COVID-19 vaccine mandates and their relationship with vaccination intention, psychological reactance, and trust: a rapid behavioural evidence synthesis

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Research Question: What is the impact of implementing (or removing) COVID-19 vaccine mandates on *trust* in institutions and in science, on psychological *reactance*, and/or on *intention* to get future doses/vaccines?

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Executive Summary: Vaccine mandates, intention, reactance, and trust

- Vaccine mandates have been used internationally to promote vaccination and strive for population-level immunity. However, vaccine mandates may have a negative impact on intention to get vaccinated, psychological reactance, and trust.
- We, therefore, conducted a rapid evidence synthesis to explore the relationship between vaccine mandates, intention to get vaccinated, psychological reactance, and trust
- Our search strategy identified 29 relevant studies related to vaccine mandates and intention (n = 17), reactance (n = 9), and trust (n = 4). Though studies represented 12 countries, only one study reported data that included a Canadian sample (but did not report Canada-specific results). Our synthesis findings were grouped according to the outcomes of interest:
    - *Mandates and intention to get vaccinated*:
        - The relationship between vaccine mandates and intention to get vaccinated remains unclear. Identified studies found that intention increased, decreased, did not change, and was influenced by attitudes toward vaccines such that those with negative attitudes were less likely to express intention to get vaccinated in response to a vaccine mandate.
    - *Mandates and psychological reactance*:
        - Most identified studies suggested that vaccine mandates increase the likelihood of experiencing psychological reactance (i.e., anger and resistance in response to perceived threats to freedom) and that intention to vaccinate was likely to decrease. However, one study found that vaccine mandates increased intention to get vaccinated irrespective of personality trait reactance. Furthermore, two studies found evidence to suggest that explaining the benefits to high vaccination rates (e.g., economic and health benefits) attenuated the decrease in intention to get vaccinated when experiencing reactance.
    - *Mandates and trust:*
        - Based on limited research, the relationship between trust and vaccine mandates appears to be bi-directional in that those who trust in governments are more likely to support vaccine mandates, however, mandates may harm trust between governments and the public when perceptions regarding the necessity of a mandate are not aligned.
- Vaccine mandates may be more effective when they align with the public's views on vaccines and merits of vaccine mandates. However, more research is required to better understand the intricacies of how mandates, reactance, trust, and intention to get vaccinated are related.

Background

Vaccine mandates have been implemented in several countries as part of public health responses to manage the COVID-19 pandemic, including Canada, the United States (US), the United Kingdom (UK), Denmark, France, Germany, Israel, Ireland, Italy, Switzerland, and Saudi Arabia[1,2]. We define vaccine mandates as any requirement imposed by an external party (e.g., business, school, organisation, government) for an individual or group to receive a particular vaccination to access, attend, contribute to or remain in a given setting (e.g., work, business, school, travel). Mandates, in this case, may include "vaccine passports" where access to specific settings is restricted to those who can demonstrate having a defined vaccination as a means to encourage uptake and provide a guarantee to others in that given setting.

