

UCSF

UC San Francisco Electronic Theses and Dissertations

Title

Associations Between Attitudes and Beliefs About Electronic Cigarettes, Electronic Cigarette Use, and Intent to Quit Conventional Cigarettes Among Older Smokers

Permalink

<https://escholarship.org/uc/item/98x9v20h>

Author

Dankiewicz, Cheryl

Publication Date

2017

Peer reviewed|Thesis/dissertation

Associations Between Attitudes and Beliefs About Electronic
Cigarettes, Electronic Cigarette Use, and Intent to Quit Conventional
Cigarettes Among Older Smokers

by

Cheryl Dankiewicz

THESIS

Submitted in partial satisfaction of the requirements for the degree of

MASTER OF SCIENCE

in

Nursing

in the

GRADUATE DIVISION

of the

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

Dedication and Acknowledgments

I would like to recognize several key individuals who provided me with the support I needed to complete this thesis manuscript. Dr. Janine Cataldo dedicated considerable time and energy to the paper as my Thesis Committee Chair. However, she also mentored me during my journey as a graduate student researcher, allowing me to develop my critical thinking skills and confidence in writing and research. Dr. Cataldo's great patience allowed me to explore the many phases of statistical analysis and writing, and her guidance is what continued to push me forward until the thesis was complete. I am also very grateful for the support of my Thesis Committee Members, Dr. Lynda Mackin and Dr. DorAnne Donesky. Both individuals provided me with valuable guidance during the process of completing the thesis, and their support contributed to my personal development as a graduate student and future Clinical Nurse Specialist. I have greatly appreciated the opportunity to work with such incredible faculty at UCSF, and this thesis would not have been possible without their support.

Associations Between Attitudes and Beliefs About Electronic Cigarettes, Electronic Cigarette Use, and Intent to Quit Conventional Cigarettes Among Older Smokers

Cheryl Dankiewicz

Abstract

Introduction. Prevalence of electronic cigarette (e-cigarette) use is steadily increasing among older current and former conventional cigarette smokers (≥ 45 years old), and there is concern that dual use of e-cigarettes and cigarettes may be a common outcome for cessation attempts with e-cigarettes. Risk and benefit perceptions are an important factor in the decision to use tobacco products, but most research about perceptions of tobacco has focused on adolescents and young adults. The purpose of this study was to investigate older smokers' attitudes, beliefs, and perceptions about e-cigarettes and explore how these beliefs are associated with smoking behavior.

Methods. This was a secondary analysis of a cross-sectional study using data collected from an online questionnaire. QualtricsPanel was used to obtain a random national sample of current cigarette smokers 45 years and older ($N = 498$), and Qualtrics research platform was used to conduct the password-protected survey in 2014.

Results. Study findings indicate about 75% of participants would like to quit conventional cigarettes and 77% believe e-cigarettes help smokers quit cigarettes. While 60% have already tried e-cigarettes, 35% intend to try e-cigarettes for the first time within the next six months.

Current e-cigarette users (within last 30 days) agreed more strongly than non-users that e-cigarettes: help smokers quit cigarettes ($p < .001$); are safer ($p = .002$) and cleaner ($p < .001$) than cigarettes; and are acceptable according to friends ($p = .010$) and family ($p = .007$).

Smokers considering quitting cigarettes (within six months) agreed more strongly that cigarettes are harmful to themselves ($p < .001$) and others ($p < .001$) than those who were not considering quitting smoking. Meanwhile, those not considering quitting smoking believed more strongly that friends ($p < .001$) and family ($p < .001$) think it is okay to use cigarettes.

Smokers' likelihood of trying e-cigarettes (within six months) was associated with beliefs that e-cigarettes: are safer ($\rho = .408, p < .001$) and cleaner ($\rho = .309, p < .001$) than cigarettes; help smokers quit cigarettes ($\rho = .272, p < .001$); and are acceptable according to friends ($\rho = .518, p < .001$) and family ($\rho = .416, p = .001$).

Conclusion. Many older smokers believe e-cigarettes will help them quit cigarettes and do not understand the risks and health effects of e-cigarettes. The perception of social acceptability is associated with older smokers' tobacco use patterns (i.e. using or trying e-cigarettes and quitting cigarettes) and is an important consideration for healthcare professionals and policy-makers. Healthcare providers should be prepared to educate and support older smokers, an understudied population that must be informed of current evidence regarding e-cigarette use and evidence-based smoking cessation.

Table of Contents

Problem and Significance	1
Specific Aims	3
Review of Literature	3
Prevalence of Cigarette Smoking Among Older Adults	3
Cigarette Smoking Cessation and Older Adults	4
Prevalence of e-Cigarette Use Among Older Adults	5
Theoretical Framework	5
Methods	7
Study Procedures	7
Statistical Analysis	8
Results	8
Discussion	11
Nursing Implications	14
Limitations	15
Future Research	15
References	22

List of Tables

Table 1. Sample Characteristics ($N = 498$) Current Smokers (≥ 45 years)	17
Table 2. Comparisons of Current e-Cigarette Users Within Last 30 Days ($n = 108$) and Non-users Within Last 30 Days ($n = 390$)	18
Table 3. Comparisons of Smokers Seriously Considering Quitting Smoking ($n = 288$) and Not Considering Quitting Smoking ($n = 210$) Within the Next Six Months	19
Table 4. Likelihood of Trying e-Cigarettes for the First Time Within Six Months Correlated with Attitudes and Beliefs and Perceptions of Harm ($n = 243$)	20

List of Figures

Figure 1. Tobacco Consumer Decision-Making Model (TCDMM)	21
---	----

Problem and Significance

Adverse health outcomes associated with conventional cigarette smoking have been well documented and range from serious disease and disability to premature death (U.S. Department of Health and Human Services [USDHHS], 2014). After decades of research, there is enough evidence to confirm a causal relationship between smoking tobacco and multiple types of cancer (e.g., lung, bladder, cervical, esophageal, renal cell, oral, gastric, pancreatic, and leukemia), as well as emphysema, cardiovascular disease, and diabetes (USDHHS, 2014). In the last 20 years, the U.S. has made great progress in the reduction of smoking prevalence among adults, from 23% in 2000 to 15% in 2015 (Jamal et al., 2016). However, the smallest reduction in the prevalence of smoking has occurred among adults 45 years old and older (Centers for Disease Control and Prevention [CDC], 2016). Between 2000 and 2015, past-year quit attempts of conventional cigarettes increased for adults 18 years and older, while both past-year quit attempts and successful cessation decreased for older adults 45 years and older (Babb, Malarcher, Schauer, Asman, & Jamal, 2017). Older smokers overestimate the benefits of smoking, underestimate their ability to quit smoking, and are unaware of the full benefits of cessation (Dawel & Anstey, 2011; Willems, Willemsen, Nagelhout, & de Vries, 2012). Further, the burden of tobacco-related impairment is greatest for older adults, and despite their vulnerability, they are an understudied population who are often excluded from tobacco control efforts (Cataldo, Petersen, Hunter, Wang, & Sheon, 2015; Dawel & Anstey, 2011).

