Sharing tobacco and e-cigarette information: Predicting its occurrence and valence among youth and young adults

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Abstract

While interpersonal communication has been shown to influence smoking-related outcomes, mostly in the context of interventions, there is not much research showing what drives young people to talk about tobacco or e-cigarettes. Additionally, the changing media environment calls for research that expands the scope of what is included as interpersonal communication to include not just conversations but also online forms of communicating information. This study puts forth sharing as such a concept, and examines its prevalence and predictors in the context of tobacco and e-cigarette information. Using a nationally-representative rolling cross-sectional ($N = 9,115$) and re-contact ($N = 2,413$) survey of 13–25 year olds, this study found that most young people shared negatively about tobacco (56% of 1,514 tobacco sharers at Time 1) and mixed information about e-cigarettes (41% of 968 e-cigarette sharers). Sharing occurrence was predicted by topical relevance and recent exposure to information, while pro-tobacco and pro-e-cigarette sharing (compared to no sharing) was predicted by relevance, and descriptive and injunctive norms. Significant moderation analyses showed that perceived norms undermined the effect of relevance on the valence in which one shared about tobacco and e-cigarettes. These findings provide a foundation upon which to build subsequent research on the impact of sharing, which could help inform future tobacco and e-cigarette control efforts.

Keywords

sharing; health information; tobacco; e-cigarette; interpersonal communication

Over the years, there has been much research investigating the role of interpersonal communication in bringing about desired health outcomes. Conversations can bring about a sense of social support that can encourage health promoting behaviors, facilitate satisfactory patient-provider interactions, and complement or substitute for information delivered via mass media messages (e.g., Duggan & Thompson, 2014; Morton & Duck, 2001; Southwell & Yzer, 2007). In particular, a number of studies have successfully shown that smoking-related conversations have the potential to encourage quitting intentions or behavior (e.g.,

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Brennan, Durkin, Wakefield, & Kashima, 2016a; Jeong, Tan, Brennan, Gibson, & Hornik, 2015; Thrasher et al., 2016). However, there is still a substantial gap in the literature with regard to several aspects of this area of research.

Addressing Gaps in the Literature

Research scope

The first gap concerns the scope of the research. As noted above, there have been many studies showing the potential for interpersonal communication to help bring about desired smoking outcomes; however, there is a lack of parallel research regarding e-cigarettes. This may be due to the fact that most of the existing studies have specifically examined talk that occurred in the context of anti-smoking messages and interventions (i.e., campaign-generated conversations or dialogue sparked by health warnings) and there has yet to be a mass media campaign or intervention fully devoted to preventing or reducing e-cigarette use. This leads to the two areas in which there is need to broaden the scope of the research: 1) talk beyond intervention-generated conversations and 2) talk about e-cigarettes.

Other forms of talk—There is need to examine talk that occurs more generally, not necessarily as a result of exposure to mass media campaign messages or pictorial health warnings. Going one step further, there is also the need to begin investigating other forms of "talk" beyond face-to-face conversations. Until now, studies of interpersonal communication have mostly focused on "conversations" that allow for lengthy verbal exchange. However, there is an ever-growing number of options in which people can communication to or with one another, including email, instant messaging, and social media platforms – all of which have been shown to be particularly prevalent among youth and young adults (Lenhart, 2015). Communicating on these online platforms does not necessarily lead to fully developed interpersonal conversations; sometimes, the moment ends with a person having shared information to other(s) with no feedback received. Labeling a moment in which one decides to post information on a social media site for no one person in particular and with no expectation of any reciprocal behavior from anybody as "interpersonal communication" is not only imprecise but also quite limiting. Thus, in an effort to broaden the scope of what used to be called "interpersonal communication," this study proposes the use of the word "sharing" as a more inclusive concept of one-way and two-way forms of person-to-person(s) communication that can occur face-to-face or through mediated platforms.

E-cigarette communication—There is also the need to begin examining people's sharing behavior with regard to e-cigarette-related information. While some may argue that the lessons learned from tobacco communication research may be easily applied to e-cigarette communication, e-cigarettes are quite different from combustible cigarettes in terms of both knowledge and societal norms. E-cigarettes are still surrounded by a large amount of ambiguity with regards to their negative consequences and, partly as a function of that ambiguity, there is much more ambivalence among the public when it comes to e-cigarette use. Thus, there may be differences in the frequency of sharing and the way in which people share about e-cigarettes and tobacco.

