Published in final edited form as:

J Health Commun. 2017 June ; 22(6): 497–505. doi:10.1080/10810730.2017.1311972.

Perceived harms and social norms in the use of electronic cigarettes and smokeless tobacco

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Abstract

Background—Perceptions of harms and social norms influence the use of conventional tobacco cigarettes, but little research is available about their combined relationship with e-cigarette and smokeless tobacco use.

Methods—We conducted a cross sectional survey of 309 individuals from central Illinois. We explored (1) demographic predictors of perceived harms and social norms related to e-cigarette and smokeless tobacco use, and (2) whether perceived harms, social norms, or both were important predictors of e-cigarette and smokeless tobacco use.

Results—E-cigarette perceptions of harm were consistent across all demographic characteristics. Smokeless tobacco perceptions of harm were unrelated to age, race, and sex, but lower education and income were associated with lower perceived harm ($p < .05$). E-cigarette social norms were less favorable among non-whites ($p < .05$) but did not vary by other demographic characteristics. Only less education was associated with more favorable social norms of smokeless tobacco ($p < .05$). Higher perceived harms were related to lower use of e-cigarettes and smokeless tobacco ($p < .05$). Perceived social norms were not associated with product use.

Conclusions—This study provides preliminary support for implementing broad-based health messaging efforts that focus more on the potential harms of e-cigarette and smokeless tobacco use than on social norms.

Keywords

Electronic cigarettes; smokeless tobacco; perceived risk; perceived harms; social norms; cancer

INTRODUCTION

Tobacco use causes considerable morbidity and mortality in the U.S (US Department of Health and Human Services, 2014). In an attempt to mitigate this harm, the U.S. government mandated the Food and Drug Administration to regulate the marketing and advertising of all tobacco products (111th United States Congress, 2009). These regulations include not only conventional tobacco products like cigarettes, but also loose smokeless tobacco, which is often referred to as *dip*, *chew*, or *snuff* and, more recently, electronic cigarettes (e-cigarettes) (Food and Drug Administration, 2016).

Awareness and use of electronic cigarettes have increased rapidly in recent years among adults and teenagers in the U.S (Arrazola et al., 2015; King, Patel, Nguyen, & Dube, 2015). From 2010 to 2014, there have been significant increases in e-cigarette awareness (40.9–91.9%), ever use (3.3–14.9%) and current use (1.0–4.9%) among U.S. adults (King et al., 2015; Weaver et al., 2016). Many adult smokers of conventional cigarettes report using e-cigarettes as a smoking cessation aid, despite the absence of clinical trials supporting or refuting the ability of e-cigarettes to support smoking cessation (Pepper, Ribisl, Emery, & Brewer, 2014). Adult smokers also report using e-cigarettes as a strategy to reduce or avoid the harms of smoking conventional cigarettes (Pepper, Emery, Ribisl, Rini, & Brewer, 2015; Pepper, Ribisl, et al., 2014). However, the long-term health effects of e-cigarettes are unknown. The lack of combustion may reduce the risk of diseases caused by inhaling the products of burned tobacco, but the data are inadequate to conclude that e-cigarettes provide no health risk at all (111th United States Congress, 2009). Unfortunately it will likely be decades before biomedical science fully understands the health risks (if any) posed by e-cigarettes. Yet, the rapid rise in e-cigarette use prevalence suggests that waiting to gain understanding about the psychological factors that influence e-cigarette use until the harms are known is unwise because any potential impact on public health is likely to be profound by that point.

Although use of smokeless tobacco is much lower at 3.6% of adults, prevalence is disproportionately high among individuals who are non-Hispanic white men (9.3%) and who live in the southern (8.4%) and midwestern (9.0%) United States (US Department of Health and Human Services, 2014). In addition, rates of smokeless tobacco use are higher where geographic density is lower. Data from 2014 indicate that, whereas only 2.2% of residents in large metropolitan areas reported using smokeless tobacco in the last month, 10.1% of residents in completely rural areas reported past month smokeless tobacco use (Center for Behavioral Health Statistics and Quality, 2015). In contrast to e-cigarettes, the negative health effects of smokeless tobacco use are well-established and include mouth, esophageal, and pancreatic cancer (US Department of Health and Human Services, 2014). Higher rates of smokeless tobacco use among rural residents contribute to rural-urban cancer disparities (Northridge et al., 2008).