Though the severity of tobacco-related disease and disability is higher for older adults, quitting smoking can still improve their health and their quality and length of life (Kleykamp & Heishman, 2011; Tran, Falster, Douglas, Blyth, & Jorn, 2015). Attempts by older adults to quit smoking are often undermined by two factors: 1) the lack of knowledge and/or interest among

their health care providers and 2) tobacco company promotion of products that promise a “healthier way to smoke” and a safe and effective way to achieve cessation. This phenomenon is exemplified by the 2007 entry of electronic cigarettes (e-cigarettes) to the U.S. market (Rigotti & Kalkhoran, 2016). E-cigarettes are battery-powered devices that heat and aerosolize liquids containing different levels of nicotine and flavoring agents plus numerous additional known and unknown substances (Grana, Benowitz, & Glantz, 2014a). E-cigarette emissions include nicotine, oxidizing chemicals, aldehydes, particulates, and flavourants, all harmful to cardiovascular health, as well as varying levels of toxic compounds (i.e. acrolein, toxic metals, volatile organic compounds, carcinogenic nitrosamines) (Benowitz & Fraiman, 2017; Goniewicz et al., 2014). Although the levels of toxic compounds are nine to 450 times lower than those found in conventional cigarette smoke, thresholds for human toxicity of potential toxicants in e-cigarette vapor are still unknown (Goniewicz et al., 2014; Grana et al., 2014a). Evidence indicates that amounts of ultrafine particles emitted from e-cigarettes are comparable to those of conventional cigarette emissions and some e-cigarette flavors are cytotoxic (Goniewicz et al., 2014; Grana et al., 2014a). E-cigarette aerosols can include metals, such as nickel, two to 100 times higher than the amount known to be in Marlboro brand cigarette smoke (Williams, Villarreal, Bozhilov, Lin, & Talbot, 2013). In addition, the battery, heating element, reservoir, and temperature used to heat e-liquid can influence the amount and nature of the ultrafine particles that are produced, and these metal nanoparticles can cause local respiratory toxicity and enter the systemic circulation (Williams et al., 2013).

Because e-cigarettes are being marketed as a healthier alternative to the conventional cigarette and an effective smoking cessation tool, older adults are specifically being targeted (Brody, 2014; Cataldo et al., 2015). As evidence accumulates about the carcinogens and toxins in

most e-cigarettes, consumers' knowledge about safety and long-term health effects remains limited (Syamlal, Jamal, King, & Marurek, 2016). In addition, the U.S. Preventive Services Task Force has not found enough evidence to support the claim that e-cigarettes are an effective cessation tool (Syamlal et al., 2016). Meanwhile, the prevalence of e-cigarette use is steadily increasing among older current and former cigarette smokers (King, Patel, Nguyen, & Dube, 2015).

Despite the importance of risk and benefit perceptions in the decision to use tobacco products, most research about perceptions of tobacco use has focused on adolescents and young adults (Wilson & Wang, 2017). The purpose of this study was to investigate older smokers' attitudes, beliefs, and perceptions about e-cigarette use and to explore how these beliefs are associated with smoking behavior and e-cigarette use.

The specific aims of this national cross-sectional survey study among older (≥ 45 years old) current conventional cigarette smokers include:

- 1) Describe e-cigarette use (ever used and current use within the last 30 days) and intent to quit cigarettes (would like to quit cigarettes, seriously considering quitting within the next six months, and planning to quit within the next 30 days).
- 2) Explore the associations among: attitudes and beliefs about e-cigarettes (i.e. safety, effectiveness as a tool for cessation, social acceptability, importance of flavors) and use of e-cigarettes, intention to use e-cigarettes, and intention to quit conventional cigarettes in the next six months.

Review of Literature

Prevalence of Cigarette Smoking Among Older Adults

In 2015, there were 36.5 million U.S. adult cigarette smokers (Jamal et al., 2016). Though

the overall proportion of conventional cigarette smokers has decreased from 20.9% in 2005, further analysis of the population stratified by age demonstrates less reduction in adults ≥ 45 years, with the lowest decline in smoking prevalence among adults ≥ 65 years of age (USDHHS, 2014). Between 2005 and 2015, the prevalence of current cigarette smokers decreased by only 2.1% in adults ≥ 65 years of age, compared to reductions of 46% among 18-24 year olds and 22.2% among 25-44 year olds (Jamal et al., 2016). Hence, older smokers are the group who are less likely to quit while at the same time they experience the greatest smoking related health burden of all age groups and they minimize both the risks of smoking and the benefits of cessation (Dawel & Anstey, 2011).

Cigarette Smoking Cessation and Older Adults

Smoking cessation provides significant health benefits at all ages and is associated with a decline in inflammatory markers such as C-reactive protein. In former smokers, reduced inflammation and oxidative stress are associated with a lower risk of dementia and other age-related diseases (Dawel & Anstey, 2011; Gellert, Schottker, & Brenner, 2012; USDHHS, 2014). In one study, smokers ≥ 68 years old who quit smoking during the two-year study period experienced less cognitive decline and brain atrophy when compared to those who continued to smoke during the same period (Almeida et al., 2011). Another study of 45-64 year old smokers showed that many were not aware of the health benefits of cessation and did not understand that by quitting smoking, they could reverse many of the health effects of smoking (Dawel & Anstey, 2011; Kerr et al., 2006). Though research has shown that quitting smoking can improve health, quality of life, and life expectancy, adults ≥ 65 years old are about half as likely to try to quit as smokers who are 18-24 years old (Kleykamp & Heishman, 2011). In the past, the tobacco industry has aggressively and successfully targeted older adults with deceptive marketing of

“light” and “low-tar” cigarettes as healthier choices and an acceptable alternative to quitting (Cataldo & Malone, 2008). Currently, the tobacco industry is repeating that strategy with the marketing of e-cigarettes (Grana & Ling, 2014).

Prevalence of e-Cigarette Use Among Older Adults

In just one year, from 2010 to 2011, the proportion of U.S. adults who had ever used an e-cigarette almost doubled, from 3.3% to 6.2% (CDC, 2016; King et al., 2013). In 2011, 21.2% of current cigarette smokers had ever used an e-cigarette, compared to only 9.8% in 2010 (King et al., 2013). In addition, King and colleagues (2013) found that current cigarette smokers were significantly more likely to have ever used e-cigarettes than former or never smokers.

In 2015, 58.8% of U.S. adult e-cigarette users were current conventional cigarette smokers, 29.8% were former cigarette smokers, and only 11.4% were never smokers (compared to 1.3% of older e-cigarette users who were never smokers) (CDC, 2016). This suggests that dual use of both e-cigarettes and cigarettes may be a common outcome for cessation attempts with e-cigarettes. While tobacco-related health burden and health care costs are greatest for this population, older smokers have the lowest quit rate of any age group (Cataldo et al., 2015). The current confluence of three factors related to e-cigarettes: the increasing prevalence of e-cigarette use by U.S. adults; their unknown health effects; and their unknown effectiveness as a cessation tool, highlights the need for more research to characterize the benefit and risk perceptions and explore how they might impact e-cigarette and cigarette use patterns among older adults (Grana et al., 2014a).