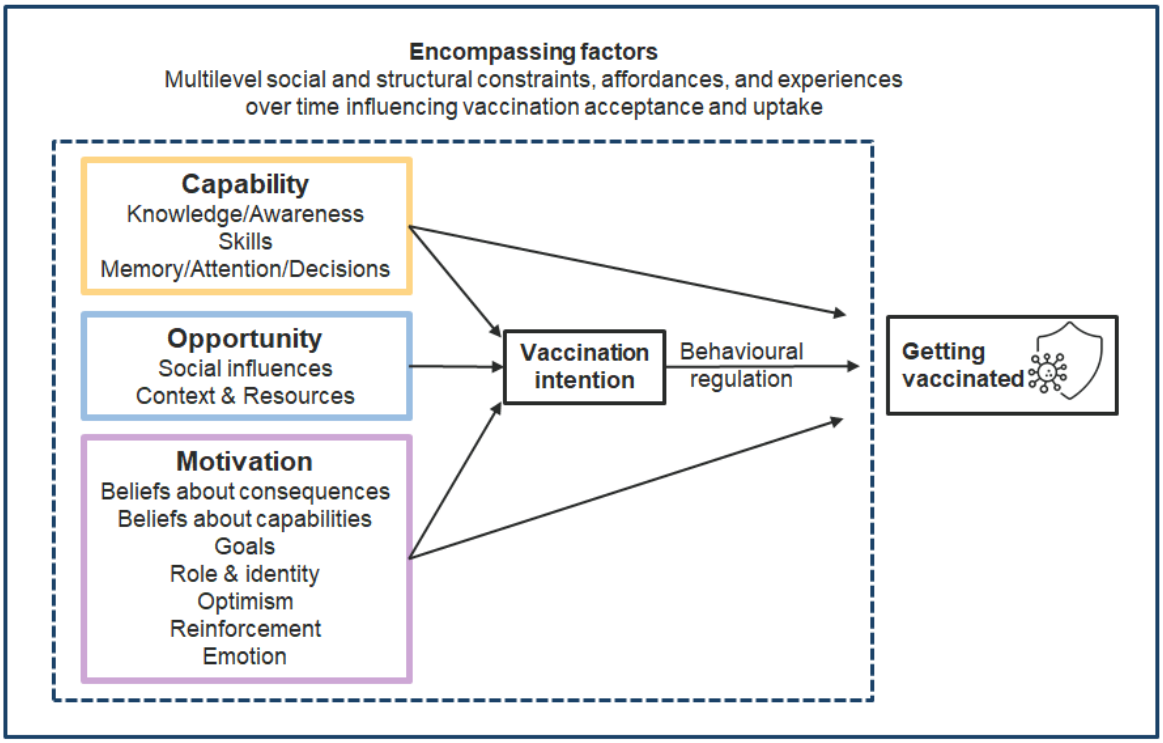
Vaccine mandates are a policy-level strategy that may be effective in increasing vaccination itself and may also have downstream consequences that are worth considering when weighing whether to deploy such approaches relative to others. Getting vaccinated – the decision and enacted behaviour – is based on multiple considerations, and these are not all shared across everyone in the population. As a result, the ability for wide-reaching strategies to support vaccine uptake depends in part on the strategy addressing the various capabilities, opportunities, and motivations of those to whom the strategy is directed[3]. When there is a match between the strategy addressing the barriers and enablers, the likelihood of supported decisions and actions occurring increases; when there is a mismatch, there is a risk that the strategy may not work as effectively for some people than others. Even if the strategy is effective, it may have downstream consequences on future action.

A behavioural science approach can be helpful for characterising which barriers/enablers to vaccination may exist and linking these to individual and policy-level strategies that maximise the likelihood that a given strategy addresses barriers and meets the specific needs of those it is designed to support[3,4,5] For instance, the Behaviour Change Wheel[3] is an especially useful tool for understanding the linkages between specific Capability, Opportunity, and Motivation barriers/enablers, strategies best suited to address specific barriers/enablers, and policies that best enable those strategies to be enacted. Within the Behaviour Change Wheel, vaccine mandates are policy interventions designed to promote greater uptake of COVID-19 vaccines, often as means to achieve population-level immunity and correspond with the *regulation* and *legislation* policy functions. Such policy levers enable the use of vaccine mandates as a direct intervention to address barriers to vaccination. Within the Behaviour Change Wheel, vaccine mandates could correspond with four specific types of interventions depending on how they are deployed and received: *coercive* (e.g., where remuneration might be withheld), *restriction* (e.g., where access to settings might be prevented) and *incentivisation* (e.g., where access is provided to settings and opportunities that would otherwise have limited been limited) interventions which are best suited to addressing barriers related to intention, goals (e.g. priority), reinforcement, environmental context and resources, and social influences (see Figure 1).

We know from our living behavioural syntheses of 175 studies on factors affecting COVID-19 vaccination acceptance and uptake that intention to get vaccinated is influenced by a variety of other factors beyond those likely to be targeted by vaccine mandates, including concerns over vaccine safety (beliefs about consequences), a desire to know more about COVID-19 vaccines and the expedited development process (knowledge), and the role of fear and emotion in promoting vaccine acceptance (emotion)[6]. In fact, Crawshaw et al. found that beliefs

about consequences were the most frequently identified barriers (e.g., concerns about vaccine safety, efficacy, side effects) and enablers (concerns about being infected, believing vaccines protect others) to COVID-19 vaccination intention[6]. Furthermore, the role of trust (and distrust) in institutions was consistently and frequently identified as contributing to vaccine hesitancy, including by (but not limited to) equity-deserving groups[7–9]. Given this existing backdrop of existing barriers/enablers to COVID-19 vaccination, and the potential sufficiency or lack thereof of mandates for addressing them, it is worth investigating what downstream effects might be expected when vaccine mandates are put in place. With this rapid review, we were especially interested in synthesising what is known about three potential consequences of vaccine mandates; their impact on psychological reactance, on trust, and on intention to get a future vaccination.