Predictors of talk

The second gap arises out of the surprising reality that compared to the numerous studies examining the effects of conversing about smoking, there is a severe scarcity of studies examining the predictors of such conversations: what induces people to talk about tobacco use in the first place? There are studies that have examined the determinants of social interactions and word-of-mouth more generally (Berger, 2014) and most recently, Brennan and colleagues advanced the dialogue within tobacco research by examining specific intrapersonal and social factors that determined the occurrence and content of anti-smoking campaign-generated conversations (Brennan, Durkin, Wakefield, & Kashima, 2016b). However, there is still a need for examining the predictors of sharing, both about tobacco (outside of the context of campaigns) and about e-cigarettes, in a way that is inclusive of both talking and having conversations, as well as sharing information to others online.

Thus, this study attempts to build upon the existing line of research and fill these gaps in the literature by 1) expanding the range of behaviors underlying the notion of "interpersonal communication" (i.e., sharing) and exploring how prevalent sharing behavior is among youth and young adults, 2) identifying what factors drive sharing behavior, and 3) examining these questions in the context of both tobacco and e-cigarettes.

The Current Study

Prevalence of sharing

The first step was to establish the prevalence of sharing behavior among youth and young adults (Research Question [RQ] 1a). Subsequently, as described in detail later, it was of interest to the study to examine the different valences in which people shared: did young people share negative, positive, or mixed information about tobacco and e-cigarettes (RQ1b)?

Predictors of sharing

The second step was to explore potential predictors of sharing behavior with regard to tobacco and e-cigarette information. As mentioned above, little is known about the predictors of talking about smoking, let alone sharing. One recent study by Brennan and colleagues examined the factors driving smoking-related conversations, but specifically in the context of anti-smoking messages and campaign-generated talk (Brennan et al., 2016b). Another study by Emery and colleagues examined correlates of people's engagement with e-cigarette-related information, including the sharing of information (Emery, Vera, Huang, & Szczypka, 2014); but while this study was a good first foray into this area of research in the context of e-cigarettes, their analyses were limited to cross-sectional data, not allowing for assumptions about causal effects. Thus, the present study aimed to examine what factors predicted sharing information about tobacco and e-cigarettes among young people (RQ2). What follows is an explanation of the different classes of intrapersonal and social factors that were explored.

Demographics—The first class of predictors was demographics. As one of the only studies that also examined sharing behavior in the context of e-cigarette information, Emery

and colleagues (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. The present study examined similar demographic variables as potential factors associated with tobacco-related and e-cigarette-related sharing (RQ3).

Topical relevance—The second class of predictors was perceived topical relevance. Research has consistently shown that people are likely to invest more effort into talking about information that they deem relevant to themselves (Hwang & Southwell, 2007; 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 most frequently thought about and therefore, most salient (Leippe & Elkin, 1987; Southwell, 2005). Accordingly, those who share information about tobacco and e-cigarettes are likely to be those who perceive tobacco and e-cigarettes as part of their identity: current users, or those who have intentions to use tobacco or e-cigarettes. In line with this conjecture, studies have shown that smokers intending to quit smoking were more likely to talk about quitting (van den Putte, Yzer, Southwell, de Bruijn, & Willemsen, 2011) and 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 people were more likely to share tobacco-related or e-cigarette-related information if they either had corresponding intentions (Hypothesis [H]1) or engaged in corresponding behaviors (H2), compared to those who do not have such intentions or behaviors.

Information exposure—The third class of predictors examined was exposure to relevant content. 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). Berger & Iyengar (2013) showed that easily accessible topics were more likely to be talked about or shared especially when people were engaging in verbal conversations. Other studies have shown that recent exposure may be associated with talking about or sharing that content. In one study, 36% of participants had a conversation about an anti-smoking ad in the first couple of days following message exposure (Brennan et al., 2016) while in another study, 97% of participants reporting talking about pictorial anti-smoking warnings after seeing them (Hall et al., 2015). Similarly, Emery and colleagues (2014) found that 16% of those who searched for e-cigarette information also shared about it. These studies, however, do not allow for conclusions to be made about whether those who are exposed to relevant content are more likely to share about such content compared to those who aren't exposed. Therefore, this study hypothesizes and tests whether sharing about tobacco or e-cigarettes is predicted by exposure to corresponding information (as a result of deliberative seeking and/or involuntary scanning (H3) and by exposure to tobacco or e-cigarette ads (H4). Additionally, this study examines the association between sharing and use of general media

(H5) and social media (H6), recognizing that media usage could serve as a proxy for opportunities to be exposed to relevant information.

