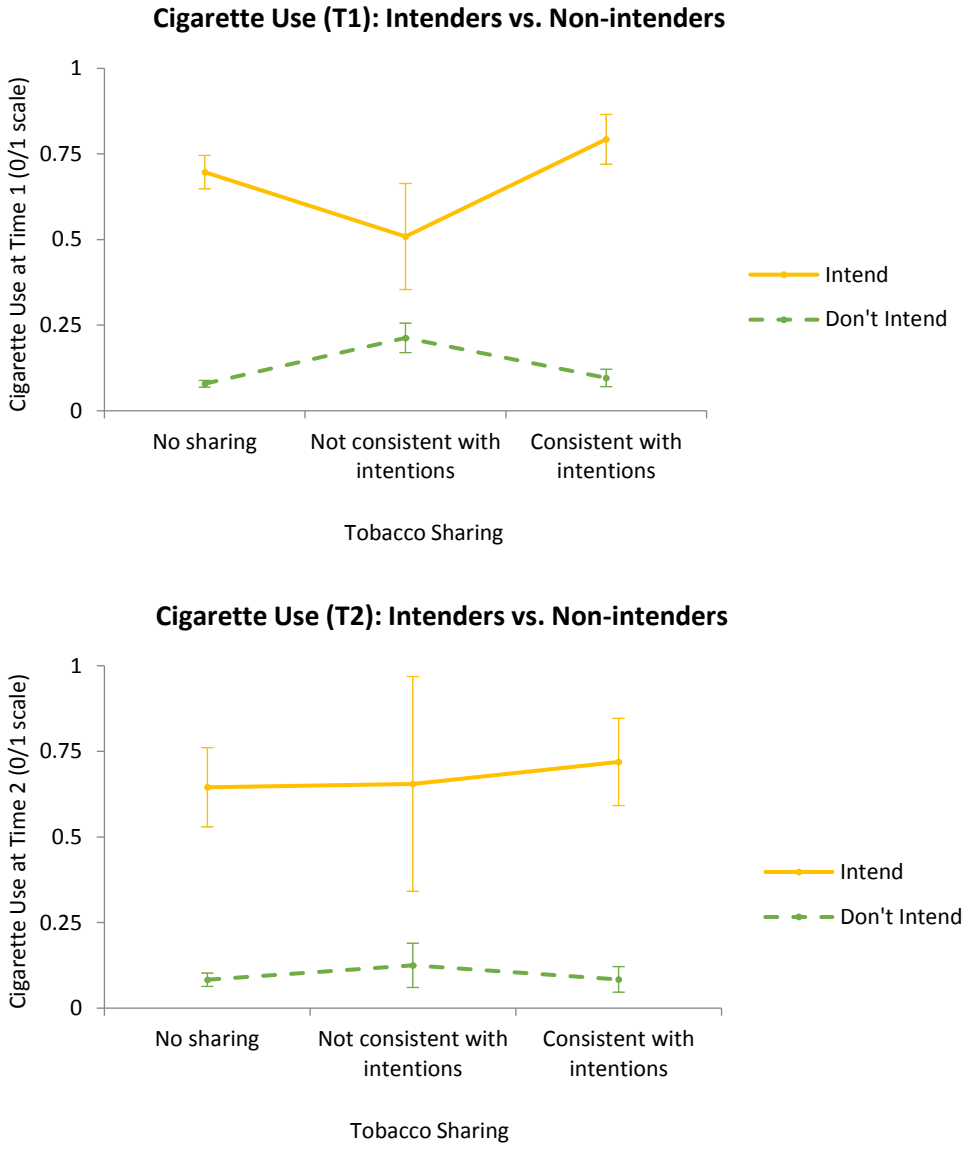
*N*s range from 5950-6233 for cross-sectional analyses, and from 1329-1423 for lagged analyses.

Figure 5.2 Contingent Effects of Intentions and Sharing on Cigarette Use at the Cross-sectional and Lagged Level



Subgroup analyses. The next set of analyses examined the effects of sharing on cigarette use among intenders and among non-intenders separately (shown in Table 5.8). These analyses are an alternative way of picturing the results of the previous analyses, but are entirely consistent with them. At the cross-sectional level, among those who intended to smoke, those who shared inconsistently with their intentions were significantly less likely to also report cigarette use compared to those who shared consistently and those who didn't share at all, while those who shared consistently with their intentions were significantly more likely to also report cigarette use compared to those who didn't share. Among those who didn't intend to smoke, those who shared inconsistently with their intentions were significantly more likely to also report cigarette use compared to those who shared consistently and those who didn't share. In other words, those who shared inconsistently with their intentions were less likely to behaviorally follow through on their intentions, compared to those who shared consistently and those who didn't share at all (see Figure 5.3). Lagged analyses showed that neither sharing consistently nor inconsistently had any significant effects on behavior six months later. See Table 5.7 for statistical tests of differences between categories.

Figure 5.3 Subgroup Analyses: the Effect of Sharing Consistently or Inconsistently with Intentions on Cigarette Use, among Intenders and Non-intenders



Note. Separate analyses were run for intenders and non-intenders, but the results were collapsed into a single graph for ease of interpretation.

Table 5.7 Statistically Testing for Differences between Variable Categories (within each IV)

		Cross-sectional Analyses		**Lagged Analyses**	
DV	IV	*Yes Intentions*	*No Intentions*	*Yes Intentions*	*No Intentions*
	(Tobacco Sharing)	(*n* = 551)	(*n* = 5399)	(*n* = 88)	(*n* = 1241)
Cigarette Use	No sharing vs. Not consistent	***F* (1, 6982) = 5.55 *p* = .019**	***F* (1, 6088) = 57.40 *p* < .001**	*F* (1, 1625) = 0.00 *p* = .951	*F* (1, 1352) = 1.88 *p* = .171
	No sharing vs. Consistent	***F* (1, 6982) = 4.10 *p* = .043**	*F* (1, 6088) = 1.62 *p* = .204	*F* (1, 1625) = 0.67 *p* = .412	*F* (1, 1352) = 0.00 *p* = .991
	Not consistent vs. Consistent	***F* (1, 6982) = 11.51 *p* < .001**	***F* (1, 6088) = 22.08 *p* < .001**	*F* (1, 1625) = 0.12 *p* = .728	*F* (1, 1352) = 1.42 *p* = .233
	(E-cigarette Sharing)	(*n* = 668)	(*n* = 5410)	(*n* = 120)	(*n* = 1250)
E-cigarette Use	No sharing vs. Not consistent	*F* (1, 6956) = 1.47 *p* = .225	***F* (1, 6237) = 18.28 *p* < .001**	*F* (1, 1621) = 1.39 *p* = .238	***F* (1, 1393) = 6.69 *p* = .010**
	No sharing vs. Consistent	***F* (1, 6956) = 21.71 *p* < .001**	***F* (1, 6237) = 31.22 *p* < .001**	***F* (1, 1621) = 4.39 *p* = .036**	*F* (1, 1393) = 1.77 *p* = .183
	Not consistent vs. Consistent	***F* (1, 6956) = 8.93 *p* = .003**	*F* (1, 6237) = 0.67 *p* = .413	*F* (1, 1621) = 0.29 *p* = .587	***F* (1, 1393) = 9.51 *p* = .002**