Perceived Harms and Social Norms

Consistent with several health behavior theories, including the theory of planned behavior and the integrated model of behavior change (Ajzen, 1985; Fishbein, 2008), perceptions of harms and social norms have been identified as key factors influencing use of conventional

tobacco cigarettes (Allen et al., 2014; Weinstein, 1999). Although some research has also identified perceived harms as important correlates of e-cigarette use, much of that research asks participants to compare the harms of e-cigarettes to conventional cigarettes (Pepper et al., 2015). For example, one qualitative study of current e-cigarette users reported that, compared to conventional tobacco cigarettes, e-cigarettes had fewer health risks, caused less craving, withdrawal, addiction, and negative physical feelings, tasted better, and were more satisfying (Harrell et al., 2015). However, *absolute* perceptions of harm – that is, perceptions of the harms of engaging in a behavior in and of itself, rather than compared to another behavior – are also important determinants of behavior in general (Sheeran, Harris, & Epton, 2013), and conventional tobacco use in particular (Weinstein, 1999). In short, absolute risk beliefs about the harms of using e-cigarettes is important because, if people believe that e-cigarettes carry very little risk, they may be more willing to use them.

Perceived harms have also been examined in the context of smokeless tobacco use. The data indicate that, although smokeless tobacco is not considered completely risk-free in an absolute sense, some individuals believe that using smokeless tobacco is safer than smoking conventional cigarettes (Liu et al., 2015).

Despite the clear association between higher use of conventional tobacco cigarettes and more favorable perceived social norms (Botvin, Botvin, Baker, Dusenbury, & Goldberg, 1992), research examining the role of social norms in e-cigarette and smokeless tobacco use is sparse. The little research that is available indicates that individuals who believe that their family, friends, or community hold favorable views of using a tobacco product are more likely to intend to use the product or actually use it. This relationship between perceived social norms and use was present for both e-cigarettes (Peters, Meshack, Lin, Hill, & Abughosh, 2013) and smokeless tobacco (Nemeth et al., 2012). One study reported e-cigarettes were viewed as more socially acceptable than smokeless tobacco, and that that smokeless tobacco was almost a full standard deviation less acceptable than conventional cigarettes (although this did not reach statistical significance) (Berg et al., 2015). This suggests that, if social norms drive the use of alternative tobacco products to the same extent as conventional cigarettes, use of e-cigarettes could continue to increase rapidly over time.

Lingering Questions

There are several questions that remain unanswered about the interrelationships among perceived harms, perceived social norms, and the use of e-cigarettes and smokeless tobacco. First, the extent to which the findings are applicable to populations that are vulnerable to experiencing health disparities is unclear. Although much e-cigarette research has very large samples (e.g., Berg et al., 2015; Pepper et al., 2015), in most of these samples there is little representation from people who reside in rural geographic areas or who have limited incomes and/or formal education. Although some data suggest that some rural residents perceive smokeless tobacco as a part of their community and as “safer” than conventional cigarettes, these data are from studies that are often qualitative in nature (e.g., Nemeth et al., 2012). Qualitative data, although certainly a rich source of information, is limited in terms of generalizability across different population segments. In addition, much research on the perceptions and norms of smokeless tobacco in rural populations is with adolescents (Couch,

Darius, Walsh, & Chaffee, 2016). Although adolescents are an important group for investigation, very little is known about rural adult smokeless tobacco users. This lack of knowledge limits the ability of health communication and public health experts to encourage cessation.

Another gap in scientific knowledge is whether perceived harms or social norms is a stronger predictor of e-cigarette and smokeless tobacco use. Although some studies have examined perceptions of harms and norms in the same sample (e.g., Berg et al., 2015), relatively few studies have examined how both constructs combine to influence behavior and no quantitative research has examined the combined influence of perceived harms and social norms on either e-cigarette or smokeless tobacco use in rural populations. Understanding these relationships more thoroughly could lead to improved health communication interventions related to the use of alternative tobacco products in rural geographic areas.

Objective and Hypothesis

The objective of this research was to gain understanding of the complex interplay among demographic characteristics, perceived harms, and perceived social norms related to two alternative tobacco products in a sample of individuals who were vulnerable to experiencing health disparities due to limited formal education, limited income, and rural residency. Specifically, we (1) explored demographic differences in perceptions of harm and social norms related to e-cigarette and smokeless tobacco use, and (2) examined the independent and combined effects of perceived harms and perceived social norms on use of e-cigarettes and smokeless tobacco. Consistent with theoretical predictions (Ajzen, 1985; Fishbein, 2008), we hypothesized that higher perceived harms and more favorable perceived social norms would be associated with lower e-cigarette and smokeless tobacco use. Due to a dearth of existing data we did not hypothesize which construct was the more important predictor of use.

