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# Is the Messenger the Message? Canadian Political Affiliation and Other Predictors of Mask Wearing Frequency & Attitudes During the COVID-19 Pandemic

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We used a longitudinal design to examine factors associated with Canadians' (1) early adoption of mask-wearing and (2) attitudes toward mask mandates before mandatory mask mandates were issued. In May 2020, 1,712 Canadians began a 28-day daily diary study tracking their experiences with the COVID-19 pandemic. We examined the associations between people's political affiliation, psychological reactance, pre-existing risk factors, attitudes about the pandemic's severity, attitudes about mask mandates, and public mask-wearing frequency. Growth curve analyses indicated that, over time, Canadians' mask-wearing frequency and attitudes supporting mask mandates both increased. Those who perceived the pandemic as more serious had higher initial levels of both positive attitudes about mask mandates and mask-wearing frequency. Political affiliation was an important predictor of mask mandate attitudes, but only after May 20th, 2020: The first day Prime Minister Trudeau and Teresa Tam publicly stated they would be wearing masks in public. Subsequently, more liberally leaning participants reported more positive attitudes toward mask mandates compared to those with more conservative political views. These findings suggest the importance of cohesive, non-partisan messaging during a public health crisis to avoid political fractures in the uptake of recommended health behaviours. We provide recommendations for public health messengers toward improving voluntary compliance with public health measures, both during and beyond the COVID-19 pandemic.


## **Public Significance Statement**


We examined predictors of Canadian's face mask wearing frequency and attitudes toward mask mandates in May–July of 2020, before face mask policies were widely supported across the country. Overall, people who perceived greater risk to themselves in relation to the virus (older people, people who viewed the pandemic as a serious situation, people with pre-existing health conditions), people who identified as politically liberal, and racialized people were more likely to report greater mask wearing frequency and endorsement of mask mandates. Political affiliation was an important predictor of mask mandate attitudes, but only after May 20th, 2020: The day Prime Minister Trudeau and Teresa Tam publicly stated they would be wearing masks in public; subsequently, more liberally leaning participants reported more positive attitudes towards mask mandates compared to those with more conservative political views.


**Keywords:** COVID-19, health behavior, political views, communication, public health

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More than a year into the COVID-19 pandemic the world has reported over 190 million cases and more than 4.1 million deaths (World Health Organization [WHO], 2021). The first year of the pandemic varied in its onset around the globe, but in general, people around the world experienced at least two to three waves of the pandemic. Many public health measures aimed at flattening the curve have been quite costly and onerous, such as shutting down the economy and issuing stay-at-home orders, transitioning to virtual learning, and closing national and regional borders. Yet, one of the

most cost effective and easiest to implement interventions, the wearing of face masks, has been met with resistance and controversy within North America. The collective adoption of mask wearing can significantly slow the spread of COVID-19 by reducing infections and therefore saving lives. The present study sought to better understand the factors associated with Canadians' mask-wearing frequencies and attitudes prior to mandatory mask mandates.

In the early stages of the pandemic, the world knew little about effective protection from COVID-19. The virus was known to spread through close physical contact with others; thus, to prevent the virus from spreading, many Canadian provincial governments implemented physical distancing and stay-at-home policies soon after the pandemic was declared (in March/early April of 2020). Within North America, recommendations concerning face masks as a method of prevention have been more varied and slower to appear. Initially, researchers knew little about the efficacy of wearing non-medical (e.g., paper or cloth face coverings) face masks as a means of decreasing the spread of COVID-19. By mid-March of 2020, all provinces and territories had recommended physical distancing, but none recommended wearing face masks (Canadian Institute for Health Information [CIHI], 2021).

During this pandemic, Canadian public health messaging about wearing face masks has followed a complicated timeline. On April 6, 2020, Canada's Chief Public Health Officer, Theresa Tam, recommended voluntarily wearing non-medical masks in indoor spaces (Tasker, 2020). However, some Canadian public health officials (Hanes, 2020) were initially uncertain (World Health Organization [WHO], 2020) about broad recommendations for people to wear masks. Reasons for this hesitancy included the notion that people may not wear masks correctly or that masks could provide a false sense of security that would cause people to stop engaging in physical distancing (CBC News, 2020). On May 20, 2020, both Canadian Prime Minister Justin Trudeau and Teresa Tam made public statements that they would wear face masks in public and recommended that Canadians do the same (Canadian Press Postmedia, 2020; Global News, 2020). As researchers began to find evidence suggesting that mask-wearing was an effective strategy to prevent the spread of COVID-19 (MacIntyre & Wang, 2020), more Canadian jurisdictions began to implement mandatory mask-wearing policies. By late July 2020, mandated mask policies were in place in many jurisdictions around the globe (#Masks4all, 2020); however, between May and July 2020, mask-wearing in Canada was largely a recommendation, not a mandate. Despite the overwhelming evidence suggesting that the widespread adoption of masks can reduce the spread of COVID-19, mandatory mask policies quickly became a controversial issue in many Western nations, including Canada (Tso & Cowling, 2020; Saey, 2020).

### **Voluntary Adoption of Public Health Recommendations**

Democratic countries—including Canada—tend to rely on voluntary adoption of public health measures (such as wearing face masks or receiving a vaccination) as the best approach to balancing citizens' health and respecting their rights and freedoms (Cheung, 2020). Under such circumstances, it is crucial to understand factors related to people's compliance with voluntary public health recommendations. In Canada, municipalities and provinces only began to implement mandatory mask policies in June 2020, despite earlier

recommendations from government officials and medical experts (e.g., announcements made on May 20th) that people wear face masks in public. Understanding people's frequency of mask-wearing and their attitudes toward wearing face masks during the unique period when doing so was voluntary will shed light on how people might respond to future requests for voluntary public health compliance. Furthermore, by examining the psychological factors related to voluntary mask-wearing and attitudes toward mask mandates, we can better understand what role governments should take when other crises occur, including how future COVID-19 public health communications should proceed (e.g., voluntary vs. mandatory vaccinations). The COVID-19 pandemic is a unique context to learn about people's changing adoption of, and attitudes toward, voluntary adoption of public health recommendations over time—and to apply these lessons forward. The goals of this study were to examine: (a) how mask-wearing frequency and attitudes toward mask mandates changed between May and June 2020 (before widespread legislation), and (b) to understand individual trajectories of mask-wearing frequency and attitudes over time as a function of psychosocial and demographic variables.