Theoretical Framework

For this study, we used the Tobacco Consumer Decision-Making Model (TCDMM). This model was developed by synthesizing literature on the relationship between tobacco-related

perceptions and tobacco use with literature on tobacco marketing (Halpern-Felsher & Cauffman, 2001). The TCDMM encompasses the onset, continuation, cessation, relapse, dual use, and switching of tobacco products (J. Cataldo, personal communication, April 1, 2017).

The TCDMM (Figure 1) is grounded in behavioral decision theory, including the Theory of Planned Behavior and the Hypothetical Model of Tobacco Consumer Response (Ajzen, 1985; Fishbein & Ajzen, 1975; Rees et al., 2009). The TCDMM reflects the fact that demographic and clinical factors, as well as past tobacco experiences, impact perceptions of risks, benefits, and acceptability of products. These perceptions are influenced by contextual factors such as exposure to tobacco marketing campaigns and anti-tobacco marketing efforts. Decisions to use tobacco (initiate, continue, switch products, dual use, relapse, cessation) are shaped by perceptions of tobacco-related risk, benefits, and acceptability of the tobacco product (J. Cataldo, personal communication, April 1, 2017). There is mounting empirical evidence that tobacco marketing contributes to smokers' perceptions about the availability, risks, and use of tobacco products, as well as their smoking patterns and behaviors (Pierce, 2007).

There is solid evidence of a predictive relationship between risk and benefit perceptions and tobacco product use, supporting the premise that cigarette smokers perceive more benefits and fewer risks of smoking than non-smokers (Pierce, 2007). Tobacco companies market the perception that smoking is acceptable and less harmful in order to encourage tobacco product use (Pierce, 2007). However, there is a lack of research investigating the impact of age and how risk and benefit perceptions, especially related to tobacco marketing, affect older adults' decisions to use tobacco products. This study further contributes to the literature by utilizing the TCDMM to explore how older smokers' perceptions of risks and benefits of conventional cigarettes and e-cigarettes are related to their tobacco use patterns.

Methods

This study is a secondary analysis of the 2014 cross-sectional phase of the Tobacco Attitudes and Beliefs Study (TABS). TABS uses a national sample of current and former adult tobacco users in three phases: focus groups, cross-sectional survey, and longitudinal survey. The present study analyzes the data from the cross-sectional correlational design phase. The data were collected between July and August of 2014, with a national sample of current tobacco smokers ≥ 45 years old ($N = 498$).

Study Procedures

Study participants were randomly selected to participate in the TABS survey from a panel of millions of respondents using QualtricsPanel, a recruitment service available through the research platform Qualtrics Inc. If selected for the study, individuals received an email requesting their participation. Those who chose to participate were directed to an online survey. Survey questions included: demographic and clinical variables; measures of perceptions of tobacco product acceptability, risks, and benefits; tobacco product use and intention to use; and intention to stop and/or stop using e-cigarettes. Within the survey, participants were shown images of different types of e-cigarettes and instructed that throughout the survey, “e-cigarettes” would refer to all electronic cigarettes, vaporizers, vape pens, and vapes.

Participants logged onto the web application using unique passwords and were presented with instructions, navigation tools, and a number for telephone support. After providing consent, participants were presented with screening questions about their age and smoking history. Individuals were included in the TABS study if they were a current or former smoker and were at least 45 years old. For the present analysis, former smokers were excluded. TABS was approved by the University of California, San Francisco Institutional Review Board, and for their

time and effort, survey participants were given a \$10 gift card at the completion of the survey.

Statistical Analysis

SPSS version 24.0 was used to analyze survey responses. Data was screened for anomalous values using standard descriptive summaries and graphical methods. The Mann-Whitney U was used to analyze nonparametric data when comparing dichotomous independent variables on ordinal outcomes. Correlations were used for nonparametric data to compare two ordinal variables using Spearman's rho correlation coefficient. For all statistical tests, a p -value < 0.05 was considered statistically significant.

Survey questions examining attitudes, beliefs, and perceptions were measured on Likert-type scales. The attitude and belief questionnaire items were measured on a Likert-type scale of 1 to 4, with higher values indicating greater agreement. Perceptions of harm of the products were measured on a Likert-type scale of 1 to 5, with higher values indicating greater agreement.

The Mann-Whitney U was used to determine whether significant differences were present between two groups when comparing distributions of survey responses for ordinal Likert-type survey questions. However, for ease of reader comprehension, means and standard deviations of survey responses were derived from t -tests and displayed in Tables 2-3 along with appropriate p -values from the Mann-Whitney U results.

Results

As shown in Table 1, participants ($N = 498$) ranged from 45 to 81 years old ($M = 57.1$, $SD = 7.3$). The age that participants started smoking regularly ranged from eight to 45 years old ($M = 18.8$, $SD = 5.4$). Over half of current smokers (59.6%, $n = 297$) had used e-cigarettes at least once, 21.7% ($n = 108$) used within the last 30 days, and 14.3% ($n = 71$) used within the last seven days. Of the 201 smokers who had never tried e-cigarettes, 34.8% ($n = 70$) reported that

they intended to try e-cigarettes within the next six months. When asked whether they “would like to quit smoking conventional cigarettes,” 74.9% ($n = 329$) said yes; 57.8% ($n = 288$) were seriously considering quitting within the next six months; and only 22.1% ($n = 110$) were planning to quit within the next 30 days.

The majority of participants (76.5%, $n = 322$) indicated that they agree with the statement “e-cigarettes help people quit smoking cigarettes,” over half (52.7%, $n = 236$) have considered using e-cigarettes to quit smoking conventional cigarettes, and 31.9% ($n = 143$) have already used them for that purpose. While 80.6% ($n = 304$) agreed “friends think it is okay to use e-cigarettes,” only 41.9% ($n = 190$) agreed “friends think it is okay to use [conventional] cigarettes.” Similarly, 61.8% ($n = 308$) agreed “family thinks it is okay to use e-cigarettes,” while only 27.5% ($n = 137$) agreed “family thinks it is okay to use [conventional] cigarettes.” In addition, 62.4% ($n = 256$) believed that “‘smoke’ from e-cigarettes is just water” and 68.2% ($n = 268$) believed that e-cigarettes were “addictive.”

Tables 2-4 present data on smokers’ attitudes and beliefs about tobacco products and their perceptions of harm for both e-cigarettes and conventional cigarettes. As shown in Table 2, when the distributions of survey responses were compared between smokers who in the last 30 days were current e-cigarette users ($n = 108$) and non-users ($n = 390$), the two groups differed significantly on 14 statements. Current e-cigarette users agreed more than non-users that e-cigarettes: help you quit using cigarettes ($p < .001$); feel cleaner than smoking [cigarettes] ($p < .001$); are futuristic ($p = .001$); are safer than conventional cigarettes ($p = .002$); do not contain tar ($p = .008$); flavors are important to me ($p < .001$); and flavored e-cigarettes are better than non-flavored to help quit [conventional] cigarettes ($p = .005$). When compared to non-users, current e-cigarette users believed more strongly that both friends and family think it is okay to

use e-cigarettes ($p = .010, p = .007$); it is okay to use e-cigarettes in the house ($p = .004$); and e-cigarettes should be allowed indoors ($p = .011$) and outdoors ($p = .043$). Non-users believed more strongly than current e-cigarette users that cigarettes are cheaper than e-cigarettes ($p = .012$) and e-cigarette vapor is dangerous to children ($p < .001$).