Predictors of valenced sharing

When people share content, it is possible that the information is completely neutral (such as when the information comprises facts), but it is quite likely that the information is infused with the sharer's opinion. In addition to examining the occurrence of sharing behavior, examining the valence of the shared information (i.e., the degree of attraction or aversion to the topic at hand) allows for more accurate predictions regarding the consequences of this sharing. Accordingly, studies have shown that perceived conversational valence plays a role in influencing a variety of health-related attitudes and intentions (e.g., Dunlop, Kashima, & Wakefield, 2010; Hendriks, van den Putte, & de Bruijn, 2015). However, there has been a lack of research examining the antecedents to sharing information in particular directions. Thus, the present study examined what factors predicted sharing about tobacco and e-cigarettes in a negative, positive, or mixed direction (RQ4). Valence of sharing was projected to be, in part, a function of two factors: topical relevance and perceived norms.

Topical relevance—As previously outlined, people are likely to talk about topics related to them. Extending this notion 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 negatively about it (Berger, 2014) in an effort to maintain a positive self-image (Leary & Kowalski, 1990). Thus, this study hypothesized that people were more likely to share positive tobacco-related or e-cigarette-related information if they either had corresponding intentions (H7) or engaged in corresponding behaviors (H8), compared to those who do not have such intentions or behaviors.

Perceived norms—Perception of social norms has long been acknowledged to be influential on people's behaviors, including self-presentation (Cialdini, Kallgren, & Reno, 1991), and may also affect how people share information. Social norms have been found to be particularly influential among adolescents and youth with regard to a range of health-related behaviors, including cigarette use (Staten et al., 2007); unsurprisingly, however, there is a lack of studies that have examined the effect of social norms with regard to e-cigarette use (Noland et al., 2016). Normative influences can manifest in two ways: in the form of descriptive norms (i.e., perceptions of how prevalent or typical the behavior is among others) or injunctive norms (i.e., perceptions of the level of approval or disapproval surrounding a behavior) (Cialdini et al., 1991). The present study acknowledged the potential for both descriptive and injunctive norms to affect sharing behavior and posed the following hypotheses: young people were more likely to share positive tobacco-related or e-cigarette-related information if they perceived the corresponding behavior to be highly prevalent among their friends and peers (H9) and if they perceived that their friends approved of the corresponding behavior (H10).

Interaction between relevance and norms—While topical relevance and normative perceptions are hypothesized to be individual predictors of sharing valence, it is also possible that they also interact. Specifically, the influence of topical relevance may be

undermined by what one perceives to be the norms surrounding a topic. In an effort to be seen as adhering to the majority norm, some people may 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-tobacco, one may be more likely to share pro-tobacco information regardless of what their current tobacco intentions are, and regardless of what they actually believe. Thus, this study put forth the following moderation hypotheses: the effect of current intentions on the valence of sharing about tobacco and e-cigarettes (as posed in H7) will be reduced with increased perceptions of high prevalence of the corresponding behavior (H11) and friends' approval of the corresponding behavior (H12).

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-related attitudes and behaviors as a result of exposure to tobacco-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=21%). The re-contact survey was intended to be administered to half of the original respondents six months later; SSRS was successfully able to re-interview a little less than half of the original sample (response rate=34%). At the time of these analyses, the study had acquired 119 weeks of cross-sectional data ($N = 9,115$) and 93 weeks of re-contact data ($N = 2,413$).

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. These measures were validated in a study elsewhere (Jeong, 2016).

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 any positive sharing of tobacco-related information. The decision was to made to collapse the "positive" and the "mix of positive and negative" categories into a "positive or mixed" category that was not only more comparable with the "negative" category in terms of sample size but also provided more statistical power to detect effects. The original categories were kept for e-cigarette-related sharing.

Cigarette and e-cigarette use—Current cigarette use 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 (nonsmoker) and 1 (smoker). Current e-cigarette use was measured the same way, but about vaping or using e-cigarettes.