Figure 1. Potential drivers of vaccination acceptance and uptake based on the COM-B model and Theoretical Domains Framework[4,5]



Psychological reactance

While beliefs about consequences are among the most widely identified barriers to vaccine uptake, such beliefs may not be adequately addressed by vaccine mandates and may instead contribute to problematic outcomes related to restrictive public health measures. For example, a study on masking adherence and attitudes in Canada and the US found that those who wore facemasks did so because of personal concerns over COVID-19 while those who did not wear masks did not believe masks were effective at preventing COVID-19; both positions reflect beliefs about consequences. Those who did not wear masks were also more likely to express discontent at being forced to wear a mask[10]. In fact, a network analysis of negative masking attitudes revealed that psychological reactance was the centrally important factor to masking[10].

Psychological reactance is a phenomenon observed when freedom of behaviour is perceived to be threatened (e.g., by rules, regulations, attempts at persuasion), people will be motivated to restore that freedom by rejecting the means of control[10,11]. When applied to public health, psychological reactance theory suggests that when people receive messaging is such a way (e.g. controlling language) that communicates a threat to their freedom, they experience anger, greater negative attitudes toward the message, and become less inclined to behave according to that message[12]. This suggests that enforcing public health measures in the absence of public support, or when beliefs about consequences run counter to the rationale for that measure, those restrictions may incite backlash and resistance to the public health measures that are being enforced. However, it is also possible to communicate in ways that reduce the potential for psychological reactance such as emphasizing choice or using reactance to emphasize a message (e.g., "You have a right to wear a mask")[10,13].

Trust

Trust may have the opposite effect as reactance. Trust in government and healthcare institutions has been identified as an important factor in promoting vaccinations[14] given that trust in government, authorities, and scientists has been associated with a greater likelihood of vaccine acceptance[15–17]. Interpersonal trust is also important given that it is a key predictor of prosocial behaviour and collective action and is associated with greater support for government responses to COVID-19[18].

Intention

While intention and hesitancy to get vaccinated against COVID-19 has been widely studied and is associated with several key determinants of behaviour[6–9], less is known about how intention to get vaccinate might change when vaccines are mandated rather than voluntary. A fundamental motivational consideration in the use of vaccine mandates is the potential impact on whether people feel they *have* to and/or whether they *want* to. This distinction has been well studied in other health settings, where the former reflects controlled motivation (i.e. feeling external pressure to do something) and the latter, more autonomous motivation (i.e. feeling that they ultimately have a choice and are doing something based on their own volition)[19]. Importantly, people can be autonomously motivated even in situations where restrictions and mandates are in place (such as during the COVID-19 pandemic) if the external source of the restrictions and mandates are trusted and the rationale transparently described and agreed upon[20–22]. Across a range of other settings, it has been shown that the more autonomously motivated people are, the more they sustain a given behaviour[23–26]. Indeed, earlier in the pandemic, three studies in Belgium showed that greater autonomous motivation was associated with greater consistency in engaging in other COVID-19 protective behaviours over time[27]. Thus, it is perhaps not only whether or not vaccine mandates impact on intention or not that is important, but also whether the mandates are communicated and deployed in a manner than fosters autonomous motivation.

It is, therefore, useful to consider the implications of vaccine mandates on intent, reactance, and trust. For this synthesis we focus our attention on the possible impact of vaccine mandates on intention to get vaccinated, psychological reactance, and trust, and aim to explore the relationship between psychological reactance and trust and how they may or may not impact

intent to vaccinate in the future. Specifically, we aimed to identify research literature that address the following research questions:

1- What is the impact of implementing (or removing) COVID-19 vaccine mandates or other vaccine mandates on trust (in government, healthcare, public health, science), on psychological reactance, and/or on intention to get future doses/vaccines, in general, and across the following sub-groups?
   a. Studies in Canada vs non-Canadians
   b. Provinces/territories (to explore differences in outcomes due to provincial differences in mandatory vaccine policies)
   c. Work sectors (healthcare, education, transportation, public service)
   d. Equity-deserving groups
2- What factors might explain any observed association between vaccine mandates, trust, psychological reactance or intention to get future vaccines?
3- Which co-interventions alongside vaccine mandates have been delivered specifically to increase trust or reduce psychological reactance?