As shown in Table 3, distributions of survey responses between conventional cigarette smokers who were seriously considering quitting smoking within six months ($n = 288$) and not considering quitting ($n = 210$) were significantly different for seven statements. Those seriously considering quitting smoking agreed more strongly that: e-cigarettes help you quit using [conventional] cigarettes ($p = .044$); e-cigarette flavors are important to me ($p = .023$); and [conventional] cigarettes are harmful to self ($p < .001$) and to others ($p < .001$). Smokers not seriously considering quitting smoking believed more strongly that: friends think it is okay to use cigarettes ($p < .001$); family think it is okay to use cigarettes ($p < .001$); and cigarettes are easier to get than e-cigarettes ($p = .035$).

Among conventional cigarette smokers who had never tried e-cigarettes, intent to try e-cigarettes for the first time in the next six months ($n = 243$) was significantly associated with several attitudes and beliefs (see Table 4). A positive Spearman's rho correlation coefficient indicates that increasing likelihood of trying e-cigarettes was significantly associated with stronger agreement that: e-cigarettes are safer than [conventional cigarettes] ($\rho = .408, p < .001$); flavors are important to me ($\rho = .383, p < .001$); friends think it is okay to use e-cigarettes ($\rho = .518, p < .001$); family think it is okay to use e-cigarettes ($\rho = .416, p = .001$), e-cigarettes help you quit using cigarettes ($\rho = .272, p < .001$); e-cigarettes are not addictive ($\rho = .255, p = .001$); smoke from e-cigarettes is just water ($\rho = .275, p < .001$); and using e-cigarettes feels cleaner than smoking ($\rho = .309, p < .001$). As respondents' perception of e-cigarettes as harmful to self

and others increased, their likelihood of trying e-cigarettes for the first time in the next six months decreased ($\rho = -.315, p < .001$; $\rho = -.204, p = .001$, respectively).

Discussion

The findings from this study add to the limited literature on older smokers' attitudes, beliefs, and perceptions about e-cigarette use and how these beliefs are associated with tobacco product use (i.e., conventional cigarettes and e-cigarettes). There are several important findings from this study: most older smokers want to quit conventional cigarettes, believe e-cigarettes are an effective smoking cessation tool and are healthier than conventional cigarettes, and many are using e-cigarettes. In addition, older smokers' perception of social acceptability can influence their decisions to start and maintain conventional cigarette and e-cigarette use.

The findings from this study suggest the majority of older smokers want to quit conventional cigarettes, are seriously considering quitting in the next six months, and about 20% plan to quit within the next 30 days. Meanwhile, almost 80% of older smokers have experienced "failure" with at least one attempt at cessation. Those intending to quit smoking were more likely to believe that cigarettes are harmful to themselves and to others, while smokers not intending to quit were more likely to believe that friends and family think it is "okay to use cigarettes." These findings support Young et al. (2010) that a belief in harm to self and others is a motivator to quit smoking, while the experience of social acceptance of smoking cigarettes is a motivator to continue smoking. In addition, Pepper and colleagues (2014) found that a common reason for e-cigarette use was the influence of friends and family members, and the perception of social acceptability of e-cigarettes can influence both initiation and continued use of the product. Findings from this study confirm that the perception of social acceptability is important for older smokers and has the potential to influence their cigarette and e-cigarette use patterns.

In this study, 60% of older smokers had tried e-cigarettes and 22% were currently using e-cigarettes. In addition, of those who had never tried e-cigarettes, 35% intended to try them for the first time within the next six months. These findings support Grana, Popova, and Ling (2014b), who found that dual use of conventional cigarettes and e-cigarettes occurs among a significant proportion of tobacco users. Our findings support the range found in a previous study where dual use for older adults was 21 to 34% (Finney Rutten et al., 2015). Dual use of products is concerning because it can discourage cessation and contribute further to nicotine addiction by allowing smokers to use e-cigarettes to avoid smoke-free air restrictions and to be exposed to additional nicotine (Benowitz & Fraiman, 2017).

Our findings suggest that smokers who intend to try e-cigarettes believe that e-cigarettes are safer, more socially acceptable, healthier and less addictive than cigarettes, and that the vapor from e-cigarettes is “just water.” In addition, current e-cigarette users believed that e-cigarettes are an effective smoking cessation tool and are safer and cleaner than conventional cigarettes. These findings support previous research that found common reasons for e-cigarette use include the belief they are less harmful than conventional cigarettes and that they can be used to help quit smoking (Finney Rutten et al., 2015; Rass Pacek, Johnson, & Johnson, 2015). Pearson and colleagues (2012) found that dual use was popular because e-cigarettes are perceived as convenient, cheaper, and as not emitting second-hand smoke. Interestingly, though most older smokers in the present study believed e-cigarettes are safer and less harmful than cigarettes, they did not believe that e-cigarettes should be advertised as a “healthier way to smoke.” This finding supports two studies that showed many adult smokers are skeptical and uncertain about their perceptions of benefits, risk, and harm related to e-cigarettes (Cataldo et al., 2015; Coleman et al., 2016). The findings from this study suggest that older smokers who are not currently using e-

cigarettes believe that e-cigarette vapor is dangerous to children; as with conventional smoking, the perception of danger to children effectively discourages the use of tobacco products (Finney Rutten et al., 2015; Rass et al., 2015).

Of concern, almost half of e-cigarette users indicated that they wanted to quit e-cigarettes; however, 17% were continuing to use e-cigarettes because “it was too hard to quit them.” Since smokers who are considering trying e-cigarettes for the first time tend to believe that e-cigarettes are socially acceptable, effective as a cessation tool, safer than conventional cigarettes, and are not addictive, it is imperative to educate the public about the risks of harm and addiction related to e-cigarettes (Grana et al., 2014a). A meta-analysis of 20 studies showed that use of e-cigarettes was associated with significantly lower odds of cessation than nicotine-replacement therapy or no cessation tool, and for the majority of smokers, the use of e-cigarettes actually lowers the chance of successfully quitting (Kalkhoran & Glantz, 2016; Yeh, Bullen, & Glantz, 2016). Education needs to include all of the risks inherent to e-cigarettes: they are addictive, not proven as an effective cessation tool, and they contain known and unknown toxins (Grana et al., 2014a; Kalkhoran & Glantz, 2016).

This research contributes to the evidence needed to guide regulatory policy. As of May 2016, the Food and Drug Administration (FDA) extended its authority to include e-cigarettes within the definition of a tobacco product (Jamal et al., 2016). Because manufacturing, marketing, and sales of tobacco products will be affected by this change, it is currently unknown how this will affect older adults’ perceptions of the benefits and risks of e-cigarettes and in turn influence their tobacco product use behaviors (Jamal et al., 2016). Since findings from this study show the perception of social acceptability can influence tobacco product use patterns, it is

especially important to consider how regulations on e-cigarette use in clean air environments can affect smokers' perceptions of social acceptability (Grana et al., 2014a).

