The influence of COVID-19-specific health risk beliefs on the motivation to quit smoking

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Abstract word count = 241

Total word count = 3,396 (excluding title, abstract, figures, tables, citations and references)

Open Science Framework data link:

https://osf.io/qp2n9/?view_only=1b5fd6578c1e4be6b509853cb67fbe10

Pre-registration link: https://osf.io/hkcm2

Abstract

In response to the COVID-19 pandemic, some smokers have experienced increased motivation to quit smoking, due to the higher risk of severe COVID-19 infection. However, this is not found across all smokers, and the motivation to quit appears dependent upon factors such as fear of COVID-19 and perceived risk from COVID-19. In the current investigation, specific COVID-19 risk beliefs were measured to isolate which beliefs predicted the motivation to quit smoking, these being the perceived severity of COVID-19 and perceived probability of COVID-19 infection. UK based smokers (N = 243) completed an online survey between September and October 2020, in which they reported their current motivation to quit smoking, fear of COVID-19, and their beliefs about how severe COVID-19 infection would be and how probable COVID-19 infection was. The only significant predictor of the motivation to quit smoking was the perceived probability of COVID-19 infection. This positive relationship remained when controlling for the general perceived probability and severity of other smoking related health conditions, suggesting a COVID-19-specific effect. Further, fear of COVID-19 only indirectly related to an increase in motivation to quit, when mediated through perceived probability of COVID-19 infection. The result places the perceived probability of COVID-19 infection as a central predictor of motivation to quit during the pandemic. Based on this evidence, messaging to smokers aiming to facilitate smoking cessation during the pandemic should focus on the highly contagious nature of the virus, to increase the motivation to quit.

Key words

Health beliefs; COVID-19; Smoking cessation; Motivation; Outcome expectancy

Highlights

- Perceived probability of COVID-19 infection predicted motivation to quit smoking
- Perceived severity of COVID-19 infection did not predict motivation to quit smoking
- Fear of COVID-19 indirectly predicted quit motivation through COVID-19 probability
- The relationships were not accounted for by levels of other smoking health beliefs

The current COVID-19 pandemic has resulted the loss of millions of lives worldwide, and survivors often left with persistent health conditions after severe illness (del Rio et al., 2020). Evidence from large scale population studies and meta-analyses suggests that, compared to never-smokers, current and former smokers are at higher risk of experiencing more severe COVID-19 symptoms and mortality (Alqahtani et al., 2020; Hopkinson et al., 2020; Patanavanich & Glantz, 2020; Vardavas & Nikitara, 2020; Zhao et al., 2020).

As a direct response to this health threat, smokers' attitudes towards smoking may be changing over the course of the pandemic. For instance, Jackson et al. (2020) found that during the first UK lockdown (beginning March 2020) there was an increase in the motivation to quit smoking and an increased number of attempts to quit. Further, reductions in smoking behaviour have also been found in multiple international surveys from across Netherlands, Pakistan, US, Italy, India, South Africa, and UK (Bommele et al. 2020; Klemperer et al., 2020; Kowitt et al., 2020; Siddiqui et al., 2020; Tattan-Birch et al., 2020; White et al., 2021; Yach, 2020; Yingst et al., 2020). Within these samples, a proportion of smokers reported an increase in the motivation to quit smoking, increased quit attempts, or an actual decrease in smoking frequency during the pandemic.

Despite the increased engagement with smoking cessation, the majority of smokers did not change their smoking habits, and many smokers actually increased smoking frequency (Bommele et al. 2020; Klemperer et al., 2020; Kowitt et al., 2020; Siddiqui et al., 2020; Tattan-Birch et al., 2020; White et al., 2021; Yach, 2020; Yingst et al., 2020). Qualitative reports from smokers revealed a complex relationship with smoking during the pandemic, with some smokers reporting that the risk from COVID-19 was a trigger to quit, but the stress during the pandemic also triggered them to smoke as a coping mechanism (Cordon et al., 2020). Indeed, stress and worry during the pandemic have been correlated with smoking as a coping mechanism (Shepherd et al., 2020), and stress during the pandemic was both a predictor of increased smoking frequency in some smokers, as well as a predictor of decreased smoking frequency in others (Bommele et al., 2020).