Methods

Data sources

We conducted a rapid evidence synthesis of the relevant literature. We searched five databases (MEDLINE, Embase, Cochrane Central Register of Controlled Trials, PsycINFO, CINHAL) in March 2022 with no date restrictions and used a combination of key word and subject term searches to identify literature related to vaccine mandates, intent to vaccinate, reactance, and trust. We also sought to identify preprints by searching PsyArXiv and MedRxiv. Search terms are provided in Appendix A.

Two reviewers (GC and MW) conducted a pilot round of level one (title and abstract) screening of 150 abstracts from published sources, discussed discrepancies, and resolved these by consensus. Level one and two (full-text) screening of published sources and preprints was completed by a single reviewer (GC, JP). Systematic reviews that were identified from the search results were hand searched for additional relevant studies.

Inclusion criteria

- *Population*: adults 18+ (general public and workers)
  - Subgroups of interest: healthcare workers, education workers, transportation workers, public servants in Canada vs outside of Canada, equity-deserving groups
- *Intervention*: Introduction and/or removal of COVID-19 vaccine mandates and other vaccine mandates
- *Outcomes*: factors or co-interventions alongside vaccine mandates associated with
  - Intention to get future doses of COVID-19 vaccine or intention to get other vaccines
  - Psychological reactance
  - Trust (e.g., in government, healthcare, public health, science)

- *Design:*
    - Survey (studies using self-reported surveys to assess vaccination intention, trust or psychological reactance)
    - Qualitative (themes of factors in interviews and focus groups, content analyses of social media)
    - Experimental (trials, quasi-experiments, interrupted time series analyses of mandate introduction or removal and of co-interventions alongside mandates)

Exclusion criteria

- *Outcome:* Studies on trust in vaccines per se (confounded with large vaccine confidence/hesitancy literature)