Nursing Implications

Among older smokers, their decision to quit and confidence in their ability to do so are influenced by advice from their healthcare providers (Dawel & Anstey, 2011). Nurses need to know that the myth that older smokers have “given up” and no longer want to quit is false; most older smokers want to quit smoking and need to be told that they can (Cataldo, 2007). Nurses need to be aware of the potential dangers of e-cigarettes and provide evidence-based education about the safety and lack of efficacy of e-cigarettes as a cessation tool. Older smokers should be counseled on options for smoking cessation, starting with evidence-based FDA-approved smoking cessation tools and pharmacotherapy (Rigotti & Kalkhoran, 2016). During patient education, nurses should discuss the harm of dual use and emphasize that even low-dose tobacco smoke exposure can contribute to ischemic heart disease (Law & Wald, 2003). Many smokers are unaware of e-cigarette ingredients and health effects but express interest in learning more, so nurses should be prepared to educate and support older smokers (Coleman et al., 2016). Nurses need to incorporate behavioral support, an evidence-based intervention, into their treatment of patients with nicotine addiction. The combination of prescription medications and behavioral counseling predicts cessation success; providing these facts to older adults may help increase their confidence in their ability to quit smoking (Dawel & Anstey, 2011; Stead & Lancaster, 2012; Yeh et al., 2016). Findings from this study can contribute to the evidence needed to help guide nurses and other clinicians in the provision of population-specific patient education, along with individualized smoking cessation treatment.

Limitations

Though the cross-sectional design offers valuable information about associations between different variables, it cannot prove causation. As with most survey-based studies, there was potential for self-selection bias because participants chose whether or not to participate, and the design does not allow for a comparison of the group included in the study with the group who refused participation. Because of the length of the survey and the repetitive nature of some items, respondent fatigue could have been responsible for some inconsistent responses. Repetition in survey questions was necessary because TABS investigated several products, not just conventional cigarettes and e-cigarettes. All survey responses were self-report and because of cost limitations, biomarkers such as cotinine were not used to validate product use. Finally, though the sample size was large, missing responses were filtered out during data analysis, which created a minimal reduction in the sample size for some analyses. Some survey questions included a “don’t know” option, and these survey responses were also filtered out during data analyses (valid percentages were used for descriptive purposes).

Future Research

Further research is needed to study this vulnerable population, contribute to the existing evidence, and help inform comprehensive population-level interventions (Hu et al., 2016). Further research is needed to contribute to the limited evidence of e-cigarettes’ potential effectiveness as a smoking cessation tool for older adults who want to quit or reduce smoking conventional cigarettes. In addition, it is necessary to continue investigating the safety and long-term health effects of e-cigarettes, as well as determine thresholds for toxic substances found in e-cigarettes. Both qualitative and quantitative studies are needed to provide evidence to support further public policy changes and improvements in nursing care for older smokers. Longitudinal

studies should investigate cessation outcome data and characterize older smokers' use patterns and perception of e-cigarettes over time. Different patterns of e-cigarette use between current and former smokers highlight a need for further studies to understand the motivations for the use of e-cigarettes and their role in promoting or discouraging cessation (Delnevo et al., 2016; Harrell, Simmons, Correa, Padhya, & Brandon, 2014). In conclusion, this study helps establish how attitudes and beliefs about tobacco products influence older smokers' tobacco use patterns and how understanding this relationship can inform policy and enhance patient education and care for older smokers.

Table 1. Sample Characteristics (N = 498) Current Smokers (≥ 45 years)			
	Range	M	SD
Age (≥ 45 years)	45-81	57.1	7.3
Years Smoked	5-60	37.4	9.9
Age Started Smoking Regularly	8-45	18.8	5.4
		n	%
Gender			
Female		278	55.8
Male		219	44
Transgender		1	0.2
Ethnicity			
Caucasian/White		415	83.3
African American/Black		46	9.2
Other/Multiple ethnic groups		37	7.4
Income			
≤ \$10,000		36	7.2
\$11,000-40,000		241	48.5
\$41,000-70,000		132	26.4
\$71,000-100,000		45	9
> \$100,000		44	8.8
Education			
Did not complete high school		22	4.4
Completed high school/GED		134	26.9
Some college		177	35.5
Completed college		118	23.7
Some graduate school		14	2.8
Completed graduate school		33	6.6
Employment			
Employed		222	44.6
Unemployed		55	11
Retired		163	32.7
Full-time homemaker		55	11
Student		3	0.6
Cohabitant Smoking Status			
Subject lives alone		130	26.1
Cohabitant does not smoke		190	38.2
Cohabitant smokes		174	34.9
Cohabitant trying to quit		4	0.8
Data are presented as mean and standard deviation or %.			

Table 2. Comparisons of Current e-Cigarette Users Within Last 30 Days (n=108) and Non-users Within Last 30 Days (n=390)	Current e-Cigarette Users (n = 108) M (SD)	Not Current e-Cigarette Users (n = 390) M (SD)	p-value from Mann-Whitney U
Attitudes and Beliefs (Likert Scale 1 to 4)*			
Okay to use e-cigarettes in the house	3.3 (.8)	3.0 (.9)	.004
Smoke from e-cigarettes is just water	2.9 (.9)	2.8 (.9)	.160
E-cigarettes don't contain tar	3.2 (.8)	2.9 (.8)	.008
Cigarettes are easier to get than e-cigarettes	2.6 (.9)	2.7 (.9)	.075
Cigarettes are cheaper than e-cigarettes	2.4 (1.0)	2.7 (.9)	.012
E-cigarettes aren't addictive	2.3 (.8)	2.2 (.8)	.396
E-cigarettes aren't a tobacco product	2.6 (.9)	2.5 (.9)	.241
E-cigarette vapor is dangerous to children	2.4 (1.0)	2.8 (.9)	<.001
E-cigarettes should be allowed outdoors	3.4 (.7)	3.2 (.8)	.043
People use e-cigarettes to get the same buzz that they get from cigarettes	2.8 (.9)	2.7 (.9)	.221
E-cigarettes don't produce smoke	2.9 (1.0)	2.9 (.9)	.282
E-cigarettes help you quit using cigarettes	3.2 (.7)	2.9 (.9)	<.001
E-cigarettes should be allowed indoors	2.9 (1.0)	2.6 (1.0)	.011
Using e-cigarettes feels cleaner than smoking	3.5 (.6)	3.1 (.8)	<.001
E-cigarettes are futuristic	3.3 (.7)	3.0 (.8)	.001
E-cigarettes are safer smoking	3.2 (.8)	2.9 (.9)	.002
Flavored e-cigarettes are better for helping quit cigarettes than non-flavored e-cigarettes	2.7 (.9)	2.4 (.9)	.005
E-cigarette flavors are important to me	2.5 (1.1)	1.8 (.9)	<.001
Friends think it is okay to use e-cigarettes	3.2 (.7)	2.9 (.8)	.010
Friends think it is okay to use cigarettes	2.3 (.8)	2.3 (.9)	.745
Family think it is okay to use e-cigarettes	2.8 (.7)	2.5 (.9)	.007
Family think it is okay to use cigarettes	2.0 (.8)	2.0 (.8)	.897
Perceptions of Harm (Likert Scale 1 to 5)**			
How harmful are e-cigarettes to self	2.4 (1.0)	2.6 (1.1)	.075
How harmful are cigarettes to self	4.4 (.8)	4.3 (.9)	.072
How harmful are e-cigarettes to others	1.8 (1.1)	1.9 (1.2)	.502
How harmful are cigarettes to others	3.8 (1.1)	3.6 (1.2)	.204

Significant p -values ($\alpha < .05$) are bolded. Higher means correspond with greater agreement with the statements (attitudes, beliefs, perceptions of harm).