In order to effectively enhance smoking cessation interventions during the COVID-19 pandemic, or potential future pandemics, it is essential to isolate which specific psychological factors mediate the influence of the novel health risk on the motivation to quit. Recent findings highlight the role of fear of COVID-19 as well as the perceived risk from COVID-19. For instance, Gold et al. found that fear of COVID-19 significantly predicted higher motivation to quit, even more so than objective risk factors for COVID-19 severity (e.g. age).

As well as the purely fear response to COVID-19 being a potential factor in the motivation to quit, it is likely that this is mediated through health beliefs to influence behaviour. Based on the health belief model, health behaviours are predicted by a range of different beliefs (Glanz & Bishop, 2010; Rosenstock, 1974; Rosenstock et al., 1988), which can be grounded in an emotional response to the risk (Ferrer et al., 2015; Jansenn et al., 2014). In relation to smoking, these beliefs would include the perceived benefits of quitting, perceived barriers to quitting, perceived quitting self-efficacy, and

perceived probability and severity of the smoking related health conditions. In the current investigation, the subjective beliefs regarding perceived COVID-19 severity and probability were measured to explore their relationship with the motivation to quit, as both these beliefs are related directly to the novel threat of COVID-19, rather than indirectly related to the pandemic in general (e.g. recent unemployment acting as a barrier to quitting).

Indeed, the beliefs regarding the perceived risk of severe infection from COVID-19 are also a positive predictor of the motivation to quit smoking (Chertok, 2020), and smokers who reported that COVID-19 was a greater risk to smokers than non-smokers also reported a decrease in smoking since pandemic began (White et al., 2020). However, in these previous studies, the measures of perceived risk did not isolate different risk beliefs, and either asked them broadly what the risk was to smokers, or averaged severity and probability beliefs together. When COVID-19 risk beliefs have been measured in more detail, it has been found that both perceived severity of COVID-19 and probability of infection from COVID-19 predict increased motivation to quit (Elling et al., 2020).

It is not yet known, however, whether these beliefs independently predict the motivation to quit, whether they interact, or their role in mediating the relationship between fear of COVID-19 and motivation to quit. Both perceived severity and probability of outcome are influential in the motivation to quit or persistence with smoking (Kaufmann et al., 2020), but both do not always predict engagement with all health behaviours (Carpenter, 2010). It is essential to isolate which specific belief predicts the motivation to quit, as messaging of risk to smokers would have to target the specific belief underpinning the motivation to quit when aiming to facilitate smoking cessation.

It is predicted that both perceived severity of COVID-19, as well as how probable COVID-19 infection is, will positively correlate with the motivation to quit. Further, it is expected that these beliefs will mediate the positive relationship between fear of COVID-19 on the motivation to quit smoking previously found (Gold et al., 2020). Similarly, heavier smokers, as measured with nicotine dependence, will report higher motivation to quit, when mediated through probability and severity beliefs due to their higher objective risk.

2. Methods

The current investigation is based on an existing dataset collected by Brown and Faulkner (under review), who investigated the affective response to COVID-19 health warnings. Independent of this primary investigation, the current hypotheses, methods, and analyses were pre-registered on the Open Science Framework (OSF: osf.io/qp2n9) prior to data collection, thus enabling independent investigation of this separate research question. All methods were approved by the University of Roehampton ethics committee.

2.1 Participants

An initial sample of 259 participants were recruited from Prolific Academic online recruitment pool (https://www.prolific.co/) between September 28th and 5th of October, in exchange for payment (£2.50). Pre-registered inclusion criteria were that participants be UK residents, aged 18

or over, and currently identify as a smoker. Sixteen participants were therefore excluded for reporting no longer being a smoker or failing to complete the whole survey. In the final sample, consisted of 243 smokers, with equal numbers of numbers of male (n = 120) and female (n = 120) participants, and three participants who reported identifying as neither male nor female. For full participant characteristics see Table 1.

