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The role of fear of COVID-19 in motivation to quit smoking and reductions in cigarette smoking: A preliminary investigation of at-risk cigarette smokers

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Abstract

Preliminary data suggest that cigarette smokers could have an increased mortality risk from the novel coronavirus (SARS-CoV-2), and that certain factors (e.g., increased age, medical comorbidities) can also increase risk of poor coronavirus disease (COVID-19) outcomes. Between April 30th, 2020 and May 28th, 2020, we evaluated self-reported changes in recent smoking patterns and motivation to quit smoking among current daily cigarette smokers ($N = 103$) on Amazon Mechanical Turk. We also assessed the relationship of these outcomes to age, medical comorbidity status, and fear of COVID-19. Most participants (68.9%) reported smoking less frequently than usual in the last 28 days. Among daily smokers, increased fear of COVID-19 predicted increased motivation to quit smoking and actual smoking reductions ($ps < .05$). Endorsement of one or more medical comorbidities, but not increased age, predicted increased motivation to quit smoking ($p < .05$). These data suggest the potentially greater relevance of psychological factors (e.g., fear of COVID-19) over external risk factors (e.g., medical comorbidity, increased age) on motivation to quit smoking and actual reductions in smoking patterns, and may reflect that the pandemic is a suitable time for offering smoking cessation intervention.

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Keywords

smoking; COVID-19; coronavirus; SARS-CoV-2; fear of COVID-19

Introduction

Smokers may be at increased risk of contracting the novel coronavirus (SARS-CoV-2) that causes coronavirus disease (COVID-19). Among current smokers, there is initial evidence for increased expression of the angiotensin-converting enzyme II (ACE-2) receptor in airway epithelia (Leung et al., 2020; Li et al., 2020) and research findings support the ACE-2 receptor as the entry receptor for SARS-CoV-2 (Leung et al., 2020).

In addition, smokers may also be at increased risk of COVID-19-related mortality (e.g., Alqahtani et al., 2020) and a poorer illness course (e.g., Liu et al., 2020; Vardavas & Nikitara, 2020; Yu et al., 2020). Ongoing research is necessary to better evaluate the direct relationship between smoking (both current and historical) and COVID-19 risk as well as disease progression. Yet, the World Health Organization released a statement warning that smokers are more likely to experience a severe COVID-19 illness relative to non-smokers (WHO, 2020), a warning that has also been propagated in media outlets (e.g., Hoffman, 2020) and supported by scientific outlets (e.g., Guan, Ni, et al., 2020; Zvolensky et al., 2020).

These recent findings converge on an important question: might smokers be motivated to reduce or stop their smoking considering warnings on the potential effect of smoking on COVID-19 illness outcomes? Research suggests that decisions surrounding smoking cessation are often a product of one's social network such that individuals are more likely to be motivated to stop smoking based on the smoking patterns of their social connections (Blok et al., 2017; Christakis & Fowler, 2008). Aligned with this perspective, the influence of one's social network is thought to be greater than that of events that occur on a community or geographic scale (e.g., local smoking cessation campaigns) (Christakis & Fowler, 2008). Yet perhaps a pandemic holds a different weight for smokers than other types of community-level events. To date, studies examining cigarette and e-cigarette users have found a proportion of reductions or quit attempts stemming from COVID-19 within the range of ~11.2–46.5% of users (Bommele et al., 2020; Kowitt et al., 2020; Tattan-Birch et al., 2020), suggesting a varied impact of the pandemic on actual changes in smoking patterns. However, one study found no increased downloads of a smoking cessation mobile application since the COVID-19 outbreak (Perski et al., 2020), with some studies finding that ~18.9–40.9% of smokers have increased smoking patterns (Bommele et al., 2020; Kowitt et al., 2020), and one study citing higher self-reported stress as the causative agent (both for decreased and increased smoking) (Bommele et al., 2020). This latter finding is consistent with prior work reflecting increased motivation to use substances as part of one's coping repertoire (Kuntsche et al., 2005), or using in order to cope with the emotional distress or worry caused by the pandemic (e.g. financial instability and loss of employment) (Garcia-Alvarez et al., 2020; Pfefferbaum & North, 2020; Rogers et al., 2020). Further, motivation to quit smoking, provoked by COVID-19, may not predict actual behavior

change. In one study of 345 dual cigarette/e-cigarette users, despite more than one-third reporting that COVID-19 increased their motivation to quit use, nearly half of the sample reported that COVID-19 did not provoke a change in their smoking patterns (Klemperer et al., 2020). Together, there is a potential intention-behavior gap between motivation to quit smoking due to COVID-19 and reducing or stopping use.