*Attitudes and beliefs: Likert-type scale 1 to 4 (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree)

**Perceptions of harm: Likert-type scale 1 to 5 (1 = not at all harmful, 2 = slightly harmful, 3 = moderately harmful, 4 = quite harmful, 5 = extremely harmful)

Table 3. Comparisons of Smokers Seriously Considering Quitting Smoking (<i>n</i> = 288) and Not Considering Quitting Smoking (<i>n</i> = 210) Within the Next Six Months	Considering Quitting Smoking (<i>n</i> = 288) M (SD)	Not Considering Quitting Smoking (<i>n</i> = 210) M (SD)	p-value from Mann-Whitney U
Attitudes and Beliefs (Likert Scale 1 to 4)*			
Okay to use e-cigarettes in the house	3.0 (.8)	3.1 (.9)	.305
Smoke from e-cigarettes is just water	2.8 (.9)	2.8 (.9)	.489
E-cigarettes don't contain tar	3.0 (.8)	3.0 (.9)	.853
Cigarettes are easier to get than e-cigarettes	2.6 (.9)	2.8 (.9)	.035
Cigarettes are cheaper than e-cigarettes	2.5 (.9)	2.6 (1.0)	.278
E-cigarettes aren't addictive	2.2 (.8)	2.3 (.8)	.713
E-cigarettes aren't a tobacco product	2.5 (.9)	2.5 (.9)	.900
E-cigarette vapor is dangerous to children	2.8 (1.0)	2.7 (.9)	.512
E-cigarettes should be allowed outdoors	3.2 (.8)	3.3 (.7)	.387
People use e-cigarettes to get the same buzz that they get from cigarettes	2.7 (.9)	2.8 (.8)	.874
E-cigarettes don't produce smoke	2.9 (.9)	2.9 (.9)	.943
E-cigarettes help you quit using cigarettes	3.0 (.8)	2.9 (.8)	.044
E-cigarettes should be allowed indoors	2.6 (1.0)	2.7 (1.0)	.140
Using e-cigarettes feels cleaner than smoking	3.2 (.8)	3.1 (.7)	.305
E-cigarettes are futuristic	3.0 (.8)	3.1 (.8)	.929
E-cigarettes are safer smoking	3.1 (.8)	2.9 (1.0)	.058
Flavored e-cigarettes are better for helping quit cigarettes than non-flavored e-cigarettes	2.6 (.9)	2.4 (.9)	.260
E-cigarette flavors are important to me	2.1 (1.0)	1.9 (.9)	.023
Friends think it is okay to use e-cigarettes	3.0 (.7)	2.9 (.8)	.164
Friends think it is okay to use cigarettes	2.1 (.9)	2.5 (.8)	<.001
Family think it is okay to use e-cigarettes	2.6 (.9)	2.6 (.8)	.754
Family think it is okay to use cigarettes	1.9 (.8)	2.1 (.8)	<.001
Perceptions of Harm (Likert Scale 1 to 5)**			
How harmful are e-cigarettes to self	2.6 (1.1)	2.4 (1.1)	.054
How harmful are cigarettes to self	4.5 (.7)	4.0 (.9)	<.001
How harmful are e-cigarettes to others	1.9 (1.2)	1.8 (1.1)	.156
How harmful are cigarettes to others	3.9 (1.1)	3.3 (1.2)	<.001

Significant *p*-values ($\alpha < .05$) are bolded. Higher means correspond with greater agreement with the statements (attitudes, beliefs, perceptions of harm).

*Attitudes and beliefs: Likert-type scale 1 to 4 (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree)

**Perceptions of harm: Likert-type scale 1 to 5 (1 = not at all harmful, 2 = slightly harmful, 3 = moderately harmful, 4 = quite harmful, 5 = extremely harmful)

Table 4. Likelihood of Trying e-Cigarettes for the First Time Within Six Months* Correlated with Attitudes and Beliefs and Perceptions of Harm (n = 243)	Spearman Rho Correlation Coefficient (ρ)	p-value
Attitudes and Beliefs (Likert Scale 1 to 4)**		
Okay to use e-cigarettes in the house	.278	<.001
Smoke from e-cigarettes is just water	.275	<.001
E-cigarettes don't contain tar	.382	<.001
Cigarettes are easier to get than e-cigarettes	-.034	.641
Cigarettes are cheaper than e-cigarettes	.027	.728
E-cigarettes aren't addictive	.255	.001
E-cigarettes aren't a tobacco product	.140	.057
E-cigarette vapor is dangerous to children	-.094	.246
E-cigarettes should be allowed outdoors	.243	.001
People use e-cigarettes to get the same buzz that they get from cigarettes	-.091	.225
E-cigarettes don't produce smoke	.263	<.001
E-cigarettes help you quit using cigarettes	.272	<.001
E-cigarettes should be allowed indoors	.246	<.001
Using e-cigarettes feels cleaner than smoking	.309	<.001
E-cigarettes are futuristic	.287	<.001
E-cigarettes are safer smoking	.408	<.001
Flavored e-cigarettes are better for helping quit cigarettes than non-flavored e-cigarettes	.170	.044
E-cigarette flavors are important to me	.383	<.001
Friends think it is okay to use e-cigarettes	.518	<.001
Friends think it is okay to use cigarettes	.060	.385
Family think it is okay to use e-cigarettes	.416	<.001
Family think it is okay to use cigarettes	.048	.458
Perceptions of Harm (Likert Scale 1 to 5)***		
How harmful are e-cigarettes to self	-.315	<.001
How harmful are cigarettes to self	.054	.406
How harmful are e-cigarettes to others	-.204	.001
How harmful are cigarettes to others	.012	.850

Moderate correlation coefficients ($\rho \geq .250$) and significant p -values ($\alpha < .05$) are bolded.