Variable	Mean (SD)	Frequency (total N = 243)	Percentage
Gender			
Female		120	49.38%
Male		120	49.38%
Neither male nor female		3	1.23%
Age	35.69 (12.28)		
18 - 25		46	18.9%
26 – 40		132	54.4%
41 – 55		40	16.46%
≥ 56		25	10.29%
High level of education			
GCSE		44	18.11%
A-level		58	23.87%
Post-6th form award		22	9.05%
Undergraduate		76	31.28%
Masters		27	11.11%
Doctorate		8	3.29%
No response		7	2.88%
Cigarettes per day	10.88 (7.23)		
≤1		23	9.5%
2-10		91	37.4%
11-20		94	38.7%
>20		35	14.4%
Hours since last cigarette	83.75 (661.68)		
≤ 2 hours		167	63.8%
3 - 12 hours		38	15.6%
13 - 24 hours		21	8.7%
25 - 48 hours		10	4.12%
>48 hours		17	7%
Age of smoking onset	17.45 (4.42)		
11 - 13		18	8.07%
14 - 16		101	45.29%
17 – 18		64	28.7%
19 – 21		39	17.49%
>22		21	9.42%
Number of LT Quit attempts	4.32 (3.82)		
1		45	20.18%
2 - 5		142	63.68%
6 - 10		34	15.25%
>10		22	9.87%
FTND	3.23 (2.43)		
0 – 2		100	44.84%
3 – 4		64	28.7%
5		28	12.56%
6 - 7		41	18.39%
8 - 10		10	4.48%
Motivation to quit Smoking	3.49 (1.74)		
1		26	10.7%
2		68	28%
3		32	13.2%
4		47	19.3%
5		37	15.2%
6		15	6.2%
7		18	7.4%
Concurrent E-cigarette user		71	29.22%
COVID19 risk pre- knowledge		185	76.1%

Table 1. Full outline of participant characteristics of the full sample, N = 243. LT Quit attempts = lifetime attempts to quit; FTND = Fagerstrom Test for Nicotine Dependence; COVID-19 risk pre-knowledge refers to awareness of the risk of increased COVID-19 mortality for smokers prior to the survey. See Materials and procedure section (2.2) below for motivation to quit smoking response coding.

A power analysis suggested that the final sample was suitable to detect a significant predictive model with an R^2 of .06 ($\alpha = .05$, $\beta = .90$, 5 predictors). Originally, two samples were pre-registered, these completed different affective rating tasks with COVID-19-related or traditional tobacco health warnings. These groups did not differ on any dependent or predictor variables (see Brown & Faulkner, under review; preprint available) and were therefore pooled together to increase statistical power. The inclusion of group as a covariate in all analyses did not change the significance or pattern of the results.

2.2 Materials and procedure

Participants accessed the Qualtrics software survey link through Prolific Academic advert. They first completed demographic variables including age, gender, and highest level of education. This was followed by a smoking history questionnaire developed in-house, which measured when their last cigarette was, the number of cigarettes smoked per day and how long they had smoked this number for, what nicotine products they used (e.g. e-cigarettes, rolled cigarettes), age of smoking onset, and number of life-time quit attempts. Participants then reported their level of nicotine dependence with the 6-item Fagerstrom Test for Nicotine Dependence (FTND; Fagerstrom, 2011), and their current nicotine withdrawal state with the 25-item Shiffman-Jarvik withdrawal scale (Shiffman & Jarvik, 1976).

Participants then completed the single-item motivation to stop smoking scale (MTSS; Kotz et al., 2013). The single item scale ranged from one to seven, each point corresponding to a specific statement of motivation: 1 = “I don’t want to stop smoking”; 2 = “I think I should stop smoking but don’t really want to”; 3 = “I want to stop smoking but haven’t thought about when”; 4 = “I REALLY want to stop smoking but I don’t know when I will”; 5 = “I want to stop smoking and hope to soon”; 6 = “I REALLY want to stop smoking and intend to in the next 3 months”; 7 = “I REALLY want to stop smoking and intend to in the next month”.

After the MTSS, participants completed measures of perceived probability and severity of smoking related outcomes. The perceived probability and severity were rated independently. Based on recommendations by Kaufman et al. (2020), participants rated how likely/probable they were to personally experience a range of 11 negative health outcomes along a 7-point scale, ranging from ‘very low possibility’ to ’very high possibility’. After, participants reported how severe they expected the same outcomes to be if they experienced them. The ratings were on a 5-point scale ranging from ‘not at all severe’ to ‘extremely severe’. The average probability and severity was calculated for symptoms unrelated to COVID-19 (i.e. reproductive/sexual dysfunction, tooth damage, lung cancer, throat cancer, premature aging, emphysema; Cronbach’s alphas: probability = .88; severity = .76), excluding those which were strongly linked to COVID-19 or indicative of COVID-19 (i.e. respiratory illness, increased susceptibility to illness, weakened immune system), or were not well known outcomes from COVID-19 at time of recruitment (i.e. stroke, heart disease).