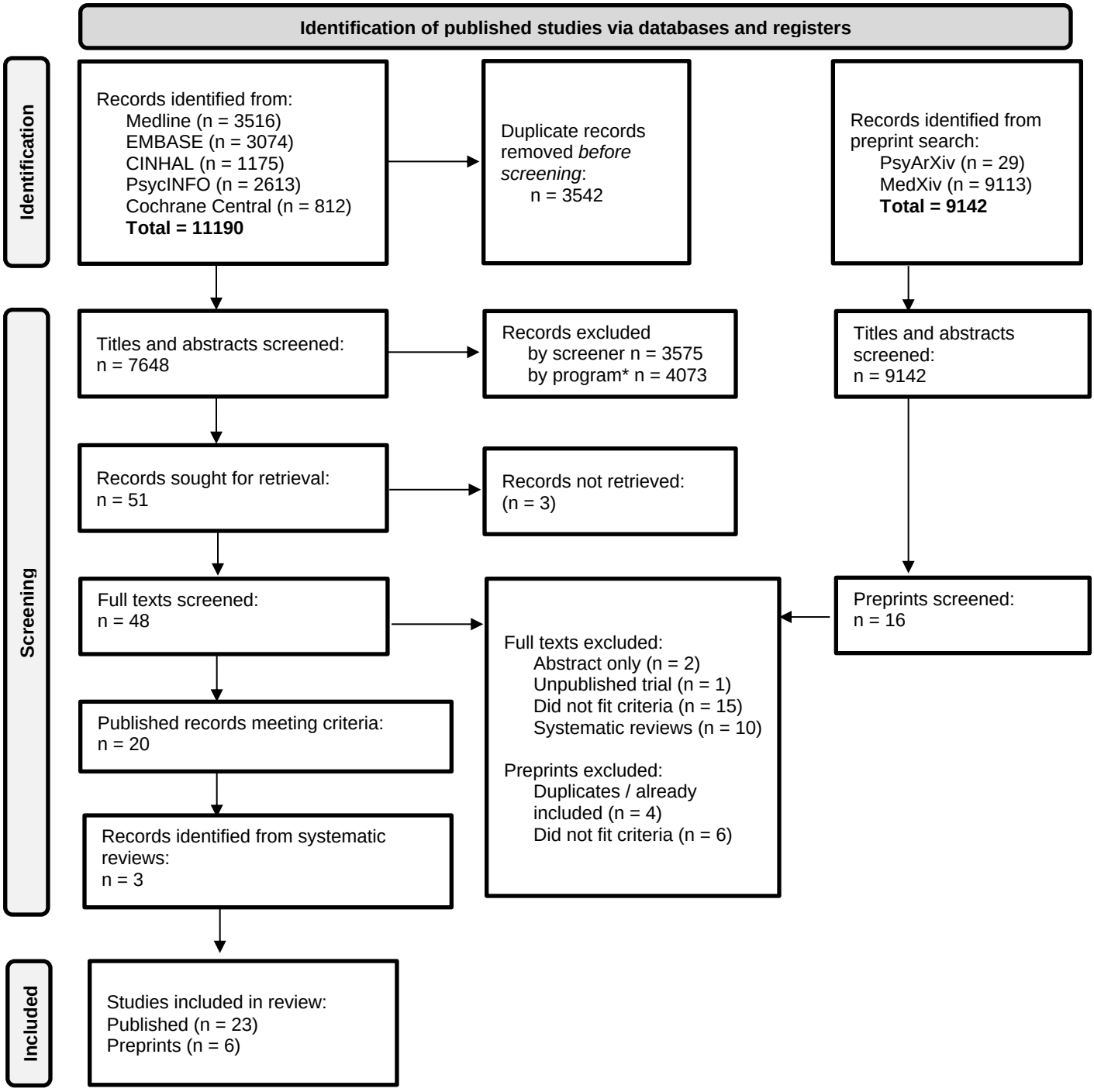
Data extraction

We used a standardised extraction form (Appendix B) to extract relevant data related to study characteristics, the characteristics of vaccine mandates, and the main findings related to the outcomes of interest (i.e., intention, reactance, trust).

Synthesis

We conducted a narrative synthesis of the reviewed literature, including identified preprints. Findings are organized according to the outcomes of interest (intention, reactance, trust) and the types of study designs (experimental, survey, qualitative). Sub-group analyses (by jurisdiction, work sector, and equity-deserving group) are presented where possible.

Figure 2. PRISMA diagram



* n = 4073 records were not screened based on predictions provided by Abstrackr that suggested most relevant sources had been identified.

Results

Search results

We identified 7648 unique published records and 9142 preprints based on our search strategy. Of these, we identified 29 studies relevant to vaccine mandates and intention (n = 17)[16,28–43], reactance (n = 9)[44–52], and trust (n = 4)[52–55]. Sixteen sources report on quantitative survey results[16,28–33,35,37,38,40,46,49,52–54], eight sources report on experimental and quasi-experimental research[36,39,42,44,45,47–49], four sources discuss qualitative findings from interviews or focus groups[41,43,50,51], and two studies reported the results of open-ended survey questions[34,55]. Research participants resided in the US (n = 8)[34,36,37,40,44,47–49], Germany (n =7)[42,45,47–49,52,53], the UK (n = 5)[32,43,46,50,51,55], Saudi Arabia (n = 2)[29,31], Kuwait (n =1)[28], Israel (n = 1)[46], China (n = 1)[39], Slovakia (n =1)[38], Poland (n = 1)[33], Switzerland (n = 1)[41], Denmark (n = 1)[54] and the Netherlands (n =1)[30]. One study reported results from an international sample but did not specify what countries were included[35] and one study reported results from a random sample representing 19 countries, including Canada[16]. None of the other identified studies indicated data were collected from a Canadian sample. Most studies focused on COVID-19 mandates (n = 25)[16,28–39,42–44,46,48–55], two discussed influenza mandates[40,41], one discussed a fictitious vaccine and associated mandate[47], and one did not ask participants about a specific vaccine but rather compulsory vaccines in general[45]. Details of the identification and screening process are presented in the PRISMA diagram in Figure 2 and study details are provided in Table 1.

Overview: Vaccine mandates and intention, reactance, and trust

We provide a narrative synthesis of the literature discussing vaccine mandates, intention to get vaccinated, reactance, and trust and how these concepts are related. We begin by addressing what impact, if any, vaccine mandates have on intention, reactance, and trust. We then examine what other factors have been identified that may explain the relationship between vaccine mandates, trust, reactance, and intent to get future vaccines. Finally, we describe research that suggests possible interventions to support the implementation of mandates. We present studies in order of relevance and robustness and note where sufficient literature is lacking. Subgroup analyses were not possible to conduct given the limited number of relevant studies identified.

Section 1: Impact of vaccine mandates on reactance, trust, and intent to get future vaccines

Vaccine mandates

Vaccine mandates were differentially described within the identified literature. While some studies focused on specific types of mandates (e.g., COVID-19 vaccines required for international travel, employer mandated vaccines, vaccines to access public spaces)[29,33,35–37,39–41,55], others discussed non-specific mandates where governments may enforce compulsory immunization or vaccine passports without further description [31,45,47–49,51–54], some asked about multiple mandates at once (e.g., asking participants about "vaccines required for work, school, or travel")[34,44] or compared participant responses to different types of mandates (e.g., COVID-19 vaccines required for international travel vs vaccines required to access public spaces vs vaccines required for employment vs vaccines generally required of all residents)[28,30,32,49]. These

differences are worth noting as some studies found that respondents were more or less accepting of certain types of mandates.

Vaccine mandates and impact on intention to get vaccinated

We identified 15 studies that explored intention to get COVID-19 vaccines under mandates that were planned but not yet implemented or were hypothetical[16,28–31,33–39,42,43,56]. Data for these studies were collected between June 2020 and September 2021, both before and after vaccines were approved and as vaccines were being mandated in certain regions. Of these studies, 13 sought to document views from the general public[28,30,33–37,39,42,43,56,57] and two focused on health care workers[31,38]. Additionally, we identified two studies that focused on intention to receive the influenza vaccine. One study explored the likelihood of getting the influenza vaccine by students in healthcare professions[40] and the other explored the views of nurses on influenza vaccine mandates[41]. Table 1 summarizes the main findings from these studies.

Experimental research

Three studies used experimental methods to assess the conditions in which vaccine mandates positively impacted intent to receive a COVID-19 vaccine[36,39,42]. In August 2020, Wang et al conducted an online discrete choice experiment with 873 adults in China to determine whether a mandated colour-coded smartphone app called "Health Code" would promote COVID-19 vaccination[39]. Participants were randomized into one of 12 blocks that presented them with six choice sets (see Wang et al for example). Three sets included the Health Code app and specified that a green code involved getting vaccinated while a yellow code, which would result in restricted access to public spaces, would be assigned if they were not vaccinated. Health Code choices were presented alongside other attributes of interest (e.g., vaccine effectiveness, number of doses, probability of side effects, etc.). They found that the Health Code attribute was significantly associated with greater intention to get vaccinated and that those who previously expressed vaccine hesitancy (e.g., unsure or unwilling to receive a COVID-19 vaccine once available) were more likely to intend to receive a vaccine when remaining unvaccinated was paired with a yellow Health Code. They further found that those expressing vaccine hesitancy where more likely to accept a vaccine when vaccines were free, domestic, produced minimal side effects, and were at least 60% effective than they were with other combinations.

A second experimental study sought to test the impact of behavioural nudges on participant support for COVID-19 vaccine travel passports, if there are synergies between the effects of two nudges, and whether there may be any negative impacts or spillover effects on vaccine intention[36]. Sotis et al. conducted a double-blind online experiment where American participants (N = 4000) were randomized into one of four conditions: 1) a control condition where participants received information about a COVID-19 vaccine travel passport, 2) a status quo nudge indicating that vaccine passports are not new, 3) a peer effect nudge suggesting that vaccine passports are well supported by others, and a fourth condition that combined both status quo and peer effect nudges[36]. Though these nudges did not increase vaccine intention, they did improve support for vaccine passports. Specifically, participants in the combined nudge condition were more likely to agree with statements regarding the importance of vaccine passports and to disagree with statements suggesting vaccine passports were unfair. The authors

conclude that behavioural nudges can be used to bolster support for COVID-19 travel passports without reducing intent to vaccinate if passports were implemented.

A third study sought to assess whether legal (i.e., greater freedoms in public spaces) or financial incentives were effective in promoting COVID-19 vaccination. Sprengholz et al. conducted a between and within-subjects experiment where a sample of German participants who had not been vaccinated (N = 782) were randomly assigned to one of two conditions: 1) a legal incentive condition where participants were told they would enjoy greater freedoms (e.g., access to restaurants and services without proof of a negative test, unmasking in public spaces) if they were vaccinated or 2) a no legal incentive condition where getting vaccinated would not lead to greater freedoms. They were also presented with pricelists and were asked to make a series of decisions, choosing between getting vaccinated or not getting vaccinated and being paid a specific amount from 0-5000 Euros (increasing in increments of 250) and then 10,000 Euros. Sprengholz et al found that in the absence of payment, participants in the two experimental conditions (legal incentives vs no legal incentives) did not differ in their intention to get vaccinated. Thus, a hypothetical vaccine mandate did not affect intention to get vaccinated in this sample.

Survey research

Eleven studies sought to explore the impact of vaccine mandates on subsequent vaccination intention using cross-sectional survey designs. A large cross-sectional survey (N = 17611) was conducted in April 2021 in the UK to assess participant views on the effects of a COVID-19 vaccine passport on their intent to get vaccinated[56]. Participants were asked how inclined they would be to accept a COVID-19 vaccine if a domestic COVID-19 passport were introduced (i.e., where proof of vaccination or immunity would be required to attend social events) and how inclined they would be to accept a COVID-19 vaccine if a COVID-19 passport were introduced for international travel. Almost half of participants indicated their intent to get vaccinated would not change in response to either domestic (46.5%) or travel (42%) related vaccine passports while a comparable number would "definitely" accept a COVID-19 vaccine for domestic use (48.8%) and international travel (42.9%). The authors were also interested in exploring who was more likely to see a change in intention and found that COVID-19 vaccine mandates may have a polarizing impact whereby those who already intended to get vaccinated experience an increase in vaccine acceptance whereas those with a pre-existing lower intention to get vaccinated experience decreases in vaccine acceptance[56]. de Figueiredo et al. also found that the impact of passports on COVID-19 vaccine acceptance differed across demographic variables. Specifically, men, participants identifying as Black or Black British, those who are unemployed, working part-time, or had another work status, those looking after the home, and those who spoke another language reported decreases in vaccine intentions if domestic mandates were introduced. Similar trends were reported for international travel mandates[56].

Eight studies focused on the impact of a single specific mandate on intention. For example, four studies assessed the impact of COVID-19 travel vaccines on intent. One study found that in a sample of Saudi Arabian adults (N = 758) the possibility of requiring a COVID-19 vaccine for international travel was significantly associated with increased intent to vaccinate (OR: 16.52; 95% CI:10.23–26.68, $p<0.001$)[29]. Similarly, Feleszko et al found that 11% of a sample of Polish adults who indicated they would refuse a vaccine once available (n = 301)

reported they would change their mind if getting a COVID-19 vaccine meant they could travel internationally[33]. Two more studies also found support for an effect of COVID-19 travel vaccine mandates on intention[35,37]. These studies further sought to identify the behavioural factors contributing to intention by assessing the predictive strength of specific theories. These studies are discussed in greater detail in section two. One study sought to assess vaccine intention among hospital workers in Slovakia (N = 1277) and found that compulsory vaccination for healthcare workers (aOR: 9.15; 95% CI: 2.92-28.62) and for other select groups (aOR: 9.47; 95% CI: 2.75-34.31) was associated with greater vaccine acceptance[38]. One study surveyed American university students in health professions (n = 1249 of 3578 students sampled) and found that most students in health professions who had already gotten their influenza vaccine did so under an academic program mandate[40]. Of the health profession students who had received an influenza vaccine, 77% indicated they would be willing to accept a future influenza vaccine even if it was voluntary. Finally, two studies found that vaccine mandates had a negative effect on intention. For example, Arif et al found that in a convenience sample of Saudi Arabian healthcare workers (N = 529), participants were less likely to intend to receive a COVID-19 vaccine when asked to consider whether vaccines should be government mandated[31]. Lazarus et al found that respondents (N = 13426) were less likely to agree with a statement indicating they would to accept a