METHODS

Design and Setting

This study represents a secondary analysis of data collected via a cross-sectional survey that was conducted in August and September, 2014. Data regarding the proportion of participants who used electronic cigarettes and their demographic characteristics are reported in (LeVault et al., 2016). This project was reviewed and approved by the Springfield Committee for Research Involving Human Subjects.

A convenience sample of participants was recruited in Springfield, Illinois during the Illinois State Fair, the Springfield Mile event, and at the Southern Illinois University School of Medicine. The state fair was chosen as a recruitment venue because it is one of the largest gatherings of Illinois residents, with an estimated annual attendance of 400,000–500,000 people drawn from across Illinois and neighboring states. The Springfield Mile event and the School of Medicine were also chosen based on the ready availability of potential participants.

Participants and Procedure

To be eligible to complete the survey, individuals were required to be aged 18 years or older and a current user of *either* e-cigarettes, smokeless tobacco, or conventional cigarettes. Several strategies were used to recruit participants. At the Illinois State Fair and at the Springfield Mile Event, a vendor table was reserved and large signage used to attract potential participants. The sign read, “Your Opinion Matters” and had pictures of tobacco products. Individuals who were interested in participating were screened for eligibility. Those who were eligible completed the survey on a tablet computer and received \$10 in cash or gift cards. Recruitment at the School of Medicine occurred via an email that was sent to a listserv that reached all faculty, staff, and students of the School of Medicine. Individuals who expressed interest in participating completed the survey within the offices of the School of Medicine Center for Clinical Research.

Measures

All items were obtained from either the National Health and Nutrition Examination Survey (CDC, 2014), the Global Adult Tobacco Survey (WHO, 2014), the 2010 Minnesota Adult Tobacco Survey (MDH 2014), or the Brief Smoking Consequences Questionnaire-Adult (Rash and Copeland, 2008). The survey included three separate modules of items: one module for electronic cigarettes, one for conventional tobacco cigarettes, and one for smokeless tobacco. All participants completed all 3 modules, but only the e-cigarette and smokeless tobacco items will be discussed further because beliefs about conventional tobacco cigarettes are outside the scope of this paper.

Perceived harms—Perceived harms of using electronic cigarettes and smokeless tobacco were assessed using the following items using a 9-point Likert-type agree / disagree scale: “There is any harm in *using an occasional e-cigarette / taking an occasional dip / chew*”; “*E-cigarette use / Using smokeless tobacco* is taking years off my life”; “*E-cigarette use / Using smokeless tobacco* damages my health”; “The more I use *e-cigarettes / smokeless tobacco*, the more I risk my health”; “By using *e-cigarettes / smokeless tobacco*, I risk *heart disease / mouth cancer*”; “By using *e-cigarettes / smokeless tobacco*, I risk *lung cancer / damaging my teeth and gums*.” Items specific to e-cigarettes included: “The liquid from e-cigarette cartridges can be harmful to children if ingested”; and “Do you think that breathing vapors from other people’s e-cigarettes is: very harmful to one’s health, Somewhat harmful to one’s health, Not very harmful to one’s health, or Not at all harmful to one’s health?”

Perceived social norms—Social norms was assessed using the following items: “Most people who are important to me think that my *e-cigarette / smokeless tobacco* use is [1] unacceptable – [7] acceptable”; “My friends think that my *e-cigarette / smokeless tobacco* use is [1] unacceptable – [7] acceptable”; “My immediate / close family members think that my *e-cigarette / smokeless tobacco* use is [1] unacceptable – [7] acceptable”; “Among my friends, *e-cigarette / smokeless tobacco* use is [1] strongly discouraged – [5] strongly encouraged” “Among my immediate / close family members, *e-cigarette / smokeless tobacco* use is [1] strongly discouraged – [5] strongly encouraged”; “In my community, *e-cigarette / smokeless tobacco* use is [1] strongly discouraged – [5] strongly encouraged.”

Current tobacco product use—Current e-cigarette and smokeless tobacco use were assessed with the following items: “Do you use e-cigarettes (electronic cigarette, personal vaporizer, electronic nicotine delivery system) on a daily basis, less than daily, or not all?”; and “Do you use smokeless tobacco (dip, chew, snuff, or snus) on a daily basis, less than daily, or not all?”