After completing all smoking-specific measures, participants completed COVID-19 related measures these being the Fear of Coronavirus scale (Ahorsu et al., 2020), which is a 7-item measure

reflecting the fear/stress experienced when thinking of COVID-19. The scale included items such as 'It makes me uncomfortable to think about COVID-19' rated along a 5-point scale, ranging from 'strongly disagree' to 'strongly agree'. This was followed by two subscales from the recently developed scale by Di Crosta et al. (2020) which measure the belief of COVID-19 contagion (4-items; i.e. probability of COVID-19 infection) and belief of COVID-19 consequences (4-itmes; i.e. perceived severity of COVID-19 health outcomes). The COVID-19 probability subscale included items such as "I think I could be infected with COVID-19 in the future" and "I think that a dear or close person to me could potentially be infected with the virus in future". Whilst the COVID-19 severity subscale included items such as "I think that a person infected with COVID-19 could recover" and "I think it is probable that I would recover after being infected with the virus". Ratings were along Visual Analogue scales ranging from 0-100. After completing the COVID-19 related measures, participants were asked whether they were aware of the increased severity of COVID-19 health outcomes for smokers before the study ('yes'/'no'). As part of a separate investigation, participants also rated the arousal and valence of cigarette health warnings, and the 27-item delay discounting monetary choice questionnaire (MCQ; Kirby & Maraković, 1996).[1]

2.3 Statistical analysis

The pre-registered primary analysis was a linear hierarchical regression with motivation to quit smoking as the dependent variable, and perceived severity and perceived probability of COVID-19 as predictor variables. These were entered as an initial step, with their interaction entered in a second step. In an extension of the pre-registration, for the regression analysis, bootstrapped 95% confidence intervals were computed with 5000 resamples to account for violations of normality (Field, 2013). All continuous variables were standardised for regression analyses to allow bootstrapping of standardised *β*s. All analyses were conducted in JASP software (JASP team, 2020).

In a registered follow-up analysis, to determine whether any relationships in this initial regression were independent of general smoking health beliefs, the perceived probability and severity of other smoking-specific health conditions (e.g. cancer) were included as covariates in a separate regression model (see Table 2). If the relationships between COVID-19 severity and probability beliefs and motivation to quit are accounted for by general expectations of other smoking-specific outcomes, then it may be that COVID-19 beliefs simply reflect an extension of existing beliefs about the probability and severity of other smoking risks.

To assess the impact of Fear of COVID-19 upon the motivation to quit smoking, as mediated through beliefs about probability and severity of COVID-19 infection, a mediation analysis was conducted with fear of COVID19 entered as the predictor variable, motivation to quit as the outcome variable and both perceived probability and severity of COVID19 infection as mediators (see Figure

[1] A cigarette monetary value measure was pre-registered, but due to survey instruction error unreliable responses were recorded and are therefore omitted.

1). The significance of direct and indirect effects were calculated using bootstrapped (5000 resamples), bias-corrected percentile, confidence intervals. As with the initial regression analysis, a follow-up analysis was conducted which controlled for smoking-specific conditions health beliefs. To explore the impact of nicotine dependence on the COVID-19 health beliefs as well as the motivation to quit, the identical mediation analysis was conducted but with the FTND score instead of fear of COVID-19 score.

The overall relationships between all variables are presented using bivariate Pearson's correlations (Table 3). For all correlation, Bayes Factors (BF) were computed using JASP, and were calculated using a using a default stretched beta prior of 1 in JASP. Bayes factors above 3 denote moderate evidence for the experimental hypothesis, below .33 denotes moderate evidence for the null. Between .33 and 3 denotes inconclusive results requiring more data (Dienes, 2014).

3. Results

3.1 Probability and severity belief regression analysis

When entered into a hierarchical regression model, the independent effects of COVID-19 severity and COVID-19 probability significantly predicted higher motivation to quit smoking, R^2 = .05, $F(2,240) = 4.29$, $p = .002$. This was, however, driven purely by the perceived probability of infection, $\beta = .23$, $t = 3.56$, $p < .001$, 95% $CI_{bootstrapped}$[.10, .35], whilst the perceived severity of infection did not predict motivation to quit, $\beta = -.06$, $t = .92$, $p < .357$, 95% $CI_{bootstrapped}$[-.18, .06]. The interaction term between COVID-19 probability and severity beliefs did not significantly predict motivation to quit above the independent effects, $R^2_{change} < .01$, $F(1,239) = 1$, $p = .319$.