Cigarette and e-cigarette intentions—Smoking intentions and vaping intentions were measured slightly differently. Intention to smoke was measured in two parts: intentions to quit smoking completely in the next 6 months were asked of current smokers, and intentions to smoke cigarettes, even one or two puffs, at any time in the next 6 months were asked of non-smokers (1- "definitely will not" to 4- "definitely will"). On the other hand, vaping 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- "definitely will not to 4- "definitely will") and was asked of everyone regardless of past smoking/vaping status. In order to make the cigarette 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 for both cigarettes and e-cigarettes were recoded into binary measures: 0 (no intentions) and 1 (yes intentions).

Exposure to information—Exposure to tobacco information was a combined measure of seeking (whether one actively looked for information about cigarettes/tobacco products) and scanning (whether one came across information about cigarettes/tobacco online, in the media, or from other people even when not actively looking for it) in the past 30 days. Exposure to tobacco ads asked how many times in the past 30 days one had seen ads promoting cigarettes or other tobacco products, as well as various anti-smoking ads, on TV, radio, on the internet, in stores, or anywhere else. Measures of use of individual media platforms were combined (according to whether platforms were general media or social media), to create separate composite measures of general media use and social media use, 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.

Injunctive and descriptive norms—Tobacco-related perceived injunctive norms measured how one's closest friends would feel about one's smoking (1- "strongly disapprove" to 4- "strongly approve"); due to the distribution of the measure, the decision was made to dichotomize it (0- "approve", 1- "disapprove"). Tobacco-related perceived descriptive norms was a composite measure that combined measures of how many of one's closest friends smoked and how many peers were perceived to smoke, which was then

recoded into perceptions of low, middle, or high prevalence. E-cigarette counterparts were also created.

Demographics—The demographic variables being examined as correlates of sharing were as follows: age (13–17/18–25), sex (male/female), race (white, black, Hispanic, and other/ more than one race), and education (less than high school, high school degree, some college, and more than a college degree).

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 sharing behavior measured at Time 1.

Analytical Procedure

When examining 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 further provide evidence for the independent variables being actual predictors of sharing, rather than mere covariates, lagged analyses were performed, examining the effect of each predictor (at Time 1) on each outcome (at Time 2), again controlling for confounders as well as the corresponding outcome measured at Time 1. When examining different demographic variables as correlates of sharing, chi-square tests of independence were used to examine the overall relation between each potential demographic variable and each outcome; 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, multinomial logistic regressions were performed to examine the effect of each predictor variable on positive/mixed 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 intentions and sharing valence. Analyses were run at both the cross-sectional and lagged level.

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. Tests were run on Stata 14.0 (StataCorp, 2015); missing data was minimal and were listwise deleted.

Results

Among the cross-sectional sample ($N = 9,115$), the average age of the study participants was about 19 years, 48% was female, 51% was white, and 42% had less than a high school degree; 12% reported being current cigarette smokers and 10% reported being current e-cigarette users.

At Time 1, more people shared offline (19% and 12% for tobacco and e-cigarette information, respectively) than online (about 4% and 3% for tobacco and e-cigarette information, respectively); similar rates were reported at follow-up. Among those who shared about tobacco, the majority (56%) shared negatively, while 10% shared positively and 34% shared both negatively and positively. Among those who shared about e-cigarettes, the majority (41%) shared a mix of negative and positive information, while 30% shared negatively and 29% shared positively about e-cigarettes.

Predictors of Sharing

Demographics—Cross-sectional associations between different demographic variables and tobacco and e-cigarette-sharing at Time 1 showed that 18–25 year olds were more likely to share about tobacco (OR = 1.54, 95% CI [1.36, 1.75]) and about e-cigarettes (OR = 1.35, 95% CI [1.16, 1.56]) than 13–17 year olds; similarly, those with at least a high school degree were more likely to share about tobacco and e-cigarettes than those with less than a high school degree. Blacks were less likely to share about e-cigarettes than whites (OR = 0.64, 95% CI [0.51, 0.81]), and females were marginally less likely to share about e-cigarettes than males (OR = 0.88, 95% CI [0.76, 1.02]); race and sex had no associations with sharing about tobacco.

Behavior and intentions—At the cross-sectional level, those intending to use and currently using cigarettes were significantly more likely to share about tobacco, and those intending to use and currently using e-cigarettes were significantly more likely to share about e-cigarettes, compared to non-users and those with no intentions (Table 1). Lagged analyses showed that while these associations did not hold true for tobacco sharing, e-cigarette intentions at Time 1 significantly predicted e-cigarette sharing at follow-up (with e-cigarette use marginally predicting e-cigarette sharing at follow-up).