In the current study, we evaluated self-reported changes in recent smoking patterns, reasons for these changes, and motivation to quit smoking among self-reported daily cigarette smokers recruited from Amazon Mechanical Turk (MTurk). We also evaluated the relationship of these outcomes to medical comorbidity status, age, and fear of COVID-19, given recent evidence of a positive association between COVID-19 risk perceptions (Kowitt et al., 2020) and perceived risk of harm from COVID-19 due to smoking (Klemperer et al., 2020) and intention or motivation to stop smoking. Further, given evidence that older adults and people with medical comorbidities have worse outcomes from COVID-19 (Guan, Liang, et al., 2020; Liu et al., 2020), it follows that older smokers and those with one or more medical conditions might be more fearful of COVID-19 and more motivated to quit smoking. Based on this preliminary evidence, we hypothesized that, among individuals reporting smoking less frequently than usual in the last 28 days, the primary reason for decreased smoking would be health concerns related to COVID-19. We further hypothesized that endorsement of one or more medical comorbidities and increased age would independently predict decreased cigarette use and increased motivation to quit use, and that these relationships would be moderated by fear of COVID-19 (e.g., those of increased age and having a greater fear of COVID-19, or those endorsing one or more medical comorbidities and having a greater fear of COVID-19, would endorse smoking less frequently than usual in the last 28 days and increased motivation to quit smoking).

Methods

Participants

Participants were recruited via MTurk, an online crowdsourcing recruitment tool. The sample for the current study was drawn from a larger MTurk investigation that called for the participation of individuals in an online survey evaluating the effects of COVID-19 on health behaviors and clinical outcomes of study participants; the current report concerns the 103 daily smokers in the sample who had complete data on all variables of interest for our specific analysis. Inclusion criteria for the current study were being 18 or older, currently living in the United States, reporting daily smoking, and ability to read English and supply informed consent. Surveys were completed between April 30th, 2020 and May 28th, 2020.

Procedures

After providing electronic consent for this study, participants completed questionnaires that recorded their demographics, affective symptoms (e.g., depression, anxiety), substance use, and perspectives surrounding COVID-19, among other topics. This survey study took an average of 30 minutes to complete and participants were compensated $0.52 for their participation in this study (a compensation rate comparable to other studies on the MTurk platform) (Buhrmester et al., 2011). Responses were excluded if they reflected <75% survey

completion, if quality assurance "test" questions were determined by study staff to be answered incorrectly, or if indicative of patterned responding. This study was approved by the Boston University Institutional Review Board.

Measures

Physical Health Questionnaire.—Participants reported on physical health conditions known to potentially increase risk of complications from COVID-19 based on information available at the time; these included asthma, autoimmune disease, cardiovascular disease, cerebrovascular disease, diabetes, hypertension, HIV, kidney disease, liver disease, malignant tumor, and respiratory disease/condition. From these data, we created a binary-coded variable for endorsement of one or more medical comorbidities documented to potentially increase risk of severe COVID-19 outcomes (0 = endorsement of no medical comorbidity, 1 = endorsement of 1+ medical comorbidity).

Smoking Patterns Questionnaire.—Participants reported on daily cigarette smoking patterns, less frequent cigarette use in the last 28 days (yes/no), reasons for less frequent cigarette use in the last 28 days (open response question), and motivation to quit smoking on a scale from 0 (not at all motivated) to 10 (extremely motivated) (Turner & Mermelstein, 2004). We specifically did not inquire whether participants were smoking less due to COVID-19 as we wanted to obtain an unbiased response, which we thought could be optimally achieved by participants' self-generated reasons for decreased use. Reasons for smoking less were subsequently categorized by three independent coders. Following independent coding of responses, the first author (A.K.G.) checked for consistency across categorizations, and collapsed categories where possible.

Fear of Coronavirus-19 Scale.—The Fear of Coronavius-19 Scale (FCV-19S) is a 7-item measure that evaluates fear directly associated with COVID-19 (Ahorsu et al., 2020). Items include "I am afraid of losing my life because of Coronavirus/COVID-19" and "I cannot sleep because I'm worrying about getting Coronavirus/COVID-19." Participants rate each item on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*), with higher total scores reflecting increased fear of COVID-19. This measure demonstrated strong consistency in this sample (Cronbach's α = .814).

Data analysis

We first evaluated bivariate relationships among all variables, and subsequently evaluated age and medical comorbidity status as predictors of motivation to quit cigarette smoking (via multiple regression analyses) and as predictors of change in reduced cigarette smoking status (via logistic regression analyses). We then repeated these analyses with the addition of the interaction term incorporating fear of COVID-19 (e.g., age × fear of COVID-19, medical comorbidity status × fear of COVID-19).