Participant characteristics—Standard *demographic characteristics* were assessed: sex, age, race, education, and annual household income.

Other items—More detailed information about product use (e.g., former use of tobacco products, strength of e-liquid, locations where e-cigarettes and smokeless tobacco were used, tobacco product cessation beliefs) were included in the survey but are outside the scope of these analyses. However, the full survey can be obtained from the corresponding author.

Analysis Plan

Preliminary analyses—All analyses were conducted for e-cigarettes and smokeless tobacco separately. Frequencies, means, and standard deviations were examined for all variables. Intercorrelations among the perceived harms and perceived norms items were also examined. Then, four exploratory factor analyses (EFA) were conducted to examine whether the perceived harms and social norms items for each tobacco product each tapped their purported underlying constructs. Each EFA was conducted using maximum likelihood estimation and promax rotation to account for anticipated correlations among factors. Scree plots were examined and factors with Eigenvalues >1 were retained. The results of the EFAs were used to create the following scales: perceived harm of e-cigarette use, perceived harm of smokeless tobacco use, social norms of e-cigarette use, and social norms of smokeless tobacco use. Each scale was created by taking the average of the individual questions retained. Depending on the scale in question, higher values indicated either higher perceptions of harm or more favorable social norms. Cronbach α coefficients were calculated for each scale. Any item whose factor loading or communality value was < .40, or whose removal improved the internal consistency of the scale (as defined by Cronbach α) were not included in the scales and are not discussed further.

Main analyses—As in the preliminary analyses, all of the main analyses were conducted for each tobacco product separately. Bivariate linear and logistic regressions were used to examine the unadjusted relationships between demographic characteristics and key outcome variables. Participant characteristics included demographics (i.e., race, sex, education, income, age). Key outcomes were the perceived harms scale, the social norms scale, and product use. Additional bivariate regressions were used to examine the unadjusted relationships between the perceived harms / social norms scales and product use.

Next, multivariable logistic regressions were used to determine whether perceived harms and social norms were independent predictors of product use after adjusting for key covariates. For e-cigarette and smokeless tobacco use separately, the relevant perceived harms and social norms scales were entered simultaneously as predictors. Participant demographic characteristics were entered into the model as covariates.

RESULTS

There were 309 participants who completed the survey (Fair = 288; Mile = 12; email = 9). The analytic sample for this paper included either e-cigarette users, smokeless tobacco users, or nonusers (i.e. cigarette smokers), the latter of whom were excluded from the current study. Thus, an e-cigarette user who never used smokeless tobacco would be classified as a user of e-cigarettes for the e-cigarette analyses and as a non-user of smokeless tobacco for the smokeless tobacco analyses. A person who smoked conventional cigarettes but who did not use either e-cigarettes or smokeless tobacco would be considered a non-user for both e-cigarettes and smokeless tobacco. We also included only respondents who had no missing values on any of the participant characteristic, harms, norms, and product use items of interest ($N_{\text{E-cigarette}} = 263$; $N_{\text{SmokelessTobacco}} = 252$). See Table 1 for participant characteristics for each product. Former users of e-cigarettes and smokeless tobacco were excluded from the analyses for e-cigarettes and smokeless tobacco, respectively.

Factor Analysis and Scale Construction

The items assessing perceived harms of e-cigarette use represented two underlying factors, which represented 45.8% and 5.4% of the variance for Factors 1 and 2, respectively (see Table 2). However, only 5 items (bolded in Table 2) had a factor score and communality $> .40$, and these all loaded on Factor 1. These five items were averaged into an e-cigarette perceived harms scale ($\alpha = .93$, $M = 4.6$, $SD = 2.2$, Minimum = 1, Maximum = 9). Like perceived harms, the items assessing perceived social norms of e-cigarette use also loaded onto a single factor that accounted for 52.4% of the variance in responses (see Table 3). Those six items were averaged into a single scale ($\alpha = .87$, $M = 4.2$, $SD = 1.2$, Minimum = 1, Maximum = 6). The factor loadings, communality values, variance accounted for, and characteristics of the scales assessing perceived harms and social norms for smokeless tobacco can be found in Tables 4 and 5.