Exposure—At the cross-sectional level, both exposure to tobacco information and exposure to tobacco ads were significantly associated with sharing about tobacco, and both exposure to e-cigarette information and exposure to e-cigarette ads were significantly associated with sharing about e-cigarettes, compared to no exposure (Table 1). Lagged analyses showed that both exposure to e-cigarette information and to ads continued to predict e-cigarette sharing six months later. Exposure to tobacco information also predicted later tobacco-related sharing, but exposure to tobacco ads no longer did. 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.

Predictors of Valenced Sharing

Tobacco-related sharing—In examining the antecedents to sharing about tobacco in different valences, results showed that as expected, smoking intentions and behavior were significantly associated with sharing positive/mixed tobacco content compared to no sharing. Perceiving that friends disapproved of one's smoking was associated with a lower likelihood of positive/mixed sharing. Descriptive norms had a significant positive association with sharing, such that those who perceived smoking to be more prevalent among their friends and peers were more likely to share in any direction (i.e., both negative and positive/mixed) compared to not sharing at all, but also more likely to share positive/mixed tobacco information than negative information (Table 2). At the lagged level, perceived descriptive norms predicted future sharing, such that perceptions of higher smoking prevalence among friends predicted an increased likelihood of negative sharing at follow-up.

Upon conducting moderation analyses, an omnibus test showed that there was a significant interaction between perceived descriptive norms and intentions (Wald $F(4, 7718) = 5.59$, $p < .001$). Specifically, high levels of descriptive normative perceptions were associated with a reduced effect of relevance on sharing valence, such that those with no intentions to smoke were just as likely to share about tobacco in a positive/mixed way as those with intentions, when they perceived smoking to be highly prevalent among their friends and peers. This moderation effect was not significant at the lagged level.

There was also a significant interaction between perceived injunctive norms and intentions (Wald $F(2, 7616) = 8.21$, $p < .01$). Specifically, injunctive norms were associated with a reduced effect of intentions on sharing valence such that non-intenders were just as likely to share about tobacco in a positive/mixed way as intenders only when they perceived that their friends would approve of their smoking. This moderation effect was only marginally significant at the lagged level.

E-cigarette-related 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; intenders were also significantly more likely to share positive information than not share six months later. Furthermore, perceiving that friends disapproved of one's e-cigarette use predicted a lower likelihood of sharing about e-cigarettes in a positive or mixed way compared to not sharing, both at the cross-sectional and lagged level (Table 2). Descriptive norms 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 information compared to sharing negative information or not sharing at all, both at the cross-sectional and lagged level.

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 $F(6, 7847) = 1.83$, $p = .089$). Specifically, perceptions that e-cigarette use was highly prevalent among friends and peers was associated with a reduced effect of intentions on negative and mixed sharing at the cross-sectional level. The omnibus test failed to show significance at the lagged level.

There was a significant interaction between e-cigarette intentions and injunctive norms (Wald $F(3, 7693) = 3.91$, $p < .01$), such that those with no intentions to vape were just as likely to share about e-cigarettes in a mixed direction as intenders when they perceived their friends to approve of their vaping behavior. This moderation effect was not significant at the lagged level.

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 not a 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, ambiguity concerning the benefits versus consequences of vaping still exist, as well as societal ambivalence concerning approval or disapproval of e-cigarette use. These differences seem to be reflected in the contrasting results regarding the direction in which people choose to share about tobacco and e-cigarettes.

Predictors of Sharing

Topical relevance: 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, topical relevance had strong associations with sharing behavior, both as measured by current use or intentions to use cigarettes or e-cigarettes. Specifically, there was a tendency for users and intenders to share in a direction that supported their current behavior or intentions. These results are in line with findings from previous studies that show people are generally more likely to talk about personally relevant issues (Hwang & Southwell, 2007) and show they also hold true in the context of tobacco and e-cigarette communication. Furthermore, 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 smoking and its effects, those who intend to smoke or are smokers may not feel the need to continually share about tobacco use.

Exposure to information: Also as predicted, having seen or heard relevant content was associated with sharing about it. These findings support 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 (Iyengar & Kinder, 1987). Relatedly, exposure to relevant content in the media or elsewhere may affect people's perceived understanding and relevance of the content, raising both their confidence and willingness to share about it

(Hwang & Southwell, 2009; Southwell & Torres, 2006). As an alternative explanation, it could be argued that sharing about something increases one's sensitivity to related content, increasing one's likelihood of reporting exposure to such information; but the fact that some of the effects were also found at the lagged level lends some support to the hypothesized direction of effects.