### **Potential Predictors of Adopting Voluntary Public Health Measures**

Researchers have suggested that people who perceive more significant risks to their health are more willing and likely to engage in protective behaviors and to support policies designed to mitigate health risks (Bruine de Bruin et al., 2020; Fischhoff, 2013; Rogers, 1975; Rosenstock, 1974). For example, people who view themselves as being at higher risk for adverse health outcomes related to influenza are also more likely to engage in protective health behaviors (e.g., getting the flu vaccine; Brewer et al., 2004; Bruine de Bruin & Carman, 2018). During the COVID-19 pandemic, people who perceived greater risks of COVID-19 infection or fatality also reported greater engagement in protective behaviors (Bruine de Bruin & Bennett, 2020). Recent studies with large samples of American adults suggest that mask-wearing is more likely in public settings among individuals who are immunocompromised (e.g., cancer patients, organ transplant recipients), have cardiometabolic conditions (e.g., heart disease, diabetes), chronic health conditions, or who face systemic inequalities in healthcare (i.e., Black, Indigenous, and People of Color; Camacho-Rivera et al., 2020; Qeadan et al., 2020). By the time the virus arrived in Canada, information about who was at the highest risk of severe complications or fatal outcomes was readily available. In addition to the risk factors related to mask-wearing identified above, being older is associated with more severe cases of COVID-19 (Public Health Agency of Canada, 2021). In the present study, we expected people at higher risk of experiencing severe or fatal cases of COVID-19 to report a higher frequency of wearing masks and more favorable attitudes toward mask mandates compared to people at a lower risk.

Researchers have also suggested that men and women differ in their perception of risk and voluntary adoption of public health measures. For instance, Srivastav et al. (2018) demonstrated that women consistently take significantly greater preventative actions to avoid contracting and spreading influenza, including vaccinations and personal health and interpersonal social health behaviors. Additionally, men who endorse hegemonic masculinity take fewer preventative measures (Springer & Mouzon, 2011) and are less

likely to comply with mask-wearing mandates (Cassino & Besen-Cassino, 2020; Palmer & Peterson, 2020). Along these lines, men are more likely than women to perceive mask-wearing as shameful, a sign of weakness (Capraro & Barcelo, 2020), and an infringement upon their independence (Howard, 2021). Overall, findings consistently indicate that men may be less likely than women to undertake substantial preventative behaviors due to a combination of self-perceived gender roles and endorsement of forms of masculinity associated with unsafe health behaviors.

### Political Implications/Cultural Differences

Social context and preconceived biases or beliefs can also influence a person's perception of risk. In the context of political affiliation and perception of risk associated with the COVID-19, American data suggest that Democrats may perceive more risk than their Republican counterparts. Specifically, Democrats perceive a higher risk of contracting COVID-19 (Dryhurst et al., 2020) and perceive the actual threat posed by COVID-19 and associated hospitalizations to be greater (Bruine de Bruin et al., 2020). Consequently, Democrats were 1.75 times more likely than Republicans to wear a face mask in indoor public spaces voluntarily and 1.45 times more likely to avoid public spaces altogether. Indeed, voluntarily wearing face masks in public appears to have become a behavior that is at odds with conservative political ideology in the United States. This may be related to the construct of psychological reactance (negative affect associated with feeling that one's freedom is threatened; Hong & Faedda, 1996), such that individuals with a greater concern for individual liberties (e.g., conservatives, men) may be less inclined to follow public health recommendations (Diaz & Cova, 2020). Indeed, Diaz and Cova (2020) found that people higher in psychological reactance were less likely to adhere to public health recommendations related to COVID-19. In the present study, we expected that Canadians with more liberal political beliefs and lower levels of psychological reactance would report a higher frequency of wearing masks and more favorable attitudes toward mask mandates relative to Canadians with more conservative political beliefs and higher levels of psychological reactance.

The importance of understanding how attitudes toward public health mandates and associated behaviors evolve are manifold, with implications both for the current pandemic and for future public health crises. Trajectories of attitudes and behaviors related to mask-wearing can provide a model for how the public might respond to other similar recommendations, such as those for the COVID-19 vaccines. Concerns related to "vaccine hesitancy" (Murphy et al., 2021) point to the need for a clearer understanding of the factors that influence the public's adoption of public health recommendations before recommendations become mandates.

### The Present Study

The present study aimed to examine Canadians' frequency of mask-wearing and attitudes toward mask mandates during the COVID-19 pandemic across time and between different demographic and political identities. American research indicates that women, liberals, and individuals at higher risk of experiencing severe virus-related health outcomes are the most likely to adopt voluntary mask-wearing behaviors during the pandemic. However, it is not yet clear if the same patterns apply equally to Canadians.

Researchers have not yet examined how changes in frequency might covary with changes in mask mandate attitudes, despite the fundamental connection between them. Therefore, in the present study we examined if, and to what degree, changes in mask wearing frequency and mask mandate attitudes were associated with possessing risk factors of COVID-19, gender, and political affiliation. As additional predictors, we also explored political alienation (encompassing trust in government), psychological reactance, and general demographic variables associated with an increased incidence of COVID-19 in Canada (i.e., urban vs. rural; Haischer et al., 2020, racialization; Hearne & Niño, 2021).