Results

Participant characteristics

Self-reported smokers (N = 103) reported a mean age of 33.5 years (SD = 10.7, range = 21 to 63) with 63.1% (n = 65) identifying as male and 36.9% (n = 38) as female; none identified as transgender or nonbinary. The majority of participants in this study were White (70.9%, n = 73), with the remaining racial breakdown as follows: Asian (12.6%, n = 13), Black or African-American (11.7%, n = 12), Alaska Native or American Indian (3.9%, n = 4), and More than one race (1.0%, n = 1). This sample was characterized by ethnic diversity, with 37.9% (n = 39) identifying as Spanish, Hispanic, or Latinx. Approximately 88.3% of participants (n = 91) reported 1 or more medical comorbidities that could potentially put them at increased risk of severe COVID-19 illness.

Among study participants, 68.9% (n = 71) reported smoking cigarettes less frequently in the last 28 days than was typical. Reasons for smoking cigarettes less frequently were categorized as follows: general health concerns (n = 15, 21.1%), mental status or feelings, such as ‘less stress’ or ‘if I felt happy’ (n = 10, 14.1%), general situational factors (e.g., family related, work related), such as ‘I have been too busy with my kids’ (n = 4, 5.6%), non-specified change due to COVID-19, such as ‘because of coronavirus’ (n = 6, 8.5%), reductions in smoking patterns, intentions to smoke less or stop smoking, or self-reported non-addiction to cigarettes (e.g., “I am not addicted”) (n = 2, 2.8%), lack of interest in smoking (n = 2, 2.8%), cigarette availability (n = 5, 7.0%), situational factors related to COVID-19, such as ‘because of lockdown’ (n = 4, 5.6%), changes in sleep (n = 3, 4.2%), and financial reasons (n = 2, 2.8%). Responses from 25.4% (n = 18) were idiosyncratic reasons not otherwise categorized (e.g., “cigarettes”, “less of smoking”, “fine”). On a scale of 0 (*not at all motivated to quit smoking*) to 10 (*extremely motivated*), participants reported a mean score of 6.7 (SD = 2.0).

Bivariate associations among study variables

Among daily smokers, age was negatively associated with fear of COVID-19 (r = −.30, p = .002) and with smoking less frequently than usual in the last 28 days (point biserial correlation = −.23, p = .022). Fear of COVID-19 was positively associated with smoking less frequently than usual in the last 28 days (point biserial correlation = .33, p < .001) and with motivation to quit smoking cigarettes (r = .31, p = .002). Medical comorbidity status was positively associated with fear of COVID-19 (point biserial correlation = .25, p = .010) and with motivation to quit smoking cigarettes (point biserial correlation = .25, p = .012). No other correlations were significant.

Regression models for motivation to quit cigarette smoking and reduced cigarette smoking

Table 1 depicts the hierarchical multiple regression model for motivation to quit smoking in the sample of daily smokers whereas Table 2 depicts the logistic regression model for smoking less frequently than usual in the last 28 days in the sample of daily smokers.

Discussion

We evaluated motivation to quit smoking and changes in smoking patterns in relation to a set of potential predictors--age, medical comorbidity status, and fear of COVID-19. The majority (68.9%) of participants in this study reported smoking less frequently than usual in the last 28 days, though the primary self-reported reason for this decreased use was general health concerns (rather than health concerns specific to COVID-19). Nonetheless, increased fear of COVID-19 predicted increased motivation to quit smoking and smoking less frequently than usual in the last 28 days. In our multiple regression models, endorsement of one or more medical comorbidities, but not older age, predicted increased motivation to quit smoking cigarettes among daily cigarette smokers. In addition, being younger independently predicted smoking less frequently than usual in the last 28 days. Further, we observed an interaction effect such that increased age and increased fear of COVID-19 predicted increased motivation to quit smoking.

Given that we evaluated a potentially more “at risk” population of smokers (e.g., 88.3% endorsing one or more medical comorbidities), it is interesting that increased age and positive medical comorbidity status did not independently predict smoking less frequently than usual, as the relationship between these variables and poorer COVID-19 outcomes has been widely circulated around the time period of this survey administration (CDC, 2020a, 2020b). Notably, we found that fear of COVID-19 was a motivator for reported *actual* behavior change among daily smokers. A perception of risk might have been particularly salient for daily smokers, not because of any age or comorbidity status, but because of an obvious, direct association between the choice to smoke and the respiratory illness that is COVID-19. Yet, as 37 daily cigarette smokers reported having asthma, it is interesting that medical comorbidity status did not predict actual reductions in smoking patterns in our daily smoker subgroup. Our findings thus suggest that fear of COVID-19 may indeed matter more than chronic risk factors for both of our outcomes.

