Brief Report

Perceptions of Tobacco Product-Specific COVID-19 Risk and Changes in Tobacco Use Behaviors Among Smokers, E-Cigarette Users, and Dual Users

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Abstract

Introduction: Coronavirus Disease 2019 (COVID-19) is a public health crisis, but its effects on tobacco users remain ill-defined. This report aimed to assess the relationship between tobacco product-specific risk perceptions for COVID-19 and changes in tobacco use since the start of the pandemic.

Methods: A sample (n = 776) of past-30 day exclusive smokers (n = 238), exclusive e-cigarette users (n = 143), and dual users (n = 395) residing in the US and aged 18 or older were collected using Mechanical Turk from April 27 to June 8, 2020. Adjusted associations between tobacco product-specific COVID-19 risk perceptions (ie risk that smokers/vapers are at for COVID-19 relative to non-smokers/non-vapers) and changes in tobacco use since the pandemic began were assessed using partial proportional odds models.

Results: A majority of those who used cigarettes (63.7%) and e-cigarettes (56.1%) felt that the risk of COVID-19 was greater for users of their tobacco product than for non-users. Twenty-four percent of smokers had increased their cigarette use since the start of the pandemic and 28.0% had decreased. Similarly, 27.3% of e-cigarette users had increased their e-cigarette use since the start of the pandemic and 23.8% had decreased. Higher risk perceptions for COVID-19 were associated with reductions in tobacco use since the pandemic began for exclusive e-cigarette users and dual users.

Conclusions: These findings provide the support that tobacco product-specific COVID-19 risk perceptions may be an important correlate of changes in tobacco use during the pandemic. Targeted information to inform tobacco users regarding their risks for COVID-19 is needed during this public health crisis.
Implications: Few published studies have investigated the relationship between tobacco product-specific risk perceptions for COVID-19 and changes in tobacco product use since the pandemic began. This study enhances the current literature by providing evidence that higher tobacco product-specific risk perceptions for COVID-19 are associated with reductions in tobacco use since the pandemic began for exclusive e-cigarette users and dual users of cigarettes and e-cigarettes. Additionally, daily tobacco users may be more likely to have increased their tobacco use than non-daily users. These findings emphasize the importance of disseminating targeted health information to tobacco users regarding COVID-19 risks.

Introduction

Coronavirus Disease 2019 (COVID-19) is a pandemic level threat, has caused over 90 million cases and 1 900 000 deaths worldwide at the beginning of 2021.1 Consequently, tremendous resources have been devoted to understanding what populations are at greatest risk for COVID-19, including users of tobacco products (defined here as “…any product made or derived from tobacco that is intended for human consumption, including any component, part, or accessory.”). However, the role that cigarettes and electronic cigarettes (e-cigarettes) play in influencing the incidence and severity of COVID-19 remains unclear.6,7

Apart from understanding the direct health effects of COVID-19 on tobacco users, characterizing the pandemic’s impact on tobacco use is another important area of investigation, but findings have thus far been equivocal. A nationally representative survey in the UK found that 10% of e-cigarette users and 12% of smokers who had made recent quit attempts were motivated by COVID-19.8 A separate survey concluded that 1 000 000+ people in the UK had stopped smoking since the pandemic began.9 Conversely, an online survey of Australians reported that 90% of smokers had not made any changes to their smoking10 and another survey found that 20% of Chinese smokers had increased their smoking during the pandemic.11 Global tobacco sales data shows that purchasing of tobacco products has ebbed and flowed during the pandemic, potentially attributable to a “stock-piling effect.”12 In sum, changes in tobacco use during the pandemic remain unclear. Even still, exploring the factors influencing individual-level behavior changes is important in designing interventions to benefit the health of tobacco users. This is particularly important as tobacco users often do not perceive themselves to be at increased risk for many smoking-related diseases13 and those with lower risk perceptions report higher levels of tobacco use14 and fewer quit attempts.15