Our data collection incidentally captured a noteworthy event relevant to our pre-existing research questions concerning the adoption of recommended public health measures. On May 20, 2020, Prime Minister Trudeau and Theresa Tam recommended for the first time that Canadians wear face masks in public and indicated that they would do the same. For instance, Prime Minister Trudeau announced that he would be wearing a face mask when indoors, as "[his] personal choice, that is aligned with what public health [was] recommending." Importantly, this was the first time both Trudeau and Tam took a strong public stance on wearing face masks during the pandemic (Britneff, 2020). The timing of this development allowed us to explore the role that political messaging may play in public health communications during a pandemic. It is possible that these widely publicized statements about mask-wearing from two politically Liberal figureheads—and no similarly timed message from a politically Conservative figurehead—may have contributed to the politicization of mask-wearing in Canada (van der Linden, 2020). Like other researchers (e.g., Maxmen & Tollefson, 2020), we did not anticipate that mask-wearing would become a politically charged issue. Both the timing of our data collection (beginning in early May 2020) and the items in our survey provided us with a unique opportunity to examine Canadians' mask-wearing frequency and attitudes along demographic and party lines, pre- and post-May 20th. Therefore, we also posed the following exploratory research questions: (a) In what ways do trajectories of mask-wearing frequency and mask mandate attitudes change before versus after May 20th? (b) In what ways do the effects of predictors of changes in mask-wearing frequency and mask mandate attitudes differ before versus after May 20th? Because the timing of these public announcements was idiosyncratic and unanticipated, we treated this situation as a unique platform from which to explore novel questions related to the effects of public health messaging by political leaders on the behaviors of the population.

## Method

### Participants

Participants were drawn from a more extensive study examining people's experiences while coping with the COVID-19 pandemic. Participants were recruited online via paid social media advertisements, word of mouth, and the project website. A total of 1,810 people completed the initial intake survey for this study. Our final sample consisted of 1,527 participants after removing those who did not reside in Canada, people without sufficient data on the weekly time points, and people who began the study within approximately 1 month (32 days) of the study's onset and participated in weekly follow-up surveys for either 14 or 28 days. Participants ranged in

age from 16 to 87 years old ( $M = 45.6$ ,  $SD = 17.0$ ). Most participants identified as women (82.1%) and as white (90.9%), were in a committed relationship (60.0%), and had received at least some college or university education (92.6%). Table 1 presents additional sample demographics.

## Procedure

Interested participants accessed the online survey (hosted on Alchemer) from the study's website and online advertisements. Participants completed the online intake survey on a rolling basis, starting on May 14, 2020—about 2 months after the World Health Organization declared a global pandemic. Participants were able to access and complete the intake survey on a rolling basis until July 1, 2020. The intake survey took an average of 30 min to complete. At the end of the intake survey, participants could continue with (a) daily diary surveys every day for the next consecutive 28 days, or (b) weekly diary surveys for 4 weeks. The daily surveys took an average of 10 min to complete; weekly surveys took an average of 15–20 min to complete. Participants who selected the daily diary option received the longer weekly survey every 7 days. For each survey participants completed, they received one entry into a prize

draw for gift cards of various denominations (ranging from \$20 to \$150 Canadian Dollar [CAD]) and a grand prize voucher for a six-night stay at a Canadian resort hotel. We also compensated all participants by providing them with a copy of their daily/weekly responses to the open-ended diary questions at the end of their participation. Research Ethics Board (REB)s of St. Francis Xavier University and Acadia University approved the study before data collection.

## Intake Measures

### *Background and Demographic Information*

Participants provided their age, gender, race, education level, current employment status, and current income level. We also asked participants about their Canadian political affiliation using a 7-point scale with response options ranging from *extremely liberal* (1) to *extremely conservative* (7).

### *Pre-Existing Health Conditions*

We asked participants whether they had any pre-existing health conditions that were (at the time) known to be related to experiencing more severe cases of COVID-19. Participants were given the

**Table 1**  
*Demographic and Background Characteristics of Sample Retained for Analyses*

Demographic Variable	Subsample size ( $n$ )	Proportion of total sample (%)
Gender		
Man	202	13.2
Woman	1,254	82.1
Cisgender	1,449	94.9
Transgender, non-binary, genderqueer	76	5.0
Race/ethnicity		
White	1,388	90.9
Mixed/multiple ethnic groups	48	3.1
Asian	30	2.0
Middle Eastern	6	0.4
Black/African/Caribbean	7	0.5
Latin American	12	0.8
Indigenous/Aboriginal	13	0.9
Other/prefer not to answer	203	1.5
Relationship status		
Single	401	26.3
Committed relationship/married	916	60.0
Divorced/widowed	84	5.5
Other/prefer not to answer	126	8.2
Cohabiting with a romantic partner	731	47.9
Highest educational level		
Some school without high school	21	1.4
High school graduate	91	6.0
Some college/university education	317	20.8
Degree from a college or university	678	44.4
Post-graduate degree	419	27.4
Employment		
Unemployed	183	12.0
Student	254	16.7
Employed or self-employed	987	61.6
Retired	317	20.8
Province		
BC, AB, SK, MB	287	18.9
QC, ON	476	31.2
NL, NS, NB, PEI	754	45.9
YT, NWT, NVT	9	0.6

following list of risk factors and asked to select the ones that applied to them: smoker, pregnant, a heart condition, diabetes, high blood pressure, a current/recent respiratory illness, compromised immune system, or living with a disability.

### ***Political Alienation***

We used Olsen's (1969) measurement of political alienation to examine the extent to which participants felt estranged from their political system and leaders. This measure has three items, each measured on a 7-point scale (*Strongly disagree* = 1, *Strongly agree* = 7; e.g., "People like me don't have a say about what the government does."). We also added one additional, reverse-scored item to this scale: "I trust my government." Higher total scores indicate greater feelings of alienation and lower trust in government. Cronbach's  $\alpha$  was .80 and McDonalds Omega was .81.

### ***Hong Psychological Reactance Scale***

We used eight items from Hong and Faedda (1996) psychological reactance scale. Using a 7-point scale (1 = *Strongly disagree*, 7 = *Strongly agree*), participants rated their agreement with each statement (e.g., "Regulations trigger a sense of resistance in me"). We chose items from this scale based on their perceived relationship to government behavioral regulations; due to survey length limitations, we could not include all of the items from the original scale. Higher total scores indicate greater psychological reactance. Cronbach's  $\alpha$  coefficient was .84 and McDonalds Omega was .84.

### ***Weekly Measures***

We included the following measures in both the Intake and Weekly surveys.

#### ***Mask Wearing Frequency***

We examined the weekly frequency with which participants had worn a face mask while out in public with one item: "Over the past 7 days, how often have you worn a face mask while out in public?" Participants responded to this question using a 5-point scale (*Never* = 1, *Always* = 5). When responding to this question, participants could indicate if they had not been in public during the past week (coded as N/A).