*Likelihood of trying e-cigarettes for the first time (2 = very unlikely, 3 = somewhat unlikely, 4 = somewhat likely, 5 = very likely)

**Attitudes and beliefs: Likert-type scale 1 to 4 (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree)

***Perceptions of harm: Likert-type scale 1 to 5 (1 = not at all harmful, 2 = slightly harmful, 3 = moderately harmful, 4 = quite harmful, 5 = extremely harmful)

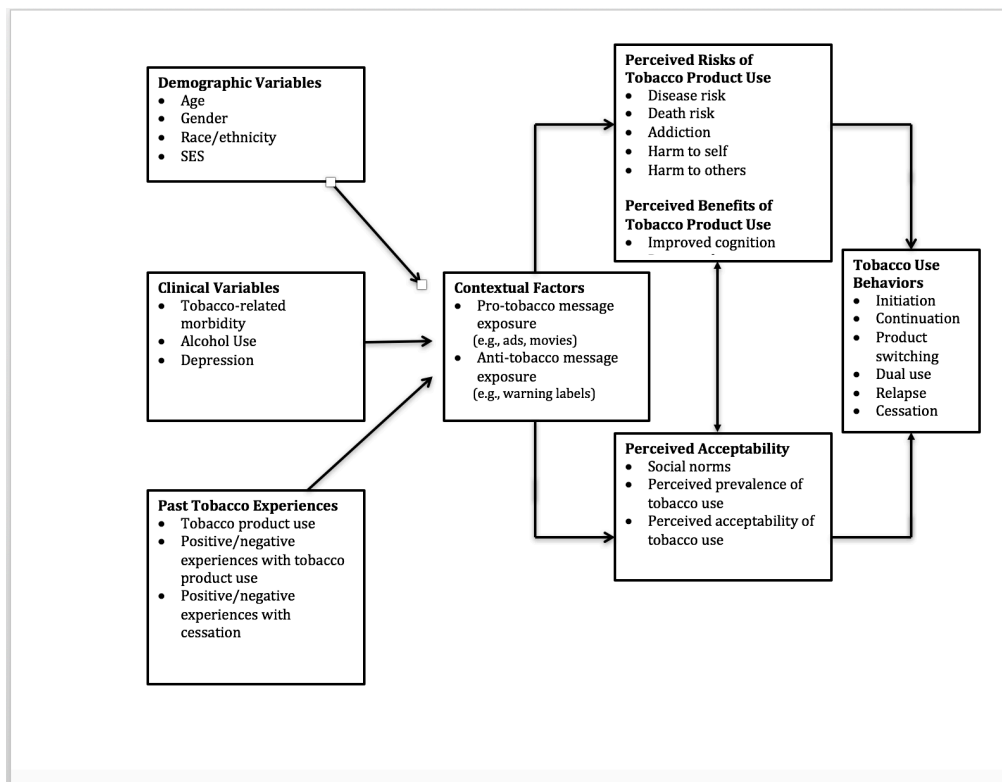


Figure 1. Tobacco Consumer Decision-Making Model (TCDMM). This figure illustrates the theoretical framework.

References

- Ajzen, I. (1985). *From intentions to action: A theory of planned behavior*. New York, NY: Springer-Verlag.
- Almeida, O. P., Garrido, G. J., Alfonso, H., Hulse, G., Lautenschlager, N. T., Hankey, G. J., & Flicker, L. (2011). 24-month effect of smoking cessation on cognitive function and brain structure in later life. *NeuroImage: Clinical*, 55(4), 1480-1489. doi: 10.1016/j.neuroimage.2011.01.063
- Babb, S., Malarcher, A., Schauer, G., Asman, K., & Jamal, A. (2017). Quitting smoking among adults — United States, 2000–2015. *Morbidity and Mortality Weekly Report*, 65(52), 1457–1464. doi: <http://dx.doi.org/10.15585/mmwr.mm6552a1>
- Benowitz, N. L., & Fraiman, J. B. (2017). Cardiovascular effects of electronic cigarettes. *Nature Reviews Cardiology*. doi: 10.1038/nrcardio.2017.36
- Brody, J. S. (2014). The promise and problems of e-cigarettes. *American Journal of Respiratory and Critical Care Medicine*, 189(4), 379-380. doi: 10.1164/rccm.201312-2263ED
- Cataldo, J. K. (2007). Clinical implications of smoking and aging: Breaking through the barriers. *Journal of Gerontological Nursing*, 33(8), 32-41.
- Cataldo, J. K., Petersen, A. B., Hunter, M., Wang, J., & Sheon, N. (2015). E-Cigarette marketing and older smokers: Road to renormalization. *American Journal of Health Behavior*, 39(3), 361-371.
- Cataldo, J. K., & Malone, R. E. (2008). False promises: the tobacco industry, “low tar” cigarettes, and older smokers. *Journal of the American Geriatrics Society*, 56(9), 1716-1723.
- Centers for Disease Control and Prevention, National Center for Health Statistics (2016).

- QuickStats: Cigarette smoking status among current adult e-cigarette users, by age group – National Health Interview Survey, United States, 2015. *Morbidity and Mortality Weekly Report*, 65(42), 1177. <http://dx.doi.org/10.15585/mmwr.mm6542a7>
- Coleman, B. N., Johnson, S. E., Tessman, G. K., Tworek, C., Alexander, J., Dickinson, D. M., ... Green, K. M. (2016). “It’s not smoke. It’s not tar. It’s not 4000 chemicals. Case closed”: Exploring attitudes, beliefs, and perceived social norms of e-cigarette use among adult users. *Drug and Alcohol Dependence*, 159, 80-85. doi:10.1016/j.drugalcdep.2015.11.028
- Dawel, A. & Anstey, K. (2011). Interventions for midlife smoking cessation: A literature review. *Australian Psychologist*, 46(3), 190-195. doi: 10.1111/j.1742-9544.2010.00014.x
- Delnevo, C. D., Giovenco, D. P., Steinberg, M. B., Villanti, A. C., Pearson, J. L., Niaura, R. S., & Abrams, D. B. (2016). Patterns of electronic cigarette use among adults in the United States. *Nicotine & Tobacco Research*, 18(5), 715-719. doi: 10.1093/ntr/ntv237
- Finney Rutten, L. J., Blake, K. D., Agunwamba, A. A., Grana, R. A., Wilson, P. M., Ebbert, J. O., ... Leischow, S. J. (2015). Use of e-cigarettes among current smokers: Associations among reasons for use, quit intentions, and current tobacco use. *Nicotine & Tobacco Research*, 17(10), 1228-1234.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley Publishing.
- Gellert, C., Schottker, B., & Brenner, H. (2012). Smoking and all-cause mortality in older people: Systematic review and meta-analysis. *Archives of Internal Medicine*, 172(11), 837-844. doi: 10.1001/archinternmed.2012.1397
- Goniewicz, M. L., Knysak, J., Gawron, M., Kosmider, L., Sobczak, A., Kurek, J., ... Benowitz, N. (2014). Levels of selected carcinogens and toxicants in vapour from electronic

- cigarettes. *Tobacco Control*, 23, 133-139. doi: 10.1136/tobaccocontrol-2012-050859
- Grana, R., Benowitz, N., & Glantz, S. A. (2014a). E-cigarettes: A scientific review. *Contemporary Reviews in Cardiovascular Medicine*, 129, 1972-1986.
<http://dx.doi.org/10.1161/CIRCULATIONAHA.114.007667>
- Grana, R. A., & Ling, P. M. (2014). "Smoking Revolution:" A content analysis of electronic cigarette retail websites. *American Journal of Preventative Medicine*, 46(4), 395-403. doi: 10.1016/j.amepre.2013.12.010
- Grana, R. A., Popova, L., & Ling, P. M. (2014b). A longitudinal analysis of e-cigarette use and smoking cessation. *JAMA Internal Medicine*, 174(5), 812–813.
<http://doi.org/10.1001/jamainternmed.2014.187>
- Halpern-Felsher B. L., & Cauffman, E. (2001). Costs and benefits of a decision: Decision-making competence in adolescents and adults. *Journal of Applied Developmental Psychology*, 22(3), 257-273.
- Harrell, P. T., Simmons, V. N., Correa, J. B., Padhya, T. A., & Brandon, T. H. (2014). Electronic nicotine delivery systems ("e-cigarettes"): Review of safety and smoking cessation efficacy. *Otolaryngology--Head and Neck Surgery: Official Journal of American Academy of Otolaryngology-Head and Neck Surgery*, 151(3), 381–393.
<http://doi.org/10.1177/0194599814536847>
- Hu, S. S., Neff, L., Agaku, I. T., Cox, S., Day, H. R., Holder-Hayes, E., & King, B. A. (2016). Tobacco product use among adults – United States, 2013-2014. *Morbidity and Mortality Weekly Report*, 65(27), 685-691. Retrieved from
<http://www.cdc.gov/mmwr/volumes/65/wr/mm6527a1.htm>
- Jamal, A., King, B. A., Neff, L. J., Whitmill, J., Babb, S. D., & Graffunder, C. M. (2016).