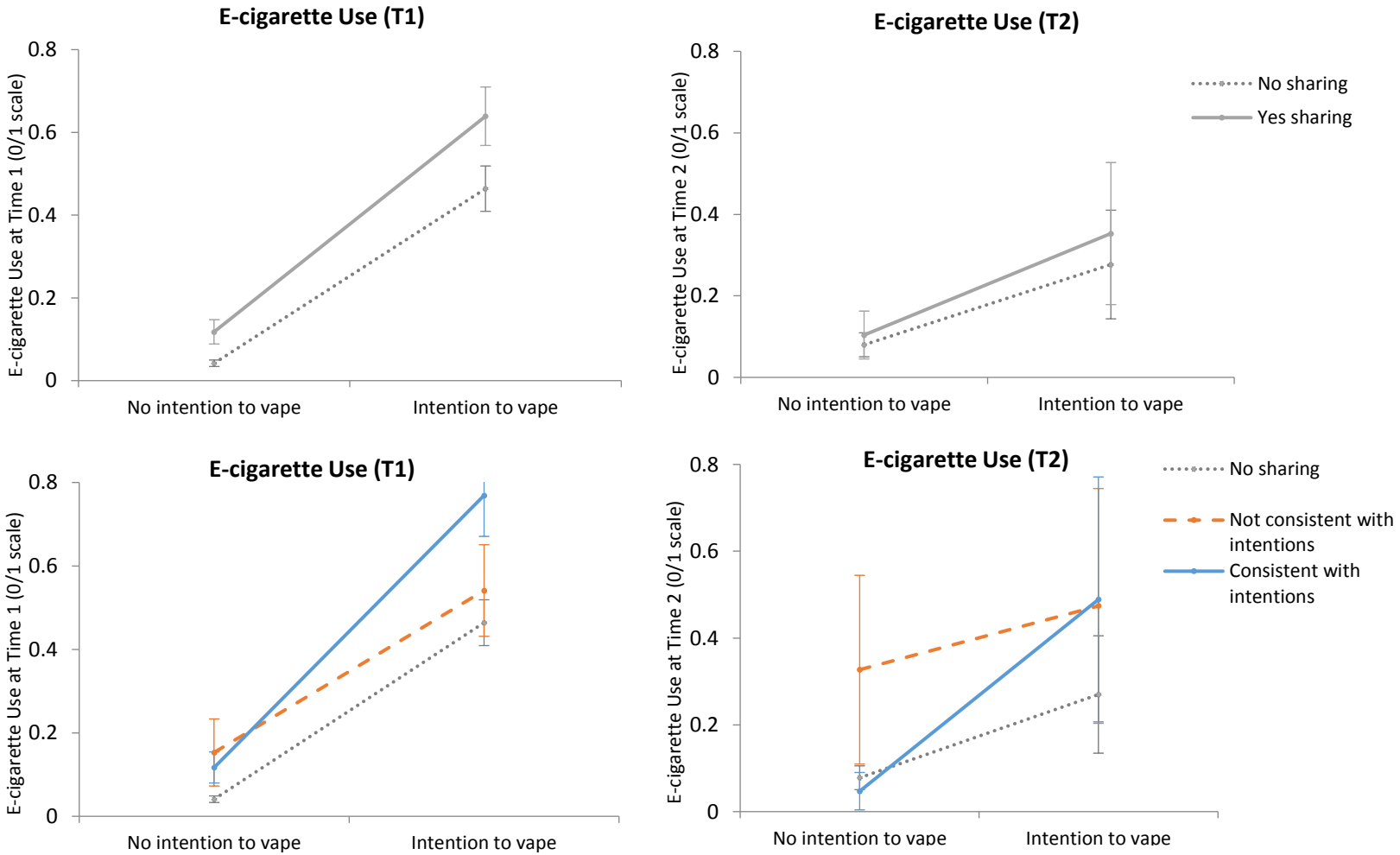
Note. Presented are adjusted Wald *F* tests to examine whether the predictive margins of each DV differ between pairs of variable categories (within each IV). Bolded results are significant at the .05 significance level.

Contingent Effects on E-cigarette Use

Interaction effects. Overall sharing about e-cigarettes did not significantly moderate the relationship between intentions and behavior, either at the cross-sectional level (Wald F (1, 6232) = 2.20, p = .138) or the lagged level (Wald F (1, 1422) = 0.02, p = .884) (see Table 5.6). However, when assessing the moderating effect of different valence categories, omnibus tests of the interaction between sharing and intentions were significant, both at the cross-sectional level (Wald F (2, 6076) = 4.11, p = .016) and marginally at the lagged level (Wald F (2, 1368) = 2.94, p = .053), indicating that the effect of intentions on behavior significantly varied across different valence categories. At the cross-sectional level, sharing inconsistently with one's intentions significantly reduced the likelihood of behaviorally following through on those intentions compared to sharing consistently (among those who had prior intentions to vape) and compared to not sharing at all (among those who had no intentions to vape). However, while sharing consistently with one's intentions significantly increased the likelihood of following through on intentions compared to not sharing at all for those with intentions to vape, it significantly *reduced* the likelihood of following through on intentions, compared to not sharing at all, for those with no intentions to vape (see Figure 5.4).

Interestingly, these results changed at the lagged level such that when the behavior was measured six months later, those with no intentions to vape who shared consistently with one's intentions, along with those who didn't share at all, were significantly more likely to behaviorally follow through on intentions compared to those who shared inconsistently (Figure 5.4). There were no effects of sharing among those who already intended to vape.

Figure 5.4 Contingent Effects of Intentions and Sharing on E-cigarette Use at the Cross-sectional and Lagged Level