#### ***Mandatory Mask Policy Attitudes***

To assess attitudes about mandatory mask-wearing policies, participants rated their agreement with the following statement: "Until the COVID-19 pandemic is over, it should be mandatory to wear a mask while out in public." Participants responded to this question using a 7-point scale (*Strongly disagree* = 1, *Strongly agree* = 7).

#### ***Personal Pandemic Attitudes***

We used four items from Diaz and Cova (2020) to measure attitudes about the seriousness of the COVID-19 pandemic. Participants rated their agreement with each statement using a 7-point scale (1 = *Fully disagree*, 7 = *Fully agree*; e.g., "The COVID-19 pandemic is one of the most serious health crises in recent times.").

Higher scores indicate a belief that the pandemic is a serious issue. Participants' initial (first time point) pandemic attitudes were used in our study and internal consistency reliability failed to meet the minimum threshold (Cronbach's  $\alpha$  = .71, McDonalds  $\omega$  = .72).

### ***Data Analysis***

For the growth curve models, the intercepts represented the average initial score (at Time 1). The slope coefficients were coded linearly (i.e., 0, 1, 2, 3, 4) and thus represented the average linear change in the outcome between timepoints (Bollen & Curran, 2006). The sample exceeds standards from simulation studies ( $N > 500$  for similar studies) for statistical power to detect growth parameter associations (Hertzog et al., 2006) and exceeds sample size requirements to detect small effect sizes ( $N > 800$ ; Lee & Whittaker, 2018). All Structural Equation Modeling (SEM) models were estimated with the R *lavaan* package (Rosseel, 2012) using robust maximum likelihood (Yuan et al., 2000). Table S1 (Supplemental Materials) displays missing data percentages. We used the full information maximum likelihood (FIML) estimation method to deal with missing data.

We first estimated univariate growth curve models separately to ascertain the shape of change over time in mask wearing frequency and mask mandate attitudes (see Supplemental Figure S1 for the form of these models; Panel A). Second, to study how mask mandate attitudes and mask-wearing frequency changed together over time we estimated both sets of growth constructs simultaneously with covariances between them (see Figure S1; Panel B). Then, covariates were added to the multivariate model.

## ***Results***

### ***Descriptive Results***

The means and standard deviations of mask-wearing frequency and mask mandate attitudes are shown in the supplementary material (Supplemental Table S1) with relevant descriptive statistics for the covariates.

#### ***How Do Mask-Wearing Frequency and Mask Mandate Attitudes Change Over Time?***

Univariate linear models displayed excellent fit according to all indices (see Table 2; Models 1 and 2) and were retained. Findings supported that mask-wearing frequency and mask mandate attitudes linearly increased over time (see Table 3; Models 1 and 2).

#### ***Multivariate Model of Mask-Wearing Frequency and Mask Mandate Attitudes***

We estimated mask-wearing frequencies and mask mandate attitudes together as a multivariate latent growth curve model to ascertain if, and to what degree, changes in one paralleled changes in the other. This model fit well and was retained (see Table 2, Model 3), which provided empirical evidence to suggest that mask-wearing frequency and mask mandate attitudes trajectories were connected. Slopes of mask-wearing frequency and mask mandate attitudes were not correlated, suggesting that change in mask wearing frequency did not necessarily parallel change in mask mandate attitudes (Table S2; Model 3). But the association between the cross-construct intercepts was strong and significant, meaning that people

**Table 2**  
*Fit Indices for All Growth Models Estimated*

Model	$\chi^2$	<i>df</i>	<i>p</i> value	RMSEA [90% CI]	SRMR	CFI	TLI	BIC	Pass?
Mask wearing frequency models									
Model 1: Baseline model. ( <i>N</i> = 1,440)	31.94	10	<.001	.04 [.03, .06]	.03	.99	.99	11585.24	Y
Model 1a: Baseline model + Multigroup ( <i>N</i> <sub>1</sub> = 472; <i>N</i> <sub>2</sub> = 968)	50.00	20	<.001	.05 [.03, .07]	.04	.99	.99	11615.44	Y
Mask mandate attitudes models									
Model 2: Baseline model ( <i>N</i> = 1,524)	20.59	10	.03	.03 [.01, .05]	.03	.995	.995	13455.14	Y
Model 2a: Baseline model + Multigroup ( <i>N</i> <sub>1</sub> = 516; <i>N</i> <sub>2</sub> = 1,193)	27.83	20	.11	.02 [.00, .04]	.04	.996	.996	13505.77	Y
Parallel process models									
Model 3: Correlated model ( <i>N</i> = 1,525)	68.42	36	<.001	.02 [.02, .03]	.03	.99	.99	24295.07	Y
Model 3a: Correlated model + Multigroup ( <i>N</i> <sub>1</sub> = 517; <i>N</i> <sub>2</sub> = 1,008)	110.84	72	.002	.03 [.02, .04]	.04	.99	.99	24428.28	Y
Model 4: Correlated model + Covariates ( <i>N</i> = 1,393)	157.77	96	<.001	.02 [.02, .03]	.02	.99	.98	21995.52	Y
Model 5: Correlated model + Covariates + Multigroup ( <i>N</i> <sub>1</sub> = 461; <i>N</i> <sub>2</sub> = 978)	254.99	192	.002	.02 [.01, .03]	.03	.99	.98	23007.44	Y

*Note.* Each multivariate model is estimated with within-time cross-construct covariances. RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; BIC = Bayesian Information Criterion.

who began the study higher in mask mandate attitudes also began the study higher in mask wearing frequency (and vice versa).

Next, we examined intercept-slope correlations to ascertain whether people's initial levels of mask-wearing and mask mandate attitudes might be associated with differential change rates. Initial levels of mask mandate attitudes were negatively associated with the slopes of mask-wearing frequency, meaning that people with more positive initial attitudes toward mask mandates increased less over time (compared to those with lower initial attitudes; Table S2; Model 3). Likewise, initial mask-wearing frequency was negatively associated with the slope of mask-wearing frequency, meaning that people who had higher initial scores increased less over time.<sup>1</sup> Initial mask wearing frequency was positively related to the slope of mask wearing attitudes, suggesting that people who began the study higher in mask-wearing frequency had more rapid increases in their mask mandate attitudes over time.