Few studies have investigated the relationship between tobacco product-specific risk perceptions for COVID-19 and changes in tobacco use since the start of the pandemic. One survey of cigar smokers (n = 777) found that while 76.0% perceived their level of risk for COVID-19 to be higher than non-smokers, 40.9% of participants increased their tobacco use since the pandemic began.16 Those with higher COVID-19 risk perceptions had higher odds of intending to quit tobacco use and of making a quit attempt since the start of the pandemic. In another survey of 345 tobacco users on Mechanical Turk (MTurk), smokers and e-cigarette users were moderately, but similarly, concerned about the risk their tobacco use placed them at for contracting COVID-19.17 This study also reported that while half of the respondents reported no change in their cigarette and/or e-cigarette use since the start of the pandemic, COVID-19 had prompted nearly a quarter to reduce their tobacco use. However, the authors did not find an association between risk perceptions and changes in tobacco product use, perhaps due to limited power (n = 345) or because the study was conducted on a single day early in the pandemic (April 10, 2020).

This report aims to extend our understanding of how tobacco users’ perceptions of tobacco product-specific COVID-19 risk (ie the risk that smokers/vapers are at for COVID-19 relative to non-smokers/non-vapers) relate to changes in tobacco use among a convenience sample (n = 776) of current exclusive smokers, exclusive e-cigarette users, and dual users in the United States (US), collected over 6 weeks of the pandemic.

Methods

Participants were recruited using MTurk between April 27 and June 8, 2020. To be eligible for the screening survey, respondents had to have an MTurk account registered in the US, be aged 18 or older, have completed 100 prior “Human Intelligence Tasks” (HITs), and hold at least a 90% HIT approval rating. Those who endorsed past 30-day use of cigarettes or e-cigarettes on the screener were deemed eligible for the main survey (n = 1,226). Respondents who did not submit the final page of the survey (n = 82), did not reconfirm past 30-day use of cigarettes or e-cigarettes (n = 91), missed both attention-check questions (n = 62), or had a completion time ±3 standard deviations from the mean (n = 1) were excluded from present analyses. Respondents were classified as “exclusive smokers” if they reported past 30-day use of cigarettes only, “exclusive e-cigarette users” if they reported past 30-day use of e-cigarettes only, or “dual users” if they reported past 30-day use of both products. After accounting for missing data (n = 214) we were left with an analytic sample of 776 participants. Bivariate tests comparing tobacco product-specific risk perceptions, frequency of tobacco product use, and behavior changes between those observations that were included in the analytic sample and those that were not (due to missing data) did not reveal statistically significant differences (ps < 0.05).

The primary outcome of interest was the reported change in tobacco use since the start of the COVID-19 pandemic. Exclusive smokers were asked if they were “smoking less,” “smoking about the same amount,” or “smoking more” since the pandemic began and exclusive e-cigarette users were asked a similar question about their e-cigarette use. Dual users were asked both questions. Questions in the survey also assessed perceptions of risk for COVID-19 for smokers compared to non-smokers and e-cigarette users compared to non-e-cigarette users, both on 5-point Likert scales. Specifically, exclusive smokers and dual users were asked to rate the level of risk for COVID-19 that they felt smokers had relative to non-smokers from “Much lower risk” to “Much higher risk.” Exclusive e-cigarette users and dual users were asked to rate the level of risk for COVID-19 that they felt vapers had relative to non-vapers. Respondents also reported their gender, age, education, income, race/ethnicity, overall perceptions of their physical

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Results

Responsive Characteristics
Of the 776 participants in our analytic sample, 238 (30.7%) were exclusive smokers, 143 (18.4%) were exclusive e-cigarette users, and 395 (50.9%) were dual users (Table 1 and Supplementary Table 1). The majority of the sample identified as male (58.6%) and “White or Caucasian” (80.0%). A plurality of respondents was 25–34 years old (43.8%). The majority (59.1%) of exclusive users were daily users of their tobacco product with no differences detected between exclusive smokers and exclusive e-cigarette users ($p = .24$). Similarly, among dual users, 40.5% were non-daily users, 36.2% were predominant smokers, 14.2% were predominant e-cigarette users, and 9.1% were daily dual users.