Perceived Harms and Demographic Characteristics

In general, perceptions of harm did not tend to vary by demographic characteristics for e-cigarettes or smokeless tobacco (see Table 6). Perceptions of harm for e-cigarettes were not related to age, sex, education, or income at the bivariate or multivariable level. The only significant finding at the bivariate level, which suggested that non-white participants perceived higher harm from e-cigarettes than white participants ($p = .04$), was reduced to nonsignificance in the multivariable analyses.

Smokeless tobacco-related perceived harm was unrelated to age, race, and sex in bivariate and multivariable analyses. However, participants with a high school degree or less reported lower perceived harm from smokeless tobacco than participants with at least a Bachelor's degree in bivariate ($p = .003$) and multivariable ($p = .03$) analyses. Perceptions of harm were also lower among participants who reported earning less than \$20,000 annually ($p = .002$ and $p = .04$ for bivariate and multivariable analyses, respectively).

Perceived Social Norms and Demographic Characteristics

Perceptions of social norms were also relatively consistent across demographic groups (see Table 7). For e-cigarettes, age, sex, education, and income were unrelated to social norms of e-cigarette use. The only statistically significant finding was that non-whites reported less favorable social norms surrounding e-cigarette use than did white participants at the bivariate ($p < .001$) and multivariable level ($p = .001$).

Perceptions of social norms related to smokeless tobacco use were unrelated to age, race, sex, and income. The only significant difference was related to education. Participants with no more than a high school diploma reported significantly more positive social norms than participants with at least a Bachelor's degree ($p = .016$ and $p = .030$ for bivariate and multivariable analyses, respectively).

Perceived Harms, Social Norms, and Product Use

The correlation between perceived harms and social norms was $r = .37$ for e-cigarettes and $r = .24$ for smokeless tobacco. Perceived harms and social norms were important for e-cigarette and smokeless tobacco use to varying degrees (see Table 8). In bivariate analyses, higher perceived harms were associated with lower reported use of e-cigarettes ($p = .001$) and smokeless tobacco ($p < .001$). More favorable social norms were associated with higher use of e-cigarettes ($p = .015$), but not with smokeless tobacco ($p = .80$). In contrast, when both perceived harms and social norms were entered simultaneously into the model along with the demographic covariates, only perceived harms significantly predicted product use. Specifically, higher perceived harms were associated with lower use of both e-cigarettes ($p = .003$) and smokeless tobacco ($p = .001$). Perceived social norms were not related to either e-cigarette or smokeless tobacco use ($ps > .05$).

Sensitivity Analyses

To determine the potential impact of recruitment modality on our results, we conducted a sensitivity analysis that excluded the 21 participants who were not recruited from the state fair. Although the vast majority of results remained similar in the direction of the effect and in terms of their statistical significance or non-significance, the results did vary in a few cases. Specifically, the following relationships became non-significant: the bivariate association between race and perceived harms of e-cigarette use ($b = 0.47$, 95% CI $-0.16 - 1.09$, $p = 0.14$), the multivariable association between education and perceived harms of smokeless tobacco ($b = -0.86$, 95% CI $-1.77 - 0.06$, $p = 0.07$), the multivariable association between education and social norms of smokeless tobacco use ($b = 0.51$, 95% CI $-0.06 - 1.07$, $p = 0.08$), and the bivariate association between social norms of e-cigarettes and use of e-cigarettes (OR = 1.22, 95% CI 0.99–1.52, $p = 0.07$). The remaining 6 significant findings between demographic variables and perceived harms and norms depicted in Tables 6 and 7 remained significant, as did the 5 remaining significant predictors of product use depicted in Table 8.

DISCUSSION

This project sought to understand the perceived harms and social norms of e-cigarette and smokeless tobacco use. We extended prior research by recruiting a sample comprised primarily of rural residents with limited incomes and by examining the combined influence of perceived harms and social norms together, rather than separately. The key finding was that only perceived harms were associated with product use; social norms were not important once perceived harms had been accounted for. This finding is consistent with existing research demonstrating that use of e-cigarettes, smokeless tobacco, and conventional tobacco cigarettes is lower among people who believe that they are harmful to one's health (Allen et al., 2014; Pepper et al., 2015; Weinstein, 1999), but it contradicts research indicating that more favorable social norms are associated with increased use (Nemeth et al., 2012; Peters et al., 2013). It could be that social norms are more important for younger than older smokeless tobacco users and that for our sample, which was comprised mostly of smokeless tobacco users who were older than 26, norms had become less important than the addiction to nicotine. It could also be that our measure of social norms was not sensitive enough to detect existing differences.