## Effects of Covariates on Mask Wearing and Attitudes

### Effects of Covariates on Mask Wearing Frequency

To understand the effects of a variety of covariates, they were added as exogenous variables predicting the slopes and intercepts of both mask-wearing frequency and mask mandate attitudes in the multivariate model. Increased age, believing the pandemic to be more serious/severe, having risk factors, living in an urban area, and starting the survey further into the pandemic were associated with increased initial mask wearing frequency (see Table S3). There were no significant predictors of mask wearing slopes.

### Effects of Covariates on Mask Mandate Attitudes

Being older, having more liberal political views, believing the pandemic to be more serious/severe, having risk factors, and being a member of a visible minority were associated with higher initial levels of mask mandate attitudes (see Table S3). The only significant slope predictors were visible minority and day. The visible minority

effect suggested that visible minority people' mask attitudes increased less over time compared to non-visible minority people. The significant effect of day on the slope suggested that people who began the study later on from the outset had steeper increases in mask mandate attitudes compared to those who began earlier.

### Effects of Mask Wearing Announcements by Liberal-Affiliated Messengers (on May 20th)

To explore differences between participants who began the study before or after May 20th we again estimated the multivariate growth curve model of mask-wearing frequency and mask mandate attitudes, but this time as a multi-group model with the grouping variable being joining the study before or after May 20th. The goal was to examine whether people who began the study prior to May 20th had different growth functions and/or different effects of covariates compared to those who began the study after May 20th. We estimated several multi-group growth models for thoroughness: A multigroup model of the univariate growth curves for both mask-wearing frequency and mask mandate attitudes (Table 2, Models 1a and 2a) as well as the multivariate form with (Model 5) and without (Model 3) covariates. All models fit well by most indices.

**Change in Mask Wearing Frequency.** In terms of growth parameters, slope coefficients estimated in the multi-group format showed that mask wearing frequency increased linearly for both the before and after May 20th groups (Table S4; Model 1a; Model 1b).

**Change in Mask Mandate Attitudes.** Before May 20th, the mask mandate attitude slope was not significant, meaning there was no significant linear change (neither increase nor decrease; Table S4;

<sup>1</sup> Note that negative slope-intercept correlations are common when the growth construct is measured on a closed-ended Likert-type scale (Little, 2013). The scaling of measurement means that people who begin high on mask mandate attitudes, for example, may have their capacity to *increase* constrained at subsequent time-points, which precipitates a tendency toward negative coefficients (i.e., a person reporting a 5/5 on mask mandate attitudes cannot increase). Thus, intercept to slope correlations should be interpreted with caution.

**Table 3**  
*Growth Parameter Estimates for Univariate and Multivariate Mask Wearing and Mask Mandate Attitudes Models*

Model	Growth parameter	Estimate	Std. Err.	<i>p</i> value	LL 95% CI	UL 95% CI	Std. estimate
Model 3 overall	Mask wearing intercept	2.92	.04	.000***	2.84	3.01	1.93
	Mask wearing slope	.11	.01	.000***	.09	.14	.47
	Attitudes intercept	4.72	.05	.000***	4.63	4.81	3.04
	Attitudes slope	.06	.01	.000***	.03	.08	.33
Model 3a: Before May 20	Mask wearing intercept	2.67	.08	.000***	2.52	2.82	1.93
	Mask wearing slope	.13	.02	.000***	.08	.17	.47
	Attitudes intercept	4.70	.08	.000***	4.55	4.85	3.04
	Attitudes slope	.03	.02	.211	-.02	.07	.33
Model 3b: After May 20	Mask wearing intercept	3.05	.05	.000***	2.94	3.15	2.01
	Mask wearing slope	.10	.02	.000***	.07	.13	.44
	Attitudes intercept	4.73	.06	.000***	4.62	4.84	3.06
	Attitudes slope	.06	.02	.000***	.03	.09	.58

\*\*\* *p* < .001.

Model 2a). After May 20th, the mask mandate attitudes slope coefficient was significant and denoted a linear increase to mandate attitudes after that date (but not before).

**Analysis of Co-Change.** Analysis of the correlations between intercepts and slopes of growth parameters in the multi-group model largely mirrored the overall results but with several exceptions (Table S2). In the overall model, initial levels of mask mandate attitudes were negatively associated with the slope of mask-wearing frequency, however, that same association was not significant when broken down in the multi-group format in either model (Table S2).

Before May 20th, there was no correlation between initial mask-wearing frequency and the slope of change in mask mandate attitudes, however, after May 20th the correlation is significant and positive. People who began the study higher in mask-wearing frequency after May 20th had mask mandate attitudes that increased more rapidly (Table S2; Model 3a).

**Effect of Covariates on Mask Frequency.** Before May 20th, believing the pandemic to be more serious and possessing risk factors were associated with higher initial levels of mask wearing (Table 4). Being a visible minority was associated with increased change in mask usage over time; visible minority people reported a more rapid increase in mask usage. After May 20th, increased age, viewing the pandemic as more serious, possessing risk factors, being a woman, and a later study enrolment date were associated with higher initial mask-wearing (Table 5).

**Effect of Covariates on Mask Mandate Attitudes.** Before May 20th, believing the pandemic to be more serious was associated with increased initial attitudes toward mask mandates. There were no significant predictors of slopes (Table 4). However, after May 20th, several effects became significant. Higher age, more liberal political views, believing the pandemic to be more severe, lower psychological reactance, possessing risk factors, and being a visible minority were significant predictors of higher initial levels only for people who began after May 20th (Table 5). In terms of slope predictors, being a member of a visible minority was associated with less drastic increases in attitudes toward mask mandates.