Perceived Risk for COVID-19 for Smokers and E-Cigarette Users
A majority of those who used cigarettes (63.7%) and e-cigarettes (56.1%) felt that the risk of COVID-19 was much greater or somewhat greater for users of their tobacco product than non-users (Supplementary Table 4). There was no unadjusted difference in

| Table 1. Select Sample Characteristics |
|---------------------------------------|
| Overall | Exclusive smokers | Exclusive e-cigarette users | Dual users | $p$-value |
| N | 776 | 238 | 143 | 395 | – |
| Tobacco use changes since the start of the COVID-19 pandemic$^a$ | | | | | |
| Cigarettes | | | | | |
| Increased use | 24.0% | 24.4% | – | 23.8% | .146 |
| Made no change in use | 48.0% | 52.5% | – | 45.3% | |
| Decreased use | 28.0% | 23.1% | – | 30.9% | |
| E-cigarettes | | | | | |
| Increased use | 27.3% | 23.8% | – | 28.6% | .286 |
| Made no change in use | 48.9% | 53.9% | – | 47.1% | |
| Decreased use | 23.8% | 22.4% | – | 24.3% | |
| Tobacco product-specific COVID-19 perceived risk$^a$ | | | | | |
| Mean (SD) | | | | | |
| Smokers compared to non-smokers | 3.7 (1.1) | 3.8 (1.1) | – | 3.7 (1.1) | .232 |
| E-cigarette users compared to non-e-cigarette users | 3.5 (0.9) | – | 3.7 (0.9) | 3.5 (1.0) | .100 |
| Demographics | | | | | |
| Male | 58.6% | 53.4% | 58.7% | 61.8% | .115 |
| Age (years) | | | | | |
| 18–24 | 8.8% | 2.9% | 15.4% | 9.9% | <.001 |
| 25–34 | 43.8% | 39.5% | 46.2% | 45.6% | |
| 35–54 | 40.7% | 45.0% | 32.2% | 41.3% | |
| 55+ | 6.7% | 12.6% | 6.3% | 3.29% | |
| Non-white/non-Caucasian | 20.0% | 17.7% | 16.1% | 22.8% | .128 |
| Education | | | | | |
| Some college or less | 43.3% | 52.5% | 40.6% | 39.0% | .003 |
| College degree or higher | 56.6% | 47.5% | 59.4% | 61.0% | |
| Tobacco use frequency (exclusive users) | | | | | |
| Non-daily use | 40.9% | 38.7% | 44.8% | – | .241 |
| Daily use | 59.1% | 61.3% | 55.2% | – | |
| Tobacco use frequency (dual users) | | | | | |
| Concurrent non-daily user | 40.5% | – | – | 40.5% | |
| Predominant smoker | 36.2% | – | – | 36.2% | |
| Predominant e-cigarette user | 14.2% | – | – | 14.2% | |
| Daily use | 9.1% | – | – | 9.1% | |
| Seriously considering quitting tobacco use in the next 6 months | 67.5% | 67.2% | 60.1% | 70.4% | .081 |
| Use flavored tobacco product | 46.6% | 43.7% | 68.5% | 52.4% | <.001 |

Note: This table shows sample characteristics for select variables. To view sample characteristics for all variables included in these analyses, see Supplementary Table 1.

$^a$ The exact text for the questions and response options for these measures are available in the notes section of Supplementary Table 1.
average risk perception for smokers between exclusive smokers (3.79 [SD 1.12]) and dual users (3.68 [SD 1.06]) (“Much lower risk” = 1, “Much higher risk” = 5; p = .23). There were also no unadjusted differences in average COVID-19 risk perceptions for e-cigarette users between exclusive e-cigarette users (3.66 [SD 0.93]) and dual users (3.51 [SD 1.00]) (p = .10).