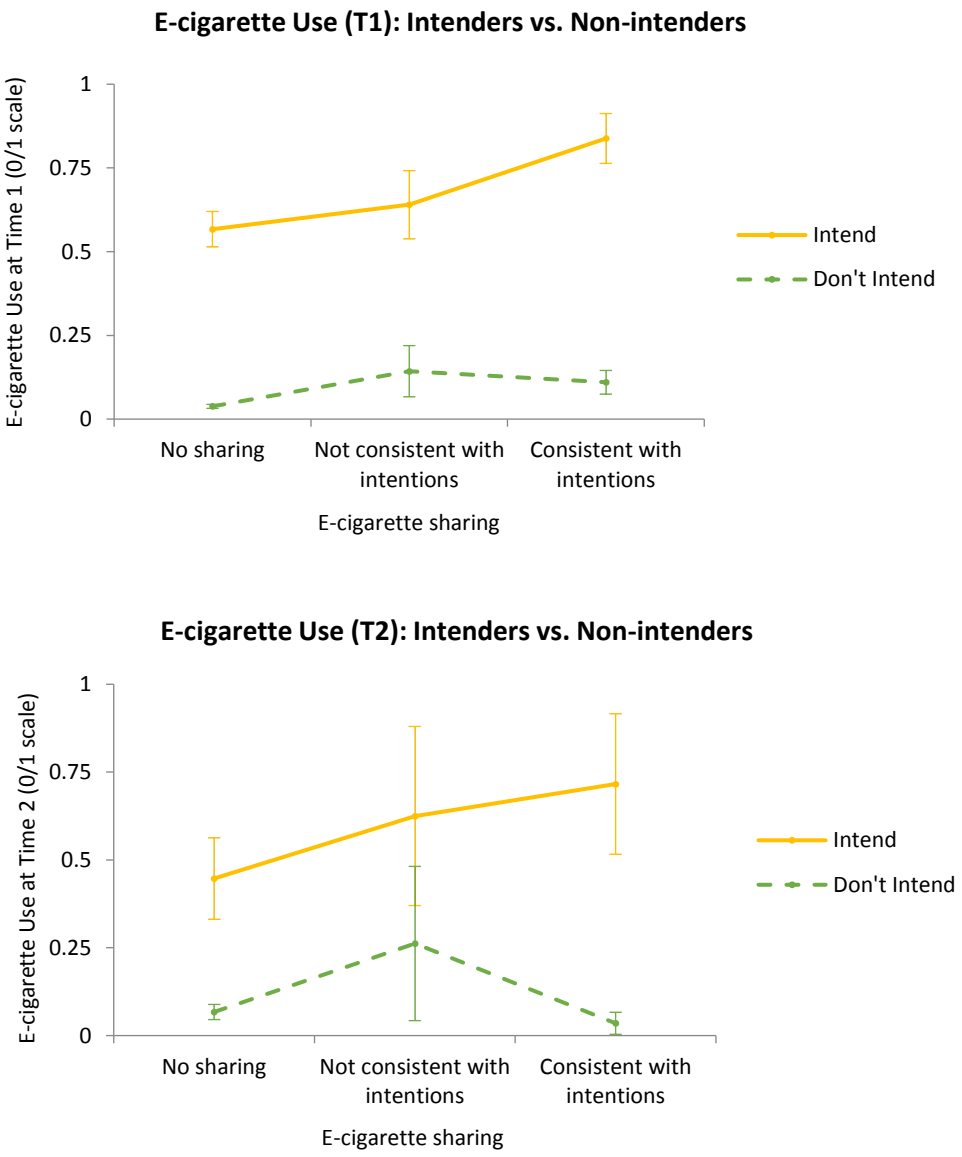


Subgroup analyses. Table 5.8 also displays the results of examining the effects of sharing on e-cigarette use among intenders and non-intenders separately, again providing an alternative way of picturing the results just reported. At the cross-sectional level, among those who already intended to vape, those who shared consistently with intentions were significantly more likely to also report e-cigarette use, compared to those who didn't share and those who shared inconsistently with intentions. However, among those with no intentions to vape, both sharing inconsistently *and* consistently significantly increased the likelihood of e-cigarette use, compared to not sharing at all. In other words, among intenders, sharing consistently with intentions significantly increased the likelihood of behaviorally following through on those intentions, but among non-intenders, any sharing (regardless of whether it was consistent or not with intentions) significantly reduced the likelihood of following through on intentions (see Figure 5.5).

The results of lagged analyses showed that most of the findings exhibited at the cross-sectional level still held true when the behavior was measured six months later. Among intenders, those who shared consistently with intentions were significantly more likely to also report e-cigarette use six months later, compared to not sharing at all (but not compared to those who shared inconsistently, Wald F (1, 1621) = 0.29, p = .587). Among non-intenders, those who shared inconsistently with intentions were significantly more likely to also report e-cigarette use six months later, compared to both those who shared consistently with intentions and those who didn't share at all. In other words, sharing consistently with intentions increased the likelihood of behaviorally following through on intentions compared to not sharing at all (only for intenders), and compared to

sharing inconsistently with intentions (only for non-intenders). See Table 5.7 for statistical tests of differences between categories.

Figure 5.5 Subgroup Analyses: the Effect of Sharing Consistently or Inconsistently with Intentions on E-cigarette Use, among Intenders and Non-intenders



Note. Separate analyses were run for intenders and non-intenders, but the results were collapsed into a single graph for ease of interpretation.

Table 5.8 Subgroup Analyses: Multivariate Logistic Regression Models Examining the Effect of Sharing Consistently or Inconsistently with Intentions on Behavior at Time 1 and Time 2, by Intention

		Cross-sectional Analyses OR [95% CI]		**Lagged Analyses** OR [95% CI]	
DV	IV	*Yes Intentions*	*No Intentions*	*Yes Intentions*	*No Intentions*
		(*n* = 551)	(*n* = 5399)	(*n* = 88)	(*n* = 1241)
Cigarette Use	Tobacco sharing				
	No sharing	1	1	1	1
	Not consistent	**0.42* [0.20, 0.86]**	**3.88*** [2.73, 5.51]**	1.08 [.10, 11.42]	2.51 [.67, 9.37]
	Consistent	**1.73* [1.02. 2.94]**	1.28 [0.88, 1.86]	1.70 [.48, 6.08]	1.01 [.30, 3.39]
		(*n* = 668)	(*n* = 5410)	(*n* = 120)	(*n* = 1250)
E-cigarette Use	E-cigarette sharing				
	No sharing	1	1	1	1
	Not consistent	1.39 [0.82, 2.36]	**4.39*** [2.23, 8.66]**	2.42 [0.56, 10.53]	**5.72* [1.53, 21.49]**
	Consistent	**4.28*** [2.32, 7.89]**	**3.22*** [2.14,4.85]**	**4.01* [1.09, 14.72]**	0.49 [0.17, 1.40]

†$p<.10$; *$p<0.05$; **$p<0.01$; ***$p<0.001$

Note: IV = independent variable; DV = dependent variable; OR = odds ratio; 95% CI = 95% confidence intervals. The ORs reflect the association between the IV at Time 1 and the DV at Time 1, adjusting for confounders (cross-sectional analyses); and the DV at Time 2, adjusting for the DV at Time 1 and confounders (lagged analyses). The reference category is no sharing.

Discussion

This study was an attempt to examine the consequences of sharing, compared to not sharing, on the intentions and behavior of the sharer. The main effects analyses showed that overall, tobacco sharing and e-cigarette sharing predicted corresponding intentions and behavior. A look at the effects of different valences of sharing showed that these effects were mostly driven by pro-tobacco or pro-e-cigarette sharing, such that sharing information that was supportive of the behavior highly predicted increased likelihood of actually engaging in (or intending to engage in) that behavior, while sharing information that was against the behavior did not necessarily reduce the likelihood of engaging or intending to engage in that behavior.