### Discussion

In this longitudinal study, we examined the trajectories of change over time in both mask wearing frequency and mask mandate

attitudes. Our findings suggest that Canadians' mask wearing frequency increased over time and their attitudes toward mask mandates became more positive. Perceiving the pandemic as more serious was ubiquitously a predictor of higher initial levels of mask wearing and more positive initial levels of mask mandate attitudes (but not rates of change) in all our models. The unique timeframe of our data collection period allowed us to examine people's frequency of wearing face masks before doing so was mandatory, as well as people's evolving attitudes towards mask mandates before they happened. Indeed, public health recommendations need not become regulations when they are broadly adopted by the public. Regulations are costly and time-consuming to enforce, they may create perceived infringement on people's civil liberties, and in some cases, they may deepen a nation's political divides (Dryhurst et al., 2020). For these reasons, in a democratic country that emphasizes individual freedoms, non-mandated but broadly implemented behaviors toward the collective public good is ideal. Furthermore, by examining people's changing attitudes toward mandating public health recommendations, we can better understand and predict how the public may respond to future regulations.

### Increases in Mask Wearing Frequency and Attitudes Over Time

Our findings suggest that, in aggregate, public health messaging about face masks was positively related to people's frequency of wearing face masks and their attitudes toward mask mandates. Specifically, we found that people did voluntarily increase mask-wearing frequency as positive messaging about wearing face masks became more prevalent. We also found that people's mask mandate attitudes did not change in aggregate before May 20, 2020 (the day Prime Minister Trudeau and Chief Public Health Officer Tam publicly stated their intention to wear face masks); however, they increased linearly after May 20. Altogether, these findings support the importance of public health statements by government officials. It is essential that public health information be disseminated in ways that resonate with as many people as possible; we should not underestimate the value of clear public statements by government leaders.



**Table 4**  
*Effects of Predictors on Change Coefficients for Before May 20*

Covariate	Estimate	Std. Err.	<i>p</i> value	LL 95% CI	UL 95% CI	Std. Est.
Mask frequency intercept						
Age	.00	.01	.709	-.01	.01	.02
Political views	-.08	.06	.210	-.20	.04	-.07
Political alienation	.00	.02	.905	-.03	.03	-.01
Pandemic attitudes	.50	.06	.000***	.38	.62	.36
Reactance	.01	.01	.401	-.01	.03	.05
Risk factor	.35	.15	.019*	.06	.64	.12
Gender	.14	.18	.426	-.21	.50	.04
Visible minority	-.28	.32	.373	-.90	.34	-.05
Urban	-.04	.15	.813	-.34	.26	-.01
Day	-.12	.06	.054	-.25	.00	-.09
Mask frequency slope						
Age	.00	.00	.561	.00	.00	.07
Political views	.03	.02	.110	-.01	.06	.18
Political alienation	.00	.01	.731	-.01	.01	.04
Pandemic attitudes	-.01	.03	.697	-.06	.04	-.05
Reactance	-.01	.00	.074	-.01	.00	-.20
Risk factor	.03	.04	.459	-.05	.12	.08
Gender	-.01	.06	.897	-.12	.10	-.01
Visible minority	.27	.12	.021*	.04	.49	.33
Urban	.02	.05	.626	-.07	.11	.05
Day	-.02	.02	.465	-.06	.03	-.08
Mask mandate attitudes intercept						
Age	.00	.01	.521	-.01	.01	.03
Political views	-.13	.07	.068	-.27	.01	-.11
Political alienation	.01	.02	.512	-.02	.04	.04
Pandemic attitudes	.58	.08	.000***	.43	.73	.38
Reactance	.01	.01	.546	-.01	.02	.03
Risk factor	.10	.16	.533	-.21	.40	.03
Gender	.25	.19	.188	-.12	.63	.06
Visible minority	.36	.27	.173	-.16	.89	.06
Urban	.03	.16	.829	-.27	.34	.01
Day	-.08	.06	.191	-.19	.04	-.05
Mask mandate attitudes slope						
Age	.00	.00	.520	.00	.00	.07
Political views	.05	.03	.132	-.01	.11	.24
Political alienation	-.01	.01	.242	-.02	.01	-.14
Pandemic attitudes	-.01	.03	.806	-.06	.05	-.03
Reactance	.00	.00	.935	-.01	.01	.01
Risk factor	.01	.05	.882	-.09	.10	.01
Gender	.02	.06	.810	-.11	.14	.02
Visible minority	-.02	.10	.872	-.22	.18	-.02
Urban	-.04	.05	.449	-.14	.06	-.07
Day	-.04	.02	.082	-.08	.01	-.15

\*  $p < .05$ . \*\*\*  $p < .001$ .

### Effects of Demographic and Individual Predictors

We found that several demographic and individual variables played a role in predicting increased mask-wearing frequency and positive attitudes toward mask mandates over time; these included pre-existing conditions that would increase risk of severe or fatal COVID-19, perception of pandemic severity, gender, and political affiliation.

#### *Pre-Existing Risk Factors*

People who were considered “high risk” of severe or fatal outcomes (i.e., older, racialized, at least one pre-existing health condition) were the most likely to report higher initial mask wearing frequency and favorable attitudes toward mask mandates.

Consistent with previous research (e.g., Bruine de Bruin & Bennett, 2020; Fischhoff, 2013), these results suggest that people who perceived greater risks of COVID-19 infection and/or fatality also reported greater engagement in, and support for, policies toward mask wearing as a protective health behavior.

#### *Pandemic Attitudes*

The call for consistent and clear messaging targeting all segments of society is further underscored by our finding that individuals who perceived the pandemic as more severe or serious (i.e., those for whom public health messaging had resonated), reported greater frequency of mask-wearing as well as more favorable attitudes toward mask mandates.