Another important finding was that perceptions of harms and social norms were generally uniform across different socio-demographic groups. Only education was consistently associated with differences in perceived harms and norms, but only for smokeless tobacco. Our results are consistent with research showing lack of differences in perceptions of harms of e-cigarettes by key demographic characteristics (Pepper et al., 2015). Yet, these results may not be as surprising today as they may have been only a few years ago; e-cigarette awareness is nearly ubiquitous in the general population (i.e., 77–86% (Pepper, Emery, Ribisl, & Brewer, 2014; Tan & Bigman, 2014)), there is a widespread perception that e-cigarettes are less risky than conventional tobacco products (Harrell et al., 2015), and e-cigarettes have an anecdotal reputation for facilitating smoking cessation (Etter & Bullen, 2014).

Sensitivity analyses that examined how excluding the 21 participants who were recruited from venues other than the state fair affected results generally support our conclusions: only perceived harms – not social norms – were associated with e-cigarette and smokeless tobacco use at the multivariable level. Sensitivity analyses also supported the conclusion that, overall, perceptions of harms and social norms did not vary systematically across socio-demographic groups in multivariable analyses.

Strengths, Limitations, and Future Directions

These results should be considered preliminary interpreted in light of several considerations. First, because most participants were recruited from the Illinois State Fair, the results may have limited generalizability to other rural geographic locations. Nevertheless, this is one of the first studies to examine perceptions of harms and social norms of e-cigarette use in a sample purposefully designed to focus on rural residents (LeVault et al., 2016). Future research should extend this work by examining whether rural areas of other parts of the US show similar findings.

Another complication is that the sample size is fairly small, perhaps contributing to our inability to identify demographic differences in perceived harms and norms and/or differences in the role of perceived harms/norms in predicting product use. In addition, like all cross-sectional surveys, we cannot infer causation or draw conclusions about the directionality of the effects. For example, individuals who use a product for harm reduction purposes are likely to experience lower perceived harm over time because they believe that they are engaging in an activity that is less risky than their prior use of traditional cigarettes. This recursive relationship between perceived risk and behavior has been identified in prior research (Brewer, Weinstein, Cuite, & Herrington Jr., 2004). Our use of a convenience sample may have also led to selection bias. Although we did our best to ensure privacy while taking the survey, it is possible that only individuals who felt comfortable being seen taking a survey about tobacco use were willing to participate. This would likely obscure any demographic differences in perceived social norms by setting an artificial floor on social norms for participation. Therefore, it would be useful to supplement these results with either qualitative research to add depth to the findings or a quantitative survey that is based on a larger population-based, representative sample of rural Illinois residents.

Conclusions

This study yielded important insights into the complex interplay among perceptions of harm, perceived social norms, demographic characteristics, and the use of e-cigarettes and smokeless tobacco. Such insights may provide guidance for future health communication efforts. Specifically, the results suggest that health communications that emphasize harms may be just as impactful in rural communities as those that emphasize harms and social norms. Furthermore, public health agencies may be able to implement mass media communications that focus more on broad-based messaging across audience segments within specific rural geographic areas (e.g., rural residents of both sexes and all races, ages, and income levels) rather than investing resources in developing multiple messages that target audiences based on the different demographic characteristics within a rural area. In other words, perhaps a communications strategy that focuses on “rural residents” is sufficient, rather than “rural men,” “rural women,” “low-income rural,” “middle/high income rural,” and so on. It would be worthwhile to explore specific strategies for developing and implementing such communications in rural geographic areas in the future.

Acknowledgments

Funding: This study was supported by funding from the Illinois Department of Public Health (PI: Wiley D. Jenkins; Contract #53201001C) and the National Cancer Institute (1P20CA192987-01A1; PIs Graham A. Colditz, Laurent Brard). Erika Waters was also supported by supplemental funding from the Barnes Jewish Hospital Foundation.