In examining the interplay between intentions and sharing, both interaction models and subgroup analyses were performed. The interaction analyses found that for the most part, sharing significantly moderated the relationship between intentions and behavior, for both tobacco and for e-cigarettes. As hypothesized, those who shared consistently with their pre-existing intentions were more likely to behave according to those intentions, while those who shared inconsistently with their pre-existing intentions were less likely to behave according to those intentions. Subgroup analyses supported all of the findings from the interaction models, although there were several effects that were present only in the subgroup analyses.

Table 5.9 presents a summary of the results found in the moderation analyses (both via interaction analyses and subgroup analyses). Hypotheses were considered fully supported if all of the predicted effects were found at both the cross-sectional and lagged

level, across all subgroups (i.e., people with intentions and no intentions), and found to a greater extent in comparison to both reference groups (people who didn't share or shared in the opposite valence). Hypotheses were considered partially supported if 1) the predicted effects were only found at the cross-sectional level, 2) the predicted effects were only found in one subgroup, or 3) the predicted effects were only found in comparison to one reference group.

Table 5.9 Summary Table of Results for Moderation Analyses

	Amplified Effect of Intentions?				***Reduced Effect of Intentions?***			
	H3a: Consistent (Tobacco)		**H3b: Consistent (E-cigarettes)**		**H4a: Inconsistent (Tobacco)**		**H4b: Inconsistent (E-cigarettes)**	
	> No sharing	> Opposite valence	> No sharing	> Opposite valence	> No sharing	> Opposite valence	> No sharing	> Opposite valence
Interaction Analyses								
Intentions (cross-sectional)		✓	✓	✓		✓		✓
No intentions (cross-sectional)		✓	*		✓	✓	✓	
Intentions (lagged)								
No intentions (lagged)				✓			✓	✓
Subgroup Analyses								
Intentions (cross-sectional)	✓	✓	✓	✓	✓	✓		✓
No intentions (cross-sectional)		✓	*		✓	✓	✓	
Intentions (lagged)			✓					
No intentions (lagged)				✓			✓	✓
Hypothesis Supported?	Partially		No		Partially		Partially	

Note. > denotes whether sharing consistently or inconsistently had the expected effect (i.e., amplified or reduced likelihood of intentions becoming behavior), more so than either no sharing (which fully supports the hypothesis) or the opposite valence (which only partially supports the hypothesis).
Cells with a ✓ represent the effects that were found; * = There was an effect but in the opposite direction.
Hypotheses were considered fully supported if all of the predicted effects were found in comparison to both reference groups, at both the cross-sectional and lagged level, and across all subgroups. Hypotheses were considered partially supported if 1) the predicted effects were only found at the cross-sectional level, 2) the predicted effects were only found in comparison to one reference group, or 3) the predicted effects were only found in one subgroup.

There was one reverse finding at the cross-sectional level that is worth consideration: sharing consistently with pre-existing vaping intentions predicted a *reduced* likelihood of following through on those intentions compared to no sharing, only for those with no intentions to vape. In other words, non-intenders who shared *not positively* about e-cigarettes were more likely to use e-cigarettes compared to those who didn't share anything. A possible explanation for this effect may be in the way e-cigarette sharing was coded. The valence categories were non-positive vs. positive, such that non-positive was a combination of "negative" and "mixed" sharing, not only "negative." Thus, what participants reported as "mixed" may have actually been more positive than negative – not an unreasonable speculation, given that the means analysis in Figure 5.1 showed that "mixed" sharing was associated with higher intentions and use than "negative" sharing –, inducing people who shared "mixed" content about e-cigarettes to gain more favorable impressions of vaping. It could also be that because e-cigarettes are a more novel product than regular tobacco cigarettes, any sharing is considered a way to gain new information that informs their decision, even if that sharing is in a non-positive direction. This notion seems particularly sensible, considering that the direct effect of overall e-cigarette sharing on e-cigarette use was much larger than the direct effect of overall tobacco sharing on cigarette use (Table 5.4), albeit at the cross-sectional level. However, given that this reverse finding goes away at the lagged level, it could also be that it takes time for sharing to have any effects on actual behavior.

It is also interesting to note that only e-cigarette sharing had any lagged effects; neither consistent nor inconsistent tobacco sharing had any effects on actual behavior six months later. Again, this may due to the difference in the products themselves. Because

most people aren't as aware of the health effects or benefits of e-cigarettes as they are of the effects of regular tobacco cigarettes, it may be that sharing continuously provides people with a way of obtaining needed or desired information, and that an accumulation of these sharing effects appears in the form of behavior six months later. Alternatively, this contrast in results may be due to the fact that tobacco and e-cigarette sharing valence comprised differential groupings. While the final analyses for both tobacco and e-cigarette sharing were based on identically-labeled valence groups (i.e., consistency vs. inconsistency with prior intentions), the original valence categories that defined these groups differed between tobacco sharing (i.e., negative vs. non-negative) and e-cigarette sharing (i.e., positive vs. non-positive). Though the decision to use different valence groupings was based on sound statistical and conceptual reasoning, there is the possibility that this decision may have affected the contrasting effects of tobacco and e-cigarette-related sharing.

Still, despite the fact that the results of this study weren't consistent across all cross-sectional and lagged analyses, findings from this study seem to point to the possibility that sharing drives behavior, above and beyond intentions. As hypothesized, sharing consistently with one's intentions amplified the likelihood of behaving according to those intentions. Also hypothesized but particularly intriguing was the finding that those with no intentions to smoke or vape who shared pro-tobacco or pro-e-cigarette information were *more* likely to smoke or vape, and those with intentions to smoke or vape who shared anti-tobacco or anti-e-cigarette information were *less* likely to smoke or vape. A potential explanation for this finding stems from theories of cognitive dissonance, a state in which one's cognitions (e.g., beliefs, attitudes, intentions) or

behaviors are not aligned (Festinger, 1957). When one shares in a way that is discrepant with one's prior intentions, one may experience a state of dissonance as well as a surge of negative emotion (Kruglanski, 1996; Mandler, 1984). According to cognitive dissonance theory, the existence of dissonance will motivate the person to try to reduce that dissonance and achieve consonance, by changing one of the discrepant factors to match the other (Festinger, 1957; 1962). Given that sharing is a more public act compared to rather private intentions, it may be more likely for people to behave in a way that adheres to whatever they publicly shared – forcing intentions to be in line with what one has just shared – than for people to behave according to their prior intentions (and thus failing to save face).

The majority of this study characterized the different valences of sharing as being consistent or inconsistent with prior intentions and reviewed the results in terms of whether sharing predicted an amplified or reduced effect of intentions on behavior, and though there was an overall pattern in the findings, results weren't completely consistent across all analyses. Thus, the same results were examined from an alternative angle, i.e., examining the actual positive vs. negative nature of the sharing and whether that led to higher or lower likelihood of cigarette or e-cigarette use. As it turns out, in all instances in which people shared positively about smoking or vaping – regardless of prior intentions –, there was a higher likelihood of smoking and vaping compared to no sharing.