		β	t	p-value	95% CI lower bound	95% CI upper bound
Step 1: Covariates	Smoking-specific outcome probability	.05	.73	.467	-.10	.20
	Smoking-specific outcome severity	.15	2.29	.023	.01	.28
	$R^2 = .03$, $F(2,240) = 3.75$, $p = .025$					
Step 2: COVID-19 specific beliefs	Smoking-specific outcome probability	.06	.85	.399	-.10	.21
	Smoking-specific outcome severity	.13	1.94	.054	-.01	.25
	COVID-19 infection probability	.21	3.22	.001	.09	.32
	COVID-19 infection severity	-.09	1.32	.189	-.20	.04
	$R^2 = .08$, $F(4,238) = 4.69$, $p = .001$					
Step 3: severity probability interaction	Smoking-specific outcome probability	.06	.89	.376	-.11	.22
	Smoking-specific outcome severity	.13	1.95	.052	-.01	.27
	COVID-19 infection probability	.21	3.20	.002	.08	.33
	COVID-19 infection severity	-.10	.64	.156	-.21	.03
	COVID-19 probability x severity	-.08	1.10	.524	-.33	.17
	$R^2 = .08$, $F(5,237) = 3.97$, $p = .002$					

Table 2. Regression analysis with motivation to quit smoking as the outcome variable. Step 1 controls for possible confounding general negative health outcomes from smoking; Step 2 reflects the contribution of beliefs about the COVID-19 probability and severity, and step 3 reflects the interaction between these two beliefs. Smoking-specific outcomes refer to smoking health risks not linked to COVID-19. Confidence intervals were bootstrapped with 5000 resamples.

In a pre-registered follow-up analysis, the perceived probability and severity of smoking-specific health outcomes were included as covariates in an initial step (see Table 2). The initial step with these variables in was itself predictive of higher motivation to quit smoking, specifically, the perceived severity of the outcomes was predictive of motivation to quit. Importantly, inclusion of these variables did not alter the relationship between perceived probability of COVID-19 infection and motivation to quit smoking. The relationships between all variables analysed are presented in Table 3.

			1	2	3	4	5	6
1	Motivation to quit		-					
2	Fear of COVID-19	*r*	.05	-				
		BF_{10}	.11					
3	Perceived COVID-19 probability	*r*	.22***	.33***	-			
		BF_{10}	25.20	56 x 10^3				
4	Perceived COVID-19 severity	*r*	.01	.57***	.20**	-		
		BF_{10}	.08	75 x 10^{17}	9.58			
5	Smoking-specific health probability	*r*	.10	.23***	.12†	.29***	-	
		BF_{10}	.24	41.78	.40	27 x 10^2		
6	Smoking-specific health severity	*r*	.17**	.24***	.16*	.12†	.30***	-
		BF_{10}	2.43	76.53	1.72	.48	77 x 10^2	
7	FTND	*r*	-.10	.16*	-.07	.13*	.11	.05
		BF_{10}	.24	1.58	.15	.57	.34	.11

Table 3. Bivariate correlations coefficients and Bayes Factors (BF) for all Pearson correlation between variables. FTND = Fagerstrom Test for Nicotine Dependence. Smoking-specific outcomes refer to smoking health risks not linked to COVID-19. Significance levels are signalled thus: $p < .1$ = †; $p < .05$ = *; $p < .01$ = **; $p < .001$ = ***. Bayes factors are reported for all correlation coefficients. Bayes factors were calculated using a default stretched beta prior of 1 in JASP. Bayes factors above 3 denote moderate evidence for the experimental hypothesis, below .33 denotes moderate evidence for the null. Between .33 and 3 denotes inconclusive results requiring more data (Dienes, 2014).

3.2 Fear of COVID-19 mediation analysis

The mediation analysis with fear of COVID-19 as the predictor revealed no significant direct effect of fear of COVID-19 on motivation to quit. However, there was a significant indirect effect when mediated through the perceived probability of COVID19 infection, as it strongly related to an increase in perceived probability of COVID-19, which in turn predicted increased motivation to quit. Despite strongly correlating with perceived severity of COVID19, there was no significant indirect effect through this path.