Exposure to tobacco or e-cigarette-related information predicted sharing both at the cross-sectional and lagged levels. However, given that this was a composite measure of having sought and/or scanned information, sensitivity analyses were conducted to parse the effect of overall exposure by examining seeking and scanning separately as predictors of sharing. Findings showed that seeking was a significantly stronger predictor of sharing compared to scanning at cross-sectional and lagged levels, suggesting 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.

Exposure to ads: Being exposed to cigarette and e-cigarette ads was associated with sharing tobacco-related and e-cigarette-related information, respectively. This finding is in line with past research that found exposure to pro-tobacco advertisements was associated with higher smoking intentions and initiation (Bunnell et al., 2015; Capella, Webster, & Kinard, 2011), and e-cigarette ads were associated with e-cigarette intentions and use among youth and adults (Dai & Hao, 2016; Pepper, Emery, Ribisl, Southwell, & Brewer, 2014).

It was interesting to note that while e-cigarette ad exposure affected e-cigarette-related sharing both immediately and six months later, exposure to tobacco-related ads was not 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. Subsequent sensitivity analyses were conducted to examine the effects of exposure to pro-tobacco ads and anti-tobacco ads separately. However, the results showed that neither were predictive of tobacco sharing six months later (pro-tobacco ads: OR = 1.29; $p = 0.11$; anti-tobacco ads: OR = 1.09; $p = 0.63$), suggesting that in general, e-cigarette ads may be more readily accessible in people's heads.

E-cigarette ads may achieve greater accessibility because they're more abundant in quantity or more memorable due to the novelty of the product itself or to the content of the ads. For instance, a large portion of e-cigarette marketing was found to emphasize the benefits of e-cigarettes in comparison to regular cigarettes, including the utility of e-cigarettes as cessation devices (Richardson, Ganz, Stalgaitis, Abrams, & Vallone, 2013), and messages

that advertised such differences were found to elicit greater interest in trying e-cigarettes compared to other types of ads (Pepper et al., 2014). Thus, exposure to such ads may potentially lead to an increased likelihood of sharing about e-cigarettes over a longer period of time as part of an ongoing effort to quit smoking, among other potential reasons.

General and social media use: 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, the present study 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 this study examined heavy (vs. light) social media use among young people, while Emery and colleagues examined any social media use among adults. Relatedly, given the frequency and intensity with which youth regularly use social media, compared to adults (Lenhart, 2015), it is actually unsurprising that social media use is more significant in the context of youth. 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.

Predictors of Valenced Sharing

Upon examining the predictors of different valences of sharing, it was found that topical relevance (as measured by current use and intentions) and normative perceptions were all associated with the valence in which one shared about tobacco and e-cigarettes at the cross-sectional level, and were predictive of e-cigarette sharing valence six months later. Interestingly, perceptions of high prevalence of smoking/vaping among friends and peers were associated with increased positive *and* negative sharing about tobacco/e-cigarettes, such that having more friends who smoke or vape may lead to sharing in any direction.

Even more intriguing is the finding that when it came to sharing about tobacco six months later, perceptions of higher smoking prevalence no longer predicted positive/mixed sharing and only predicted an increased likelihood of *negative* sharing. At first glance, this finding seemed to go against initial hypotheses. As a potential preliminary explanation, perhaps this effect was driven by non-smokers such that the increased negative sharing occurs among non-users who want to help their friends quit smoking or vaping. Because the larger societal norms surrounding smoking are quite negative, having many smoker friends and peers may encourage more negative sharing (to help those friends quit) rather than deterring it. These findings are in direct contrast to the effect of descriptive norms on e-cigarette sharing, where perceptions of high prevalence of vaping behavior encouraged more positive/mixed sharing in the long run. This suggests that for topics that are surrounded by a fair amount of ambivalence such as e-cigarettes, more proximal normative perceptions (i.e., norms shaped by friends) play a larger role in driving sharing behavior.

Interaction between intentions and norms: When intentions and norms were examined in conjunction, perceptions of descriptive and injunctive norms seemed to weaken the effect of intentions on sharing valence, at least at the cross-sectional level, which was in line with initial hypotheses. In particular, moderating effects were seen for those who perceived smoking/vaping to be highly prevalent behaviors, 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 only when the majority behavior is smoking or vaping.