However, all of the instances in which people shared negatively about tobacco or about e-cigarettes did not lead to lower likelihoods of smoking or vaping compared to no

sharing, except for one: among those with intentions to smoke, negative sharing about smoking was associated with a lower likelihood of smoking at the cross-sectional level. Though the fact that all of the other instances didn't find significant differences between negative sharing and no sharing seems to portray negative sharing as insignificant, it is worth noting that in all of these cases, there were still significant differences between negative sharing and positive sharing, such that the former was associated with a lower likelihood of smoking or vaping. Thus, it is still meaningful to share anti-tobacco or anti-e-cigarette content in an effort to counter the significant effects of sharing pro-tobacco or pro-e-cigarette content.

Most importantly, those who have intentions to smoke and share negatively about tobacco may change their minds about smoking. This is a promising finding that, if able to be replicated in future studies, can have implications for future interventions. Campaigns that hope to prevent cigarette uptake or reduce smoking rates may consider messages that encourage youth to deliberately and actively share about smoking in negative ways, and equally important, *discourage* sharing in positive ways.

In conclusion, this study finds that people who share may be affected by what they share. Not only does the valence in which people share directly predict subsequent intentions and behavior, but it also moderates the effect that intentions have on future behavior such that sharing consistently with intentions predicts amplification of the effect of those intentions, and sharing inconsistently with intentions predicts a reduction in the effect of those intentions, suggesting that sharing, being a public act, has real consequences on actual behavior, above and beyond pre-existing intentions.

CHAPTER SIX

Summary and Discussion

Summary of Results

To date, the literature on interpersonal communication has been abundant, both in and out of the health domain. In particular, conversations have been shown to have both direct and indirect effects on smoking-related outcomes, by itself as well as in the context of mass media campaigns and content. More recently, with the advent of online technology and social media, studies have begun acknowledging alternate modes of interpersonal communication. However, until now, much of the literature has mostly treated online forms of person-to-person communication (that occur via email, instant message, or social media) as distinct from traditional forms of offline face-to-face or phone conversations. This dissertation acknowledges the need to consider a more holistic, all-encompassing concept of interpersonal communication that not only covers both offline and online forms of communication but also comprises both one-way sharing and two-way conversations.

This dissertation begins to explore *sharing* as such a concept, through three main research questions: 1) What predicts sharing about tobacco and about e-cigarettes? 2) What are the consequences of sharing about tobacco and about e-cigarettes? 3) How does sharing about tobacco or e-cigarettes affect the likelihood of pre-existing intentions being followed through into actual tobacco or e-cigarette-related behavior?

In order to examine these questions, the current dissertation launched three separate studies, the results of which provided multiple contributions to the present state of the literature. The first study proposed a new sharing measure and provided evidence for its reliability and validity, offering a measure that not only could be used in the remainder of the dissertation but also in future studies wishing to examine sharing in the context of tobacco and e-cigarette communication. The second study examined the overall nature of sharing, including the prevalence of sharing about tobacco and e-cigarettes among youth and young adults in the United States, potential determinants of tobacco-related and e-cigarette-related sharing, as well as predictors of differently valenced sharing about tobacco and e-cigarettes. The last study examined not only the direct effects of sharing on tobacco and e-cigarette-related outcomes, but also the contingent effects of sharing and pre-existing intentions on future behavior.

First, findings suggest that despite the advent of newer communication technologies, sharing (both about tobacco and e-cigarettes) among youth and young adults still mostly occurs offline via face-to-face or phone conversations. Furthermore, while most of the sharing about tobacco was unsurprisingly anti-tobacco, most of the sharing about e-cigarettes was a mix of anti- and pro-e-cigarette, reflecting the higher level of ambiguity and ambivalence surrounding e-cigarette information.

Second, key correlates of tobacco and e-cigarette sharing were found to be personal relevance (as measured by current use and intentions to use cigarettes or e-cigarettes) and exposure to relevant information (as measured by seeking and scanning, ad exposure, or use of general and social media). When it came to the valence in which

people share, while personal relevance and normative perceptions were distinct predictors, they also interacted in their effects on sharing such that descriptive normative perceptions undermined the influence of intentions in determining the direction in which one chose to share.

Third, the present research was able to show that people who shared may have been affected by what they shared. Those who shared consistently with their pre-existing intentions were *more* likely to behave consistently with those intentions compared to those who didn't share at all and/or those who shared inconsistently. Specifically, those with intentions to smoke or vape who shared consistently with those intentions were more likely to smoke (immediately) or vape (six months later), and those with no intentions to smoke or vape who shared consistently with those intentions were less likely to smoke (immediately) or vape (six months later). This supports the notion that sharing, when consistent with intentions, has the ability to amplify pre-existing intentions.

The other half of the findings provide a different perspective. Those who shared *inconsistently* with their pre-existing intentions were *less* likely to behave accordingly with those intentions. Those with no intentions to smoke or vape who shared inconsistently with those intentions were more likely to smoke (immediately) or vape (six months later), and those with intentions to smoke or vape who shared inconsistently with those intentions were less likely to smoke or vape (immediately). Although there is the caveat that these results weren't consistently present across all cross-sectional and lagged analyses, the overall findings point to the possibility that sharing drives behavior change.

Put together, these findings suggest that sharing is a public act, and that regardless of what actual intentions were, people are more likely to follow through on what they just shared with others. If the sharing is in line with pre-existing intentions, then the sharing represents a public commitment to those intentions, making it more likely people will act upon those intentions. If the sharing is different from actual intentions, people are more likely to try to adhere to what they just shared rather than their prior intentions. In line with the literature on public commitment, sharing affords people a way to internalize what they just shared and to bring one's self-concept closer to what they just shared (Tice et al., 1992). Going back to the theory of reasoned action, the theoretical framework in which this work is grounded, it seems feasible then to suggest that sharing may explain some of the variance unexplained by simple intention-behavior associations, and that sharing may improve the predictive power of intentions on future behavior.

Limitations and Areas of Future Research

This section of the chapter acknowledges and addresses the limitations of the present research, through which suggestions are made for future endeavors.

The survey instrument with which data was gathered was restricted by time and space, allowing for only a single measure of sharing (albeit for tobacco and e-cigarettes separately) and a single measure of sharing valence. Though the dissertation was successful in validating the newly proposed sharing measure, having multiple items that measured sharing in the survey instrument and being able to provide evidence for internal consistency among the different items would have helped make a stronger case for the measure's validity and reliability. The present validation study did attempt to alleviate

this issue by running a separate supplemental online survey on Amazon Mechanical Turk (MTurk), the purpose of which was to ask about additional items, all of which aimed to tap into sharing. Despite the fact that the sample of participants on MTurk isn't identical with the sample provided by Social Science Research Solutions, and that the MTurk study relied on a smaller number of participants, the supplemental survey was still able to fulfill the purpose of testing for internal consistency among a *set* of items measuring sharing and to further provide evidence for the reliability of the original sharing measure.