**Table 5**  
*Effects of Predictors on Change Coefficients for After May 20*

Covariate	Estimate	Std. Err.	p value	LL 95% CI	UL 95% CI	Std. Est.
Mask frequency intercept						
Age	.02	.00	.000***	.01	.02	.20
Political views	-.07	.04	.126	-.15	.02	-.05
Political alienation	-.01	.01	.350	-.03	.01	-.03
Pandemic attitudes	.33	.05	.000***	.24	.42	.25
Reactance	-.01	.01	.132	-.02	.00	-.05
Risk factor	.28	.10	.006**	.08	.47	.09
Gender	-.39	.15	.010*	-.69	-.09	-.08
Visible minority	.03	.19	.866	-.34	.40	.01
Urban	.25	.10	.009**	.06	.44	.08
Day	.03	.00	.000***	.03	.04	.21
Mask frequency slope						
Age	.00	.00	.970	.00	.00	.00
Political views	-.01	.01	.555	-.03	.02	-.04
Political alienation	.00	.00	.787	-.01	.01	.02
Pandemic attitudes	.01	.01	.292	-.01	.04	.06
Reactance	.00	.00	.606	.00	.00	-.03
Risk factor	.03	.03	.363	-.03	.09	.06
Gender	-.01	.04	.753	-.09	.06	-.02
Visible minority	-.01	.05	.874	-.10	.09	-.01
Urban	.04	.03	.151	-.02	.10	.09
Day	.00	.00	.123	-.01	.00	-.10
Mask mandate attitudes intercept						
Age	.01	.00	.026*	.00	.01	.08
Political views	-.13	.04	.003**	-.21	-.05	-.11
Political alienation	.00	.01	.854	-.02	.02	.01
Pandemic attitudes	.63	.05	.000***	.54	.73	.46
Reactance	-.02	.01	.005**	-.03	-.01	-.11
Risk factor	.37	.10	.000***	.17	.58	.12
Gender	-.30	.17	.080	-.64	.04	-.06
Visible minority	.54	.19	.005**	.17	.92	.10
Urban	-.12	.10	.239	-.32	.08	-.04
Day	.01	.01	.033*	.00	.02	.07
Mask mandate attitudes slope						
Age	.00	.00	.365	.00	.00	.12
Political views	-.02	.01	.092	-.05	.00	-.24
Political alienation	.00	.00	.836	-.01	.01	.03
Pandemic attitudes	.02	.01	.210	-.01	.04	.14
Reactance	.00	.00	.507	-.01	.00	-.09
Risk factor	-.04	.03	.222	-.10	.02	-.16
Gender	-.06	.06	.313	-.18	.06	-.17
Visible minority	-.16	.05	.003**	-.27	-.06	-.36
Urban	.06	.03	.065	.00	.11	.23
Day	.00	.00	.631	.00	.00	.07

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

**Gender**

At intake, women reported higher frequency of mask-wearing relative to men, which is consistent with other research indicating that men are less likely than women to voluntarily wear face masks in public (e.g., Capraro & Barcelo, 2020; Cassino & Besen-Cassino, 2020; Howard, 2021). Some experts have suggested that cisgender men are more susceptible to severe or fatal COVID-19 outcomes; however, in contrast to our finding that people who are at higher risk reported higher mask-wearing frequency, men in our sample reported lower rates of mask-wearing. Masculine gender norms may prevent men from following health guidelines due to associating mask-wearing with weakness or fear—both of which conflict with traditional masculinity (Courtenay, 2000; Gibson & Denner, 2000). Indeed, the assumed requirement that men eschew all elements of femininity has been described as a method of maintaining

masculinity’s (Pascoe, 2007) ascendancy over femininity (i.e., femmephobia; Hoskin, 2020). Our finding that men are less in favor of mask mandates may, thus, be a product of femmephobia and point to the potential health consequences of the societal devaluation of femininity.

Although we found that gender was a significant predictor of mask wearing frequency, gender did not significantly predict attitudes toward mask mandates—either initially, or over time. Mask mandates may help to remove the gendered implications and attributions of mask-wearing, such that, when mandated by law, wearing a mask is no longer a sign of femininity or weakness, but rather simply a matter of following the law. Indeed, one study reported that gender differences in mask-wearing intentions were only prevalent in jurisdictions that *did not* have mask mandates (Capraro & Barcelo, 2020), which aligns with our own findings from data collected prior to mask mandates in Canada. In future

studies examining voluntary adoption of public health measures, researchers should directly consider the role that femmephobia may play in men's willingness to follow public health recommendations whose adoption may be associated with femininity and/or weakness.

### ***Political Affiliation and Psychological Reactance***

In May and June of 2020, the COVID-19 pandemic was still a rapidly evolving situation. Our data collection incidentally overlapped with May 20th—a date that became important in the context of Canadian mask discourse because it was the first time Prime Minister Trudeau and Theresa Tam made public statements that they would personally be wearing face masks in public and encouraged Canadians to voluntarily do the same. This provided a unique opportunity to test effects borne of public messaging by federal leaders. The “before May 20th” models had few statistically significant predictors; however, the “after May 20th” models had several statistically significant predictors, suggesting that there may be meaningful differences in inter-individual differences in mask-wearing frequency and mask mandate attitudes that followed these public announcements.

Analyses of people who came into the study before versus after May 20th indicated that political affiliation only became significantly associated with mask mandate attitudes after this date, such that being more “liberal,” as opposed to “conservative,” was associated with a greater likelihood of supporting mask mandates. This finding suggests that mask mandate attitudes may be demarcated by political affiliation when public figures make statements on public health issues that are not immediately echoed by the leaders of the other political parties. This finding is consistent with other research indicating that there has been a political divide in people's uptake of face masks during the pandemic (Bruine de Bruin et al., 2020; Dryhurst et al., 2020). Furthermore, people in our sample with higher levels of psychological reactance also reported less favorable attitudes toward mask mandates but only after May 20th; this finding is consistent with past findings (Diaz & Cova, 2020). Future research should explore differences in psychological reactance across political affiliations, as it may be that conservatives' negative attitudes toward mask mandates may be the result of greater psychological reactance, given the greater emphasis on individual freedoms within conservative ideologies. Of course, we cannot know if Canadians' attitudes toward mask mandates would have shifted along political lines if a Conservative federal government was in power and endorsed mask wearing. In this case, it is possible that a similar political divide would emerge, such that conservatives would more strongly (and liberals less strongly) endorse mask wearing. Future researchers should examine the effect of public health messaging along political lines when different governments are in power, or with experimental designs.

We observed a similar effect with gender: Women reported higher initial mask wearing frequency than men, but only in the sample who began after May 20th—the effect was not significant prior to May 20th. Additionally, other features like increased age, and being a member of a visible minority were associated with higher initial mask wearing frequency and mask mandate attitudes after May 20th (but not rates of change), suggesting that the messaging from the federal government may have had traction with these populations that we now understand to be at increased risk.