Still, given the interaction effects between intentions and norms, and considering that simple main effects showed that the influence of 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 share with other people and in what way are particularly subject to what they think is popular or appropriate behavior. Both descriptive and injunctive norm perceptions rely on what people perceive as normal behavior among friends and peers, and these are the people to whom they are also likely to share with. Thus, it is unlikely that youth would share something that goes against their friends' behaviors or beliefs, even if that means sharing in a way that is not in line with what they actually believe.

Future Directions and Implications

Given that this study now offers some insight into the factors leading to sharing positively or negatively about tobacco and e-cigarettes, future research may benefit from examining the effects of sharing in particular valences. While there have been many studies examining the effects of talking about smoking on related intention or behavioral outcomes (albeit mostly in the context of interventions) (e.g., Jeong et al., 2015; Thrasher et al., 2016), there has been less research examining the content of those conversations, including the direction in which a person talks about or shares the information, and how that impacts outcomes. Given the existing literature on the effect of perceived conversational valence on attitudes and intentions in the context of other health behaviors (e.g., Dunlop et al., 2010; Hendriks et al., 2015), it seems that the next step would be to examine such questions in the context of tobacco and e-cigarette outcomes.

In particular, the present study offers a useful foundation for future research in e-cigarette prevention practices. In light of the continuous rise in the level of e-cigarette use among adolescents and young adults (Bunnell et al., 2015; Kenne, Mix, Banks, & Fischbein, 2016), it is critical that researchers become familiar with the various factors that may lead to e-cigarette-related behaviors in order to be able to prevent them. Seeing that much of the factors speculated to have an effect on e-cigarette use have been found in this study to affect the sharing of e-cigarette-related information, it would be valuable for future research to investigate the effects of that sharing on actual behavioral outcomes. Such research, in conjunction with the present study findings, could then inform future efforts aimed at preventing or reducing e-cigarette use.

The lessons we have learned from past health campaigns — that have either encouraged conversations as an intended outcome (e.g., Durant, Wolfson, LaFrance, Balkrishnan, &

Altman, 2006; Morgan & Miller, 2002) or have evaluated the direct or indirect role of conversations on campaign-targeted outcomes (e.g., Frank et al., 2012; Jeong et al., 2015) — suggest that any future intervention should acknowledge the role of interpersonal communication, whether the focus is on tobacco or e-cigarettes. What the present study provides is additional evidence that young people can be driven to share tobacco and e-cigarette information as a result of various factors external to the context of campaigns, including topical relevance, information exposure, and, in particular, perceptions of social norms. These findings, along with subsequent research on the effect of sharing information, have the potential to shape promising interventions that incorporate both mass media efforts and person-to-person communication.

Limitations and Conclusions

This study is subject to limitations that are inherent to all survey-driven studies: results rely on participants' self-reports, which may be subject to recall biases related to failure to accurately remember past behavior. Relying on survey data also means there is no certainty with regards to causal order of sharing and its predictors. However, keeping in mind that 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, certain efforts were made to ameliorate these issues. Time-frame references (e.g., specifying behavior that occurred in the past 30 days) were used to lessen potential memory confusion, while re-contact data were used to conduct lagged analyses that could provide further support for hypothesized causal pathways.

It is worth acknowledging that the six-month lag between the original and re-contact survey, a function of the study design, is arguably a long time period over which to expect different factors to continue to affect sharing. However, the fact that this study found some effects at both the cross-sectional and lagged level (even despite such a stringent criterion) shows strong support for the hypotheses put forth by this study.

In conclusion, this study contributes to the existing literature by providing insight into what brings about sharing in the context of tobacco and e-cigarette information. Importantly, it provides a platform upon which to build future research that examines processes related to interpersonal communication outside of the context of interventions, as well as providing a first foray into research examining the implications of talking about e-cigarettes. Continued efforts in this line of research can help inform future efforts that do not necessarily rely on mass media vehicles but more so on person-to-person communication as a platform for preventing and/or reducing tobacco product use.