A second issue that is a function of the survey study design is the time lag between the original survey and the recontact survey. To be fair, this is less of a limitation and more so a point worth acknowledging. The time lag between the original survey and recontact survey used for the purposes of this dissertation was six months. It can be argued that six months is a long period of time, over which we can't really expect sharing to have persistent effects on intentions or behavior, especially given that some of the mechanisms through which sharing can potentially affect future intentions or behavior – such as knowledge gain or norm awareness – are fairly immediate. However, one of the main mechanisms on which the hypotheses driving Study 3 rely on actually calls for a longer period of time to unfold: in order for one to publicly commit to an intention, and then to internalize it and act upon that intention, there needs to be a fair amount of time. Furthermore, recontacting participants at a later time point allows us to test whether potential predictors at Time 1 lead to predicted outcomes at Time 2 and essentially test for the expected causal order between variables of interest. Additionally, the studies in this dissertation do not only test for lagged effects, but also for immediate effects via cross-sectional data. As was the case for many of the hypotheses tested in this

dissertation, if expected results are found at both the cross-sectional and lagged level (even despite such a stringent criterion), it can be said that there is very strong support for those hypotheses. Still, it may be worth considering shorter time intervals between original and recontact surveys in future research on effects of sharing, to be able to capture more immediate or short-term processes that may already have disappeared after six months.

Both of the aforementioned limitations are related to the survey instruments, but the limitation that is most inherent to using survey data is the fact that there is a need to rely on participants' self-reports. Self-reported data may be subject to a variety of recall biases, such as failure to accurately remember past behavior or deliberate misreporting in an effort to adhere to what participants believe are the desired responses (i.e., social desirability bias). Though efforts were made to ameliorate such biases including using measures with time-frame references (e.g., specifying sharing that occurred in the past 30 days) to lessen potential memory confusion, and using a separate online survey to help validate the main survey measure used, the potential for biased responses is a tradeoff for the ability to collect large-scale nationally representative data over time among a specific age group. However, it may be worth considering for future research to use in conjunction with surveys, alternative, more exogenous methods (such as examining actual sharing behavior on social media sites or actual conversations occurring in experimental online settings).

Given that the present research relied only on observational data, there were also limitations in terms of being able to completely counter all threats to validity. In an effort

to demonstrate the distinctiveness of the sharing construct, the validation study presented in Chapter 3 showed that sharing was not a proxy for attitudes or other information engagement behaviors, but there still remain potential alternative explanations that may explain the effects observed in the present research. For example, it is possible that sharing is actually an indication of the strength of prior intentions. People with strong intentions to quit smoking may be more likely to share negatively about tobacco than those with weak intentions, and it may be the intensity of those intentions that is driving behavior change, rather than the sharing itself. While the fact that there may be other explanations does not undermine the potential conclusions put forth here, future research may benefit by taking advantage of experimental methods, in which the effects of sharing behavior can be examined with less concern for spuriousness, and thus confirming the findings of the present research.

The current dissertation was unable to perform certain analyses due to limited sample sizes within the populations of interest. Due to sharing being an uncommon behavior in the first place, there were inabilities to examine specific instances of sharing, beyond different topics and different valences. The present inability to conduct these analyses makes for suggestions for future research directions: examining the differences between offline and online sharing (and potentially further broken down into specific platforms), and delving into the effects of different target audiences.

*Modality of sharing***.** Among those who share tobacco or e-cigarette information with others, people may differ in how they choose to share, given the multiple sharing platform options available and the nature of the information they're sharing. Given the

wide range of platforms through which people choose to share information, it may be worth investigating the motivations behind deciding to share on one or another.

For one, health information in general can be quite personal, especially for those who are quite invested in the topic (i.e., supposedly those who are also most likely to share information about that topic). On one hand, face-to-face and phone conversations assume, for the most part, that the two people involved in the exchange know each other, and may be considered venues through which one could share personal content in private: most likely to a close friend or family member. On the other hand, online platforms, which mostly rely on written communication, allow for less visibility if desired. Even if not completely anonymous, computer-mediated communication provides fewer "social context cues" such as non-verbal expressions and gestures (Sproul & Kiesler, 1986) and less sense of social presence (i.e., the feeling that other people are involved in the current interaction) (Short, Williams, & Christie, 1976), potentially making it a more ideal platform on which one can disclose personal health information. This may particularly be appealing for those who are concerned with what others think of them and wish to share on platforms that provide for anonymity.

Separately, reliance on online versus offline sharing could simply be a function of demographics, such that younger people may tend to share online compared to those who are older, given that the former are more accustomed to online communication, or that those who are more highly educated may tend to share online because of more access to (and therefore more familiarity with) online modes of communication. Given that the present research was unable to delve into this research question due to limitations in

sample size, future research may be able to explore some of these predictors of sharing modality.

*Targeted audience***.** As opposed to mass communication channels that broadcast information to a large, diverse audience (i.e., one-to-many communication), one-to-one interpersonal communication has always been acknowledged for being a more personal way of conveying information. Along with face-to-face and phone conversations, email and online instant messaging tools also allow people to share information to specific individuals (i.e., narrowcasting), depending on the information they want to share. Yet, with the advent of social media, people have now gained the ability to broadcast information, if they wish.

Studies have shown that the information people share may differ depending on their target audience, such that broadcasting led people to avoid sharing content that may undermine one's self-image, while narrowcasting led people to share content that was more useful for the recipient rather than self-enhancing content (Barasch & Berger, 2014). As such, it may be interesting for future research to examine people's sharing decisions in the context of their target audience, and whether sharing content or the motivations for sharing depend on who the target audience is.

Other areas for future research also derive from certain limitations of the current dissertation. For one, in order to fill the gap in the literature concerning sharing behavior in the health domain, this dissertation began examining sharing as an outcome and as a predictor specifically within the domains of tobacco and e-cigarettes. However, now that the current dissertation has provided a starting point for delving into the concept of

sharing, it may be worth examining the predictors and consequences of sharing in the context of other health behaviors as well. Keeping in mind that the current sharing measure was validated specifically in the context of tobacco and e-cigarette communication, the first step would be to validate a sharing measure in the context of another particular health topic or to develop a module that can be applied to a variety of health contexts. Extending this research to other health domains and finding similar results would increase the generalizability of the current findings.

The theory of reasoned action was the underlying theoretical framework in which sharing was hypothesized as being a part of. However, it was only examined in the context of current intentions and behavior, as well as future behavior. It would be useful for future research to be able to explore sharing in the context of other TRA constructs; for example, while Chapter 3 provides evidence for correlations between attitudes and sharing, it doesn't delve into causal pathways between them. Similarly, while Chapter 4 examines the effects of norms on sharing, as well as the interaction of norms and intentions on future behavior, the next step would be to examine attitudes, norms, intentions, and sharing all in one full model, and to place sharing within the full theoretical framework. Relatedly, it would be interesting to explore specific mechanisms that can provide concrete potential explanations as to how sharing affects future behavior.