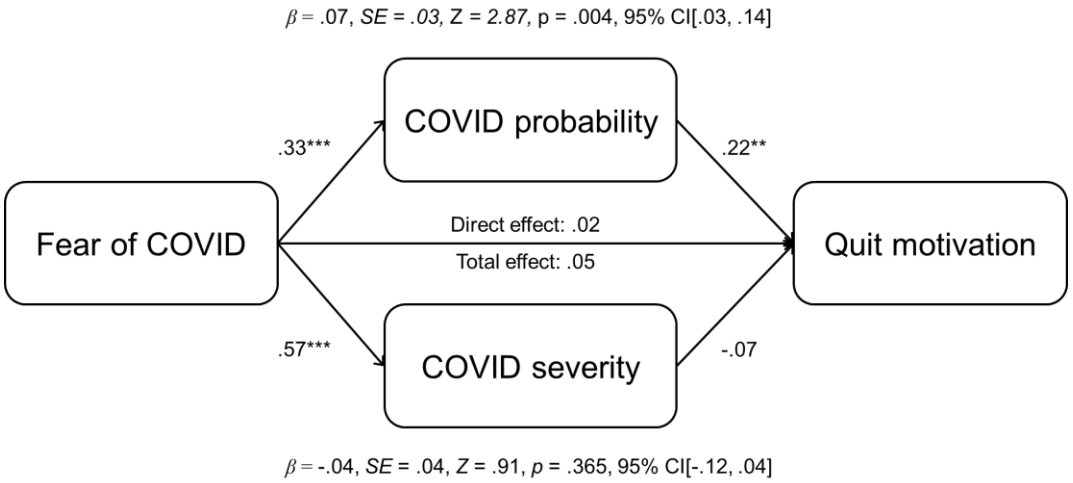

Figure 1. The mediation model for Fear of COVID-19 and motivation to quit (Quit motivation), as mediated through perceived probability of infection from COVID-19 (COVID probability) and perceived severity of COVID-19 infection (COVID severity). Indirect paths are presented adjacent to their variable. Confidence intervals were bootstrapped with 5000 resamples.

The inclusion of smoking-specific health risk beliefs as covariates did not change the results. The total effect of fear of COVID-19 on the motivation to quit remained non-significant, β = .02, SE = .07, Z = .09, p = .925, 95% $CI_{bootstrapped}$ [-.11, .15]. The indirect effect remained significant for perceived COVID-19 probability, β = .06, *SE* = .02, *Z* = 2.66, *p* = .008, 95% $CI_{bootstrapped}$ [.02, .13], and remain non-significant for perceived COVID-19 severity, β = -.04, *SE* = .04, *Z* = 1.04, *p* = .299, 95% $CI_{bootstrapped}$ [-.13, .03].

3.3 Nicotine dependence mediation analysis

When entered as a predictor in the mediation model, with both COVID-19 probability and severity beliefs as mediators, the FTND was non-significantly predictive of motivation to quit, β = -.07, *SE* = .06, *Z* = 1.18, *p* = .238, 95% $CI_{bootstrapped}$[-.20, .07]. Further, there was no significant indirect effect when mediated through either perceived probability, β = -.02, *SE* = .02, *Z* = 1.07, *p* = .286, 95% $CI_{bootstrapped}$[-.05, .01], or perceived severity, β = -.01, *SE* = .01, *Z* = .70, *p* = .482, 95% $CI_{bootstrapped}$[-.03, .01]. Though the FTND was significantly correlated with perceived severity of COVID-19 and fear of COVID-19 (see Table 3), this relationship was weak, and the Bayes factor revealed inconclusive evidence (BF > .33/ < 3).

4. Discussion

Across smokers the primary predictor of the motivation to quit smoking was the higher perceived probability of COVID-19 infection. Conversely, the belief that the COVID-19 infection would be severe was not a significant predictor of the motivation to quit smoking. Interestingly, in contrast to previous findings (Gold et al., 2020), fear of COVID-19 did not significantly predict the

motivation to quit directly; however, it did have a significant indirect effect upon motivation to quit when mediated through the perceived probability of COVID-19 infection, but not perceived severity.