### **Limitations**

Despite our efforts to recruit a demographically diverse sample, our sample overrepresented women, as well as older, white, employed, and highly educated people. Our sample size of people who joined the study prior to May 20th was smaller than our sample size after May 20th. Although our sample was relatively large overall and in both groups, the latter data have greater statistical power than the data used for the “before May 20th” models. Finally, we asked participants to self-report their voluntary mask wearing frequency. Because people may be unwilling or unable to report accurate estimates, self-report measures can vary in their correspondence to actual behaviors (e.g., Prince et al., 2008). In the future, researchers should aim to directly examine actual public health compliance behaviors.

### **Recommendations**

#### ***The Severity and Risk for All Demographic Groups of People Should Be Emphasized in Messaging Campaigns***

People who were at the highest risk of experiencing severe or fatal COVID-19 outcomes, with the exception of men, were the most likely to voluntarily wear face masks and hold favorable attitudes toward mask mandates. More work is needed in individualistic countries like Canada to encourage collective action that overrides the habit of those not perceiving a personal risk to themselves opting out of voluntary public health recommendations. Including coverage of pandemics, public health, and the necessity of collective action in a public health crisis within educational curricula may help to pre-emptively change the likelihood of future adherence to public health measures (Tso & Cowling, 2020).

#### ***All Political Leaders—At All Levels—Must Be As Unified As Possible in Public Health Messaging***

While political diversity is an important hallmark of Canada's thriving democracy, when it comes to public health, a more unified approach may be necessary in times of crisis. Indeed, one likely explanation for the political divide in our data is the lack of consistent, unified messaging from Liberal *and* Conservative leadership in Canada. Furthermore, in some cases, messaging from the provincial government and health authorities differed from the federal government's messaging. Divided messaging can lead to divided outcomes.

#### ***Specified Messaging Should Be Targeted Towards Groups of People Who Are Less Likely to Voluntarily Comply With Public Health Recommendations***

We found that some demographic groups—namely men, younger people, non-racialized people, and those without pre-existing health conditions—were less likely than their counterparts to report high mask wearing frequency and attitudes in favor of mask mandates. Although these people may not be at risk of themselves experiencing severe COVID-19 outcomes, they could still contract and spread the virus to others. Therefore, targeted messaging for these groups in future public health campaigns, such as those concerning COVID-19 vaccinations, may be beneficial.

### **More Research Is Needed on the Nuances of Public Health Messaging**

On May 20th, Prime Minister Trudeau's public commitment to wear a mask while in public was framed as a "personal choice" that he was making. While this language was likely adopted as a means of underscoring individual liberties, the phrasing may have contributed to the political divide, such that only Trudeau's existing supporters may have followed suit. Trudeau's use of "personal choice" language may also have contributed to his opponents developing more negative attitudes toward mask-wearing. Coming from Trudeau, a political leader who has long been the subject of femmephobic attacks from his opposition (e.g., denigrating him for his feminine qualities, such as being a teacher or his appearance; Lane, 2018; Maiolino, 2015), the language of "personal choice" may have been interpreted as confirmation of his "feminine weakness" in the eyes of his opponents; this may have further underscored the connection between mask-wearing and weakness. Our data cannot specifically address this question, but future research should assess the role of language/framing in delivering public health statements across political divides in order to identify the terminology that may be met with the greatest success.

### **Conclusion**

Our findings highlight important predictors of voluntary adoption of mask wearing and attitudes toward mask mandates during the COVID-19 pandemic in Canada; moreover, they are likely applicable to Canadian's future compliance with pandemic-related public health recommendations during the pandemic (e.g., voluntarily receiving the COVID-19 vaccination). Although these findings have particular significance during the COVID-19 pandemic, they may be a useful starting point for other government-led and/or politicized health behavior interventions (e.g., childhood vaccination, sexual health)—especially those that require voluntary behaviors. Indeed, improving public health messaging and identifying ways to depolarize public health issues could reduce the need for democratic governments to implement more intrusive interventions that invite backlash and protest. Identifying where the gaps are in voluntary public health compliance is the first step toward improving messaging efforts; reducing polarization in compliance ultimately saves lives.

### **Résumé**

Nous avons utilisé une conception longitudinale pour examiner les facteurs associés à (1) l'adoption précoce du port de masque par les Canadiens et (2) les attitudes envers les mandats de port de masque avant que les mandats de port de masque obligatoires ne soient lancés. En mai 2020, 1 712 Canadiens ont entrepris une étude de journal quotidien de 28 jours suivant leurs expériences avec la pandémie de COVID-19. Nous avons examiné les associations entre l'affiliation politique des personnes, la réactivité psychologique, les facteurs de risque préexistants, les attitudes sur la gravité de la pandémie, les attitudes sur les mandats de port de masque et la fréquence du port de masque en public. Les analyses des courbes de croissance ont indiqué qu'au fil du temps, la fréquence du port du masque et les attitudes en faveur du port du masque ont augmenté.

Ceux qui percevaient la pandémie comme étant plus grave avaient des niveaux initiaux plus élevés d'attitudes positives à l'égard des mandats de port de masque et de fréquence de port de masque. L'affiliation politique était un prédicteur important des attitudes à l'égard du mandat de port de masque, mais seulement après le 20 mai 2020 : le premier jour où le premier ministre Trudeau et Teresa Tam ont déclaré publiquement qu'ils porteraient des masques en public. Par la suite, les participants aux tendances plus libérales ont fait état d'attitudes plus positives à l'égard des mandats de port de masque que ceux aux opinions politiques plus conservatrices. Ces résultats suggèrent l'importance d'un message cohésif et non partisan pendant une crise de santé publique afin d'éviter les fractures politiques dans l'adoption des comportements de santé recommandés. Nous formulons des recommandations à l'intention des messagers de la santé publique en vue d'améliorer le respect volontaire des mesures de santé publique, pendant et après la pandémie de COVID-19.

**Mots-clés :** COVID-19, comportement en matière de santé, opinions politiques, communication, santé publique

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