Conclusion

By putting forth and validating a measure of sharing that fits the needs of the current state of the literature, exploring the determinants of sharing in the context of tobacco and e-cigarettes, examining the consequences of sharing on tobacco and e-

cigarette-related outcomes, and further delving into the contingent effects of sharing and intentions on future behavior, the current dissertation provides a starting point for future research on the concept of sharing, particularly in the domain of tobacco and e-cigarettes. However, while this dissertation research was able to provide first steps, there is much more that needs to be done, in order to fully grasp the role of sharing in the context of not only tobacco and e-cigarette behaviors, but within the overall framework of health communication and behavior change.

Appendix A
Breakdown of Attitudes Scales

Tobacco Attitudes Scale

Item wording	Item-rest Correlations	Cronbach's α
If I smoke every day, I will develop headaches	0.5566	
If I smoke every day, I will develop sexual and/or fertility problems	0.5364	
If I smoke every day, I will develop cancer	0.5858	
If I smoke every day, I will get wrinkles	0.5881	
If I smoke every day, I will lose my teeth	0.5952	
If I smoke every day, I will get yellow fingers	0.5373	
If I smoke every day, I will become addicted to nicotine	0.5367	
If I smoke every day, I will be controlled by smoking	0.5898	
If I smoke every day, I will look uncool	0.3952	
If I smoke every day, It will be a turn off to other people	0.5293	
*If I smoke every day, I will feel relaxed**	0.3395	
*If I smoke every day, I will enjoy life more**	0.3748	
If I smoke every day, I will breathe in thousands of chemicals	0.5563	
The tobacco industry intentionally designed cigarettes to make them more addictive	0.3634	
How much do you think breathing smoke from other people's cigarettes harms you? (Not at all, a little, somewhat, or a lot)	0.2712	
Scale		**0.8551**

Note. Response options for each item were [strongly disagree, disagree, agree, strongly agree] unless otherwise stated.
*reverse-coded

E-cigarette Attitudes Scale

Item wording	Item-rest Correlations	Cronbach's α
If I vape or use e-cigarettes it will be less harmful to me than if I smoke tobacco cigarettes *	0.5366	
If I vape or use e-cigarettes every day, I will become addicted to nicotine	0.5211	
Vaping or using e-cigarettes can help people quit smoking tobacco cigarettes *	0.4636	
How much do you think that breathing vapor from other people's e-cigarettes or vape pens harms you? (Not at all, a little, somewhat, or a lot)	0.5607	
If I vape or use e-cigarettes every day, I will develop headaches	0.6868	
If I vape or use e-cigarettes every day, I will develop cancer	0.6909	
If I vape or use e-cigarettes every day, I will get wrinkles	0.7173	
If I vape or use e-cigarettes every day, I will lose my teeth	0.7272	
If I vape or use e-cigarettes every day, I will be controlled by vaping	0.6660	
If I vape or use e-cigarettes every day, I will look uncool	0.5045	
If I vape or use e-cigarettes every day, I will feel relaxed *	0.5056	
If I vape or use e-cigarettes every day, I will enjoy life more *	0.4350	
If I vape or use e-cigarettes every day, I will enjoy the taste *	0.5164	
Scale		**0.8887**

Note. Response options for each item were [strongly disagree, disagree, agree, strongly agree] unless otherwise stated.
*reverse-coded

APPENDIX B

Key Survey Measures (from the SSRS Phone Survey)

Behavior

(Ask all)

Have you ever tried smoking cigarettes, even one or two puffs?

1 Yes
2 No

(Ask those who ever tried smoking cigarettes)

During the past 30 days, on how many days did you smoke cigarettes?

_____ (ENTER NUMBER FROM 1-30)

(Ask all)

Have you ever tried vaping or using e-cigarettes, even one or two puffs?

1 Yes
2 No

(Ask those who have ever tried e-cigarettes)

During the past 30 days, on how many days did you vape or use e-cigarettes?

_____ (ENTER NUMBER FROM 1-30)

Intentions

(Ask current smokers)

How likely is it that you will try to quit smoking completely in the next 6 months? By completely, I mean not smoking tobacco cigarettes at all. Would you say definitely will not, probably will not, probably will, or definitely will?

1 Definitely will not
2 Probably will not

3 Probably will

4 Definitely will

(Ask non-smokers)

How likely is it that you will smoke a tobacco cigarette, even one or two puffs, at any time in the next 6 months? Would you say definitely will not, probably will not, probably will, or definitely will?

1 Definitely will not

2 Probably will not

3 Probably will

4 Definitely will

(*Ask all*)

How likely is it that you will vape or use an e-cigarette, even one or two puffs, at any time in the next 6 months?

1 Definitely will not

2 Probably will not

3 Probably will

4 Definitely will

Sharing

(Ask all)

The next questions are about whether you personally shared information with others. In the past 30 days did you share information about cigarettes or tobacco (INSERT ITEM) How about (INSERT NEXT ITEM)?

1 Yes

2 No

Via email or social media?

In a conversation in-person or on the phone?

(*Ask if shared information about cigarettes*)

Think about the information you've shared with others in the past 30 days about cigarettes or other tobacco products. Was it mostly positive about using tobacco, mostly negative or a mix of positive and negative?

1 Mostly positive
2 Mostly negative
3 A mix of positive and negative

(Ask all)

The next questions are about whether you personally shared information with others. In the past 30 days did you share information about vaping or e-cigarettes (INSERT ITEM)? How about (INSERT NEXT ITEM)?

1 Yes
2 No

Via email or social media?

In a conversation in-person or on the phone?

(Ask if shared information about vaping)

Think about the information you've shared with others in the past 30 days about vaping or e-cigarettes. Was it mostly positive about vaping or using e-cigarettes, mostly negative, or a mix of positive and negative?

1 Mostly positive
2 Mostly negative
3 A mix of positive and negative

Exposure to Information

Seeking & Scanning

Some people are actively looking for information about cigarettes or other tobacco products while other people just happen to hear or come across such information. Some people don't come across information about cigarettes or tobacco at all.

(Ask all)

Thinking about the past 30 days, did you actively look for information about cigarettes or other tobacco products, yes or no?

1 Yes
2 No

In the past 30 days, did you come across information about cigarettes or tobacco online, in the media, or from other people even when you were not actively looking for it?

1 Yes
2 No

Thinking about the past 30 days, did you actively look for information about vaping or using e-cigarettes, yes or no?

1 Yes
2 No

In the past 30 days, did you come across information about vaping or using e-cigarettes online, in the media, or from other people even when you were not actively looking for it?

1 Yes
2 No

Ad Exposure

(Ask all)

The next questions are about advertisements you might have seen -- whether on TV, radio, on the internet, in stores, or anywhere else. About how many times in the past 30 days have you seen or heard each of the following?

Ads promoting cigarettes or other tobacco products?