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Table 1

Participant characteristics by product

Participant Characteristic	Overall sample N=309		E-cigarettes n=263		Smokeless tobacco n=252	
	N	%	n	%	n	%
Race						
White	237	76.9	199	75.7	194	77.0
Non-white	71	23.1	64	24.3	58	23.0
Sex						
Men	171	55.3	149	56.7	135	53.6
Women	138	44.7	114	43.3	117	46.4
Education						
High school or less	155	50.2	136	54.7	121	48.0
Some college	108	35.0	84	31.9	89	35.3
Bachelor's degree or more	46	14.9	43	16.3	42	16.7
Annual household income						
Less than \$20,000	127	41.6	109	41.4	151	59.9
\$20,000 or more	178	58.4	154	58.6	101	40.1
Age						
18–25	68	22.0	57	21.7	51	20.2
26 and older	241	78.0	206	78.3	201	78.8
Uses product						
Yes	200	64.7	158	60.1	57	22.6
No	109	35.3	105	39.9	195	87.4

Note. 46 respondents had missing data on at least 1 key item related to e-cigarette perceptions, norms or use, resulting in an analytic sample size of 263 for e-cigarettes. 57 respondents had missing data related to smokeless tobacco, resulting in an analytic sample size of 252 for smokeless tobacco. The characteristics of users of conventional cigarettes are not included in Table 1 because they are not the focus of this paper.

Table 2

Factor loadings and scale characteristics of the perceived harms of using e-cigarettes

Item	E-Cigarette Perceived Harms		
	Factor 1	Factor 2	Communality
O1: Harm from breathing vapors from others' e-cigs	<i>-.67</i>	<i>.40</i>	.27
O10: Any harm in occasional e-cig use	.41	-.10	.13
O11: E-cig use takes years off my life	.63	.13	.53
O12: E-cig use damages my health	.78	.14	.78
O13: More e-cig use, more health risk	.93	-.03	.83
O14: Using e-cigs risks heart disease	.79	.12	.75
O15: Using e-cigs risks lung cancer	.87	.08	.85
O16: E-cig liquid harmful to children	-.16	.63	.30
O17: Get addicted from using E-cigs	-.07	.45	.17
Variance accounted for	45.8%	5.4%	
Averaged scale mean (SD)	4.6 (2.2)		
Averaged scale minimum, maximum	1, 9		
Averaged scale Cronbach's α	0.93		

Note. Bolded text indicates items included in the scale. Italicized text indicates cross-loadings.

Table 3

Factor loadings and scale characteristics of the perceived social norms of using e-cigarettes

Item	E-Cigarette Perceived Norms	
	Factor 1	Communality
O1.5: Acceptable among people close to me	.85	.72
O2: Acceptable among friends	.78	.61
O3: Encouraged by friends	.70	.49
O5: Acceptable among family	.80	.64
O6: Encouraged by family	.67	.45
O8: Acceptable in community	.49	.24
Variance accounted for	52.4%	
Averaged scale mean (SD)	4.2 (1.2)	
Averaged scale minimum, maximum	1, 6	
Averaged scale Cronbach's α	0.87	

Note. Bolded text indicates items included in the scale.

Table 4

Factor loadings and scale characteristics of the perceived harms of using smokeless tobacco

Item	Smokeless Tobacco Perceived Harms	
	Factor 1	Communality
O13: Harm in occasional dip	.41	.17
O14: ST use takes years off my life	.70	.49
O15: ST use damages my health	.80	.64
O16: More ST use more health risk	.86	.74
O17: Using ST risks mouth cancer	.95	.91
O18: Using ST risks teeth/gum damage	.96	.92
Variance accounted for	64.5%	
Averaged scale mean (SD)	6.9 (2.3)	
Averaged scale minimum/maximum	1, 9	
Cronbach's α	0.94	

Note. Bolded text indicates items included in the scale.

Table 5

Factor loadings and scale characteristics of the perceived social norms of using smokeless tobacco

Item	Smokeless Tobacco Perceived Norms	
	Factor 1	Communality
O4: Acceptable among people close to me	0.86	0.75
O5: Acceptable among friends	0.88	0.78
O6: Encouraged by friends	0.82	0.66
O8: Acceptable among family	0.78	0.61
O9: Encouraged by family	0.77	0.60
O11: Acceptable in community	0.54	0.30
Variance accounted for	61.5%	
Averaged scale mean (SD)	2.9 (1.4)	
Averaged scale minimum/maximum	1, 6	
Averaged scale Cronbach's α	0.90	

Note. Bolded text indicates items included in the scale.