Contrary to prior findings (Šljivo et al., 2020), in bivariate analyses, we found a relationship between increased age and decreased fear of COVID-19. One hypothesis is that people in this study were generally younger (only 2 participants aged 60 or older, and none aged 65 or older), and thus may not represent the older demographic that may be most impacted by, and potentially fearful of, COVID-19 (e.g., in one study, individuals were more likely to die from COVID-19 if aged 65 or older; Wortham et al., 2020). We also found that younger age was independently associated with smoking reductions, consistent with prior findings that younger individuals are more likely than older adults to quit smoking or to cut down on their smoking (Dunlop et al., 2011; Messer et al., 2008). Further, prior work has shown that older smokers may have greater tobacco dependence relative to younger smokers (Hall et al., 2008), another factor which could make it difficult for older smokers to change their smoking patterns. As such, the interaction between increased age and increased fear of COVID-19 on increased motivation to quit smoking may not be inconsistent with these prior data, but instead may reflect an intention-behavior gap in older smokers (between motivation to quit smoking and reductions in smoking, particularly as quitting or reducing smoking may become more difficult with increased years of smoking dependence).

This study has some important limitations. We were not able to corroborate self-reported medical comorbidities with medical record data. We also relied on general medical condition categories (e.g., “autoimmune disease”) that were intentionally broad and could be overly inclusive of those medical conditions that increase risk for negative outcomes from COVID-19. Lastly, though participants had the option of writing in reasons for why they were smoking less, these varied in their specificity; for instance, some participants may have noted they were smoking less for “health reasons,” and it was not possible to definitively know what was being referred to (health concerns related to COVID-19, or health concerns not related to COVID-19). Thus, categorizations of participants’ reasons for smoking less may not reflect the breadth of reasons (both related to COVID-19 or not related) that could have impacted changes in smoking patterns. Lastly, online sampling methods such as those involved in this study are inherently limited in that they do not involve random sampling and could reflect a self-selected sample (e.g., individuals on Amazon MTurk interested in completing an online survey), which could in turn impact the study’s external validity (Khazaal et al., 2014).

Overall, these data provide preliminary insight into smoking patterns during the COVID-19 pandemic in a diverse sample of United States residents. Most participants in this study reported reductions in their smoking patterns. Notably, though endorsement of one or more medical comorbidities predicted increased motivation to quit smoking and being older *and* more fearful of COVID-19 predicted increased motivation to quit smoking, these variables did not predict actual reductions in smoking patterns. Indeed, across all models, fear of COVID-19 most consistently predicted increased motivation to quit smoking *and* actual changes in smoking patterns. These findings highlight the potentially more consistent role of internally-driven, psychological factors (e.g., fear) over externally-based, objective factors (e.g., increased age, endorsement of medical comorbidities) on intention and behavior in smoking reduction during the COVID-19 era. Given that younger smokers reported greater fear of COVID-19 and reductions in smoking, future work may wish to evaluate the role of social networks on smoking reductions and motivation to quit smoking during the COVID-19 pandemic. Perhaps most importantly, these data also support the importance of offering smoking cessation interventions during the pandemic, indicating that the time may be right for cessation support among relatively large samples who report smoking daily.

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Table 1.

Multiple regression model for motivation to quit smoking cigarettes, daily smokers (n = 103)

Predictor	β	t	*p*
Step 1			
Age	−.009	−.09	.929
Step 2			
Age	−.02	−.17	.866
Medical	.25	2.55	**.012**
Step 3			
Age	.07	.73	.467
Medical	.17	1.77	.081
Fear of COVID-19	.29	2.79	**.006**
Step 4			
Age	.12	1.19	.238
Medical	.20	2.02	**.046**
Fear of COVID-19	.24	2.33	**.022**
Age × Fear of COVID-19	.18	1.73	.086
Step 5			
Age	.10	.99	.325
Medical	.14	1.36	.177
Fear of COVID-19	.53	2.68	**.009**
Age × Fear of COVID-19	.21	2.01	**.047**
Medical × Fear of COVID-19	−.34	−1.70	.092

Medical: medical comorbidity status

Table 2.

Logistic regression model for less cigarette smoking in the last 28 days, daily smokers (n = 103)

Predictor	B	Wald	OR	*p*
Step 1				
Age	−.04	4.91	.96	**.027**
Step 2				
Age	−.04	4.96	.96	**.026**
Medical	.18	.07	1.19	.790
Step 3				
Age	−.03	1.53	.97	.217
Medical	−.46	.37	.63	.545
Fear of COVID-19	.13	7.54	1.14	**.006**
Step 4				
Age	−.02	.61	.98	.436
Medical	−.36	.22	.70	.639
Fear of COVID-19	.12	6.11	1.13	**.013**
Age × Fear of COVID-19	.004	.99	1.00	.320
Step 5				
Age	−.02	.53	.98	.467
Medical	−.20	.06	.82	.811
Fear of COVID-19	.09	.98	1.09	.322
Age × Fear of COVID-19	.004	.89	1.00	.346
Medical × Fear of COVID-19	.05	.19	1.05	.667

Medical: medical comorbidity status