The fact that perceived probability of COVID-19 infection was the only significant predictor of the current motivation to quit was unexpected, as evidence suggests that smokers are more at risk of severe COVID-19 infections, rather than more likely to be infected (Alqahtani et al., 2020; Vardavas et al., 2020; Patanavanich et al., 2020). Further, in an early meta-analysis, severity of health risks predicted engagement with health behaviours more than probability (Carpenter, 2010). A finding replicated with the beliefs about the severity and probability of other smoking-specific health outcomes in the current data.

One possible reason for this difference could be that severity and probability of COVID-19 beliefs may be dependent on different types of belief. Health beliefs can be divided into deliberative and experiential types, with deliberative beliefs based on declarative knowledge of probabilities, whilst experiential beliefs are grounded in the emotional or 'gut' feelings of risk (Ferrer & Klein, 2015; Ferrer et al., 2018). Importantly, experiential beliefs are more strongly linked to the motivation to quit or reduce smoking (Janssen et al, 2014).

It is possible that due to the novelty of COVID-19 at time of recruitment, the severity of COVID-19 infection was still an abstract threat to many smokers. Thus, despite many participants having prior knowledge of smoking's link to increased COVID-19 mortality (see Table 1), perceived severity did influence their attitudes towards quitting. Conversely, beliefs regarding probability of infection would be derived from personal experience of navigating infection risks (e.g. avoiding crowds, increased hand washing). The more frequent or salient actions to reduce the likelihood of infection may have resulted in this belief having a stronger experiential basis, resulting in changes in attitudes. Measures of COVID-19 experiences and attitudes were not recorded, however, meaning that it is unclear whether the beliefs differed in their experiential grounding, and would require further research.

Interestingly, the relationship between the COVID-19 infection probability and the motivation to quit remained significant when controlling for the general perceived probability of smoking-specific health outcomes (e.g. cancer). Therefore, the relationship was not limited to individuals with a general expectancy of other negative health outcomes from smoking. Such an effect is consistent with the increase in motivation to quit since the pandemic began being driven directly by the novel COVID-19 threat, independent of existing health beliefs (Jackson et al., 2020; White et al., 2021).

Further, nicotine dependence did not interact with either COVID-19 probability or severity beliefs in predicting motivation to quit, suggesting the relationship between perceived COVID-19 probability and motivation was found regardless of nicotine dependence. The findings thus suggest that both heavy and light smokers were likely to experience higher motivation to quit if they believed that COVID-19 infection was likely. Nicotine dependence was weakly positively correlated with perceived COVID-19 severity and fear of COVID-19, however, this trend did not translate into a

change in motivation. This trend was potentially due to heavy smokers being aware of their higher risk from COVID-19 (Patanavanich & Glantz, 2020).

Future work is now required to determine whether the higher motivation to quit smoking in some smokers persists beyond the peak of the pandemic and is transferred into lasting change in actual smoking behaviour, as motivation alone is not enough to result in long-lasting cessation (Borland et al., 2010). It may be that interventions can be utilised to enhance any increase in motivation to quit in response to the novel harm posed by COVID-19, though this will be dependent upon the progression of the virus globally (Grummon et al., 2020). It should be noted that the findings may be limited to a UK based sample, as the international response to COVID-19 has varied (Hale et al., 2020), meaning that replication is other samples is required.

5. Conclusion

The current findings replicate previous research reporting that the increased motivation to quit smoking is dependent on current beliefs about COVID-19 infection (Chertok, 2020). In the current investigation it was found that when focusing on the specific health beliefs, only the belief that COVID-19 infection was probable predicted the motivation to quit smoking, highlighting the different role of specific health beliefs in predicting smoking attitudes towards the novel COVID-19 threat.

The findings provide key information which can enhance the messaging of the COVID-19 health risks to smokers to facilitate smoking cessation. The current medical evidence suggests that the objective risk to smokers is increased COVID-19 severity, rather than probability of infection (Alqahtani et al., 2020; Vardavas et al., 2020; Patanavanich et al., 2020). Thus, communication of risk to smokers should not falsely imply increased probability, however, messaging the general high contagiousness of COVID-19, in conjunction with the increased COVID-19 severity for smokers, may be an effective strategy to increase the motivation to quit smoking during the COVID-19 pandemic.

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