_____ (ENTER NUMBER FROM 1-100)

Ads promoting e-cigarettes or vape pens?

_____ (ENTER NUMBER FROM 1-100)

General Media Use

(Ask all)

In the past 7 days, on how many days did you use (INSERT ITEM)?

_____ (ENTER NUMBER FROM 1-7)

a. Facebook
b. Twitter
c. Tumblr
d. Instagram
e. YouTube
f. Instant message, text message, or video chat
g. The Internet for anything else

In the past 7 days, on how many days did you (INSERT ITEM)?

_____ (ENTER NUMBER FROM 1-7)

a. Read newspapers either online or on paper
b. Read magazines either online or on paper
c. Watch movies either at home, online or in a theater

On an average weekday, how many hours do you watch TV either online or on a TV set?

_____ (ENTER NUMBER FROM 1-24)

How many hours do you watch TV on an average weekend –that is Saturday and Sunday combined, either online or on a TV set?

_____ (ENTER NUMBER FROM 01-48)

Norms

(*Ask all*)

How do you think your close friends feel or would feel about you smoking cigarettes every day? Would they strongly disapprove, disapprove, approve, or strongly approve?

1 Strongly disapprove
2 Disapprove
3 Approve
4 Strongly approve

How many of your four closest friends smoke cigarettes? None, one, two, three or four?

N None
1 One
2 Two
3 Three
4 Four

How many people your age would you guess smoke cigarettes? Would you say none, a few, about half, most?

1 None
2 A few
3 About half
4 Most

How do you think your closest friends feel or would feel about you vaping or using e-cigarettes every day? Would they strongly disapprove, disapprove, approve, or strongly approve?

1 Strongly disapprove
2 Disapprove
3 Approve
4 Strongly approve

How many of your four closest friends vape or use e-cigarettes? None, one, two, three or four?

N None
1 One
2 Two
3 Three
4 Four

How many people your age would you guess vape or use e-cigarettes? Would you say none, a few, about half, most?

1 None
2 A few
3 About half
4 Most

Demographics

(Ask all)

Age

Could you please tell me how old you are? _____ (ENTER NUMBER FROM 13-25)

Sex

Are you male or female?

1 Male
2 Female

Race

Do you consider yourself to be Hispanic or Latino?

1 Yes
2 No

What race or races do you consider yourself to be? Please select one or more of the follow categories.

1 White
2 Black or African American
3 Asian
4 American Indian or /Alaska Native (DO NOT READ: Native American)
5 Native Hawaiian or Other Pacific Islander
6 Other

Education

At any time in the last 3 months, did you attend school or college?

1 Yes
2 No

(Ask if attended in the past 3 months)

What grade or level did you attend?

6 6th grade

7 7th grade

8 8th grade

9 9th grade

10 10th grade

11 11th grade

12 12th grade

13 First year of college (freshman)

14 Second year of college (sophomore)

15 Third year of college (junior)

16 Fourth year of college (senior)

17 In a graduate program (for example: MA or PhD program, or business (MBA), medical (MD), or law (JD) school)

(Ask if didn't attend in the past 3 months)

What is the highest degree or level of schooling you have COMPLETED?

1 Less than high school degree (0-11th grade)

2 High school degree (finished 12th grade, High school diploma or GED)

3 Some college (1-3 years, Associate's degree)

4 College degree or more (Bachelor's degree) or some graduate or professional school after college (for example: for MA or PhD, business (MBA), medical (MD), or law (JD), etc))

Employment

Do you currently have a full time or a part-time job for pay?

1 Full-time job (35 hours or more)

2 Part time job (less than 35 hours/week)

3 Full time and part-time job

4 No job

5 Currently looking for a job

Parental Education

What is the highest degree or level of schooling completed by your parent or guardian who had the most education?

1 Less than high school degree (0-11th grade)

2 High school degree (completed 12th grade, High school diploma or GED)

3 Some college (1-3 years, Associate's degree)

4 College degree (Bachelor's degree)

5 Completed graduate or professional school after college (for example: MA or PhD, business (MBA), medical (MD), or law (JD), etc.)

Other Confounders

(Ask all)

Do you live by yourself?

1 Yes

2 No

(Ask if doesn't live alone)

Does anyone who lives with you now (INSERT ITEM)? How about (INSERT NEXT ITEM)?

1 Yes
2 No

a. Smoke cigarettes
b. Vape or use e-cigarettes

(Ask all)

Is vaping or using e-cigarettes allowed inside your home?

1 Yes
2 No

Appendix C

Breakdown of Sample Sizes + Means Analyses (for Study 3)

Table 5.10 Means and Sample Sizes of Cigarette Use Variables by Level of Intention and Sharing Valence Category

	No Intentions		**Intentions**	
Cigarette Use (T1)	***n***	**M (SE)**	***n***	**M (SE)**
No sharing	5149	.068 (.005)	414	.699 (.026)
Negative	646	.103 (.014)	53	.516 (.078)
Non-negative	346	.297 (.028)	132	.772 (.037)
Cigarette Use (T2)	***n***	**M (SE)**	***n***	**M (SE)**
No sharing	1238	.061 (.012)	67	.693 (.064)
Negative	143	.132 (.043)	6	.500 (.265)
Non-negative	63	.239 (.070)	20	.690 (.112)

Note. *n* = sample size; M = mean, SE = standard error

Table 5.11 Means and Sample Sizes of E-cigarette Use Variables by Level of Intention and Sharing Valence Category

	No Intentions		**Intentions**	
E-cigarette Use (T1)	***n***	**M (SE)**	***n***	**M (SE)**
No sharing	5623	.037 (.003)	494	.553 (.026)
Negative	214	.079 (.023)	16	.573 (.133)
Mix	229	.170 (.030)	98	.658 (.054)
Positive	85	.167 (.044)	124	.849 (.035)
E-cigarette Use (T2)	***n***	**M (SE)**	***n***	**M (SE)**
No sharing	1334	.059 (.010)	80	.429 (.064)
Negative	0	--	2	--
Mix	58	.082 (.039)	16	.604 (.164)
Positive	19	.345 (.129)	27	.766 (.095)

Note. *n* = sample size; M = mean, SE = standard error

Table 5.12 Means and Sample Sizes of E-cigarette Use Variables by Level of Intention and Sharing Valence Category (Modified Categories)

	No Intentions		**Intentions**	
E-cigarette Use (T1)	***n***	**M (SE)**	***n***	**M (SE)**
No sharing	5623	.037 (.003)	494	.553 (.026)
Non-positive	443	.126 (.019)	114	.641 (.050)
Positive	85	.167 (.044)	124	.849 (.035)
E-cigarette Use (T2)	***n***	**M (SE)**	***n***	**M (SE)**
No sharing	1334	.059 (.010)	80	.429 (.064)
Non-positive	105	.049 (.023)	18	.670 (.141)
Positive	19	.345 (.129)	27	.766 (.095)

Note. *n* = sample size; M = mean, SE = standard error

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