Table 6

Demographic predictors of perceived harms of e-cigarette and smokeless tobacco use (unstandardized b, 95% CI)

Predictor	E-Cigarettes (N=263)	
	Bivariate Analyses	Multivariable Analyses
Age (26+ referent)	−0.20, −0.85–0.44	−0.03, −0.71–0.64
Race (white referent)	0.63, 0.02–1.24	0.63, −0.24–1.28
Sex (male referent)	0.26, −0.27–0.80	0.35, −0.19–0.89
Education (Bachelor's+ referent)		
<i>High school or less</i>	0.34, −0.41–1.08	0.50, −0.33–1.13
<i>Some college</i>	−0.15, −0.95–0.65	−0.76, −0.88–0.73
Income (\$20K+ referent)	−0.12, −0.65–0.42	−0.53, −1.17–0.12
Predictor	Smokeless Tobacco (N=252)	
	Bivariate Analyses	Multivariable Analyses
Age (26+ referent)	0.06, −0.65–0.78	0.42, −0.29–1.13
Race (white referent)	−0.29, −0.96–0.38	0.25, −0.45–0.94
Sex (male referent)	0.30, −0.26–0.87	0.34, −0.22–0.89
Education (Bachelor's+ referent)		
<i>High school or less</i>	−1.17, −1.95–(−0.39)	−0.94, −1.80–(−0.08)
<i>Some college</i>	−0.22, −1.04–0.60	−0.19, −1.01–0.64
Income (\$20K+ referent)	−0.91, −1.47–(−0.35)	−0.69, −1.34–(−0.03)

Note. Multivariable linear regression models included age, race, gender, education, and income as predictors. Bolded text indicates $p < .05$.

Table 7

Demographic predictors of perceived social norms of e-cigarette and smokeless tobacco use (unstandardized b, 95% CI)

Predictor	E-Cigarettes (N=263)	
	Bivariate Analyses	Multivariable Analyses
Age (26+ referent)	0.09, -0.27–0.44	0.10, -0.28–0.47
Race (white referent)	-0.70, -1.03–(-0.36)	-0.61, -0.97–(-0.25)
Sex (male referent)	0.16, -0.14–0.46	0.12, -0.18–0.41
Education (Bachelor's+ referent)		
<i>High school or less</i>	-0.18, -0.56–0.24	-0.004, -0.46–0.45
<i>Some college</i>	0.19, -0.26–0.63	0.16, -0.29–0.60
Income (\$20K+ referent)	-0.26, -0.56–0.04	-0.11, -0.46–0.24

Predictor	Smokeless Tobacco (N=252)	
	Bivariate Analyses	Multivariable Analyses
Age (26+ referent)	0.11, -0.32–0.54	0.01, -0.44–0.45
Race (white referent)	-0.01, -0.42–0.40	-0.21, -0.65–0.22
Sex (male referent)	0.17, -0.17–0.52	0.17, -0.17–0.52
Education (Bachelor's+ referent)		
<i>High school or less</i>	0.60, 0.12–1.09	0.60, 0.06–1.13
<i>Some college</i>	0.15, -0.36–0.66	0.12, -0.39–0.64
Income (\$20K+ referent)	0.31, -0.04–0.66	0.11, -0.30–0.52

Note. Multivariable linear regression models included age, race, gender, education, and income as predictors. Bolded text indicates $p < .05$.

Table 8

Predictors of product use (Odds Ratio, 95% CI); N=263

Predictor	E-Cigarettes (N=263)	
	Bivariate Analyses	Multivariable Analyses
Age (26+ referent)		1.09, 0.55–2.15
Race (white referent)		0.68, 0.65–1.30
Sex (male referent)		1.31, 0.76–2.26
Education (Bachelor's+ referent)		
<i>HS or <</i>		0.47, 0.19–1.13
<i>Some college</i>		0.62, 0.26–1.46
Income (\$20K+ referent)		1.42, 0.73–2.76
E-cig Perceived harms scale	0.78, 0.67–0.90	0.79, 0.67–0.92
E-cig Social norms scale	1.29, 1.05–1.59	1.03, 0.80–1.32
Predictor	Smokeless Tobacco (N=252)	
	Bivariate Analyses	Multivariable Analyses
Age (26+ referent)		1.03, 0.44–2.41
Race (white referent)		0.48, 0.20–1.15
Sex (male referent)		0.32, 0.16–0.65
Education (Bachelor's+ referent)		
<i>HS or <</i>		1.33, 0.48–3.67
<i>Some college</i>		0.58, 0.21–1.61
Income (\$20K+ referent)		1.05, 0.49–2.24
ST Perceived harms scale	0.77, 0.68–0.89	0.78, 0.67–0.91
ST social norms scale	1.03, 0.83–1.27	0.92, 0.72, 1.19

Note. Multivariable models included age, race, gender, education, and income as predictors.