Current cigarette smoking among adults – United States, 2005-2015. *Morbidity and Mortality Weekly Report*, 65(44), 1205-1211. doi:

<http://dx.doi.org/10.15585/mmwr.mm6544a2>

Kalkhoran, S., & Glantz, S. A. (2016). E-cigarettes and smoking cessation in real-world and clinical settings: A systematic review and meta-analysis. *The Lancet Respiratory Medicine*, 4(2), 116-128.

Kerr, S., Watson, H., Tolson, D. Lough, M., & Brown, M (2006). Smoking after the age of 65 years: A qualitative exploration of older current and former smokers' views on smoking, stopping smoking, and smoking cessation resources and services. *Health & Social Care in the Community*, 14, 572–582. doi:10.1111/j.1365-2524.2006.00659.x

King, B. A., Alam, S., Promoff, G., Arrazola, R., & Dube, S. R. (2013). Awareness and ever use of electronic cigarettes among U.S. adults, 2010–2011. *Nicotine & Tobacco Research*, 15(9), 1623–1627. <http://doi.org/10.1093/ntr/ntt013>

King, B. A., Patel, R., Nguyen, K. H., & Dube, S. R. (2015). Trends in awareness and use of electronic cigarettes among US adults, 2010-2013. *Nicotine & Tobacco Research*, 17(2), 219-227. doi: 10.1093/ntr/ntu191

Kleykamp, B. A., & Heishman, S. J. (2011). The older smoker. *The Journal of the American Medical Association*, 306(8), 876-877. doi:10.1001/jama.2011.1221

Law, M. R., & Wald, N. J. (2003). Environmental tobacco smoke and ischemic heart disease. *Progress in Cardiovascular Diseases*, 46(1), 31-38.

Pearson, J. L., Richardson, A., Niaura, R. S., Vallone, D. M., & Abrams, D. B. (2012). E-Cigarette awareness, use, and harm perceptions in US adults. *American Journal of Public Health*, 102(9), 1758–1766. doi: 10.2105/AJPH.2011.300526

- Pepper, J. K., Ribisl, K. M., Emery, S. L., & Brewer, N. T. (2014). Reasons for starting and stopping electronic cigarette use. *International Journal of Environment Research and Public Health*, *11*(10), 10345-61.
- Pierce, J. P. (2007). Tobacco industry marketing, population-based tobacco control, and smoking behavior. *American Journal of Preventative Medicine*, *33*(6 Suppl), S327-34.
- Rass, O., Pacek, L. R., Johnson, P. S., & Johnson, M. W. (2015). Characterizing use patterns and perceptions of relative harm in dual users of electronic and tobacco cigarettes. *Experimental and Clinical Psychopharmacology*, *23*(6), 494-503. doi: 10.1037/pha0000050
- Rees, V. W., Kreslake, J. M., Cummings, K. M., O'Connor, R. J., Hatsukami, D. K., Parascandola, M., ... Connolly, G. N. (2009). Assessing consumer responses to potential reduced-exposure tobacco products: A review of tobacco industry and independent research methods. *Cancer Epidemiology, Biomarkers & Prevention*, *18*(12), 3225-3240.
- Rigotti, N. A., & Kalkhoran, S. (2016). E-cigarettes. *UpToDate*. Retrieved from <https://www-uptodate-com.ucsf.idm.oclc.org/contents/e-cigarettes>
- Stead, L. F., & Lancaster, T. (2012). Combined pharmacotherapy and behavioral interventions for smoking cessation. *The Cochrane Database of Systematics Reviews*, *10*, CD008286. doi: 10.1002/14651858.CD008286.pub2.
- Syamlal, G., Jamal, A., King, B. A., & Marurek, J. M. (2016). Electronic cigarette use among working adults – United States, 2014. *Morbidity and Mortality Weekly Report*, *65*(22), 557-561.
- Tran, B., Falster, M. O., Douglas, K., Blyth, F., & Jorn, L. R. (2015). Smoking and potentially preventable hospitalisation: The benefit of smoking cessation in older ages. *Drug and*

Alcohol Dependence, 150, 85-91. <http://doi.org/10.1016/j.drugalcdep.2015.02.028>

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health (2014). *The Health Consequences of Smoking: 50 Years of Progress. A Report of the Surgeon General*. Retrieved from <http://www.surgeongeneral.gov/library/reports/50-years-of-progress/full-report.pdf>

Willems, R. A., Willemsen, M. C., Nagelhout, G. E., & de Vries, H. (2012). Understanding smokers' motivations to use evidence-based smoking cessation aids. *Nicotine & Tobacco Research*, 15(1), 167-176. <https://doi.org/10.1093/ntr/nts104>

Williams, M., Villarreal, A., Bozhilov, K., Lin, S., & Talbot, P. (2013). Metal and silicate particles including nanoparticles are present in electronic cigarette cartomizer fluid and aerosol. *PLoS One*, 8(3), e57987. <https://doi.org/10.1371/journal.pone.0057987>

Wilson, F. A., & Wang, Y. (2017). Recent findings on the prevalence of e-cigarette use among adults in the U.S. *American Journal of Preventative Medicine*, 52(3), 385-390. <http://dx.doi.org.ucsf.idm.oclc.org/10.1016/j.amepre.2016.10.029>

Yeh, J. S., Bullen, C., & Glantz, S. A. (2016). E-cigarettes and smoking cessation. *The New England Journal of Medicine*, 374, 2172-2174. doi: 10.1056/NEJMc1de1602420

Young, R. P., Hopkins, R. J., Smith, M., & Hogarth, D. K. (2010). Smoking cessation: The potential role of risk assessment tools as motivational triggers. *Postgraduate Medical Journal*, 86(1011), 26-33.

Publishing Agreement

It is the policy of the University to encourage the distribution of all theses, dissertations, and manuscripts. Copies of all UCSF theses, dissertations, and manuscripts will be routed to the library via the Graduate Division. The library will make all theses, dissertations, and manuscripts accessible to the public and will preserve these to the best of their abilities, in perpetuity.

Please sign the following statement:

I hereby grant permission to the Graduate Division of the University of California, San Francisco to release copies of my thesis, dissertation, or manuscript to the Campus Library to provide access and preservation, in whole or in part, in perpetuity.



Author Signature

Cheryl Dankiewicz

June 14, 2017
Date