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Table 1

Predicting Sharing about Tobacco and E-cigarettes

Independent variables	Cross-sectional		Re-contact	
	OR	[95% CI]	OR	[95% CI]
DV: Tobacco sharing				
Cigarette use	1.92***	[1.61, 2.31]	1.36	[0.88, 2.10]
Cigarette intentions	1.61***	[1.32, 1.97]	1.14	[0.70, 1.87]
Exposure to tobacco information	3.25***	[2.82, 3.74]	1.82***	[1.31, 2.52]
Exposure to tobacco ads	2.09***	[1.72, 2.55]	1.25	[0.80, 1.94]
DV: E-cigarette sharing				
E-cigarette use	4.30***	[3.53, 5.24]	1.55†	[0.96, 2.52]
E-cigarette intentions	4.52***	[3.71, 5.50]	2.16***	[1.36, 3.44]
Exposure to e-cigarette information	8.06***	[6.75, 9.63]	1.88***	[1.31, 2.71]
Exposure to e-cigarette ads	2.62***	[2.20, 3.13]	1.98***	[1.35, 2.89]
DV: Overall sharing				
General media use	1.86***	[1.64, 2.11]	1.19	[0.89, 1.58]
Social media use	1.30***	[1.15, 1.48]	1.17	[0.89, 1.54]

Note. DV = dependent variable; OR = odds ratio; 95% CI = 95% confidence intervals. All analyses adjust for confounders; re-contact analyses additionally adjust for the DV at Time 1. All analyses are weighted.

†$p < .10$;

***$p < .001$

Table 2

Predicting Valenced Sharing about Tobacco and E-cigarettes

IV	DV	Cross-sectional		Re-contact	
		RRR	[95% CI]	RRR	[95% CI]
Cigarette intentions	No sharing	1		1	
	Negative	0.79	[0.57, 1.09]	0.62	[0.30, 1.28]
	Positive/Mixed	2.84***	[2.17, 3.73]	1.91†	[0.91, 4.02]
Cigarette use	No sharing	1		1	
	Negative	0.92	[0.70, 1.22]	1.18	[0.66, 2.10]
	Positive/Mixed	4.00***	[3.10, 5.15]	1.41	[0.71, 2.81]
Friends' Disapproval	No sharing	1		1	
	Negative	1.19	[0.89, 1.60]	0.75	[0.41, 1.37]
	Positive/Mixed	0.45***	[0.35, 0.58]	0.52†	[0.27, 1.03]
Descriptive Norms (Pro-cigarette)	No sharing	1		1	
	Negative	1.25***	[1.12, 1.41]	1.37*	[1.06, 1.79]
	Positive/Mixed	1.71***	[1.47, 2.00]	1.48†	[0.97, 2.27]

IV	DV	Cross-sectional		Re-contact	
		RRR	[95% CI]	RRR	[95% CI]
E-cigarette intentions	No sharing	1		1	
	Negative	1.02	[0.60, 1.73]	0.57	[0.17, 1.87]
	Mixed	4.38***	[3.19, 6.01]	2.01†	[0.94, 4.28]
	Positive	11.42***	[8.09, 16.13]	4.32***	[2.02, 9.25]
E-cigarette use	No sharing	1		1	
	Negative	1.12	[0.65, 1.94]	0.73	[0.24, 2.18]
	Mixed	4.48***	[3.29, 6.10]	1.81	[0.87, 3.76]
	Positive	10.13***	[7.25, 14.17]	2.06†	[0.89, 4.74]
Friends' Disapproval	No sharing	1		1	
	Negative	0.90	[0.61, 1.33]	1.21	[0.54, 2.71]

IV	DV	Cross-sectional		Re-contact	
		RRR	**[95% CI]**	**RRR**	**[95% CI]**
	Mixed	0.41 ***	[0.31, 0.54]	0.36 ***	[0.19, 0.67]
	Positive	0.20 ***	[0.14, 0.28]	0.29 ***	[0.14, 0.58]
Descriptive Norms (Pro-e-cigarette)	No sharing	1		1	
	Negative	1.36 **	[1.12, 1.64]	0.87	[0.55, 1.37]
	Mixed	2.45 ***	[2.08, 2.89]	1.63 *	[1.10, 2.41]
	Positive	2.03 ***	[1.65, 2.50]	2.17 ***	[1.41, 3.35]

Note. IV = independent variable; DV = dependent variable; RRR = relative risk ratio; 95% CI = 95% confidence intervals. All analyses adjust for confounders; re-contact analyses additionally adjust for the DV at Time 1. All analyses are weighted.

†
$p < .10$;

*
$p < .05$;

**
$p < .01$;

***
$p < .001$