Smoking-Related Behavioral Changes Since the Start of the COVID-19 Pandemic

In terms of cigarette usage, there were no differences in the changes made by exclusive smokers (24.4% increased use, 52.3% made no change, 23.1% decreased use) and dual users (23.8% increased use, 45.3% made no change, and 30.9% had decreased use) (p = .146, Table 1). Similarly, there were no differences in changes to e-cigarette usage between exclusive e-cigarette users (23.8% increased use, 53.9% made no change, 22.4% decreased use) and dual users (28.6% increased use, 47.1% made no change, 24.3% decreased use) (p = .286). Daily users were more likely to have increased their tobacco use than non-daily users in each tobacco user group (Supplementary Table 3).

Adjusted Associations of Tobacco Product-Specific COVID-19 Risk and Changes in Tobacco Use

Higher perceived risk for COVID-19 for smokers and e-cigarette users (relative to non-users) was associated with reductions in tobacco use after controlling for covariates for both dual users (aOR = 0.81, p < .01) and exclusive e-cigarette users, though the latter violated the proportional odds assumption suggesting different adjusted associations between decrease versus no change/increase (aOR = 0.27, p < .01) and decrease/no change versus increase (aOR = 0.56, p < .05; Table 2 and Supplementary Table 2).
Discussion

We find that perceptions of risk for COVID-19 attributed to a specific tobacco product (cigarette or e-cigarette) were a significant predictor of changes in the use of that tobacco product since the pandemic began. This finding brings clarity to the literature which has thus far presented conflicting results.16,17 Among both exclusive e-cigarette users and dual users, the higher the level of risk for COVID-19 that respondents perceived for users of a given tobacco product, the more likely those respondents were to have decreased their use of that product since the start of the pandemic. Further, it was also noted that daily tobacco users were generally more likely to have increased their tobacco use since the pandemic than non-daily users (Table 2). This is an important finding as it shows that, at least in the short-term, exclusive e-cigarette users and dual users are willing to change their tobacco use behaviors based on their tobacco product-specific COVID-19 risk perceptions but that daily user may be more likely to increase their tobacco consumption.

The results from this study should be considered alongside several important limitations. First, data were collected through MTurk, which may not generalize to all smokers or e-cigarette users. Secondly, eligibility for the survey was based on past 30-day use of cigarettes and/or e-cigarettes. Since the survey was deployed more than a month after COVID-19 was declared a “pandemic,” it is possible some tobacco users had completely quit their tobacco use for more than a month and were thus excluded from this study. Social desirability in participant responses is another important consideration and responses were not bi-chemically validated, although observed changes in tobacco use were consistent with previously noted studies.11,17 Additionally, these results only speak to short-term changes in behavior. Last, it should be noted that dependence was not assessed using a validated tobacco dependence scale, instead frequency of product use was used.

We also recognize that the prevalence of COVID-19 and thus, risk perceptions, could vary based on where one lives. We used bivariate tests to determine whether tobacco product-specific COVID-19 risk perceptions varied by Census region (Supplementary Table 5). We also investigated whether our main findings were sensitive to controlling for a geographic region (Supplementary Table 6), which they were not. Despite these limitations, this study enhances the current literature by reporting that higher tobacco product-specific COVID-19 risk perceptions are associated with reductions in tobacco use since the pandemic began amongst dual users and exclusive e-cigarette users. These findings emphasize the importance of disseminating health information to tobacco users on COVID-19 risks as tobacco product-specific risk perceptions may be an important determinant of tobacco use changes during a public health crisis. This result is consistent with recent work, which found that “messages linking smoking with COVID-19 may hold promise for discouraging smoking and may have the added benefit of also discouraging vaping.”20 However, we also acknowledge that in this particular case, crafting public health messages is complicated by ongoing work attempting to define the impact of tobacco use on COVID-19 incidence and severity. Future research should be directed towards how public health messaging can better reach tobacco users during outbreaks of infectious respiratory diseases and why exclusive smokers appear to be less responsive to perceived COVID-19 risks.

Supplementary Material

A Contributorship Form detailing each author’s specific involvement with this content, as well as any supplementary data, are available online at https://academic.oup.com/ntr.

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Declaration of Interests

The authors have no conflicts of interest to report. All authors have contributed to the manuscript in a significant way, and all have read and approved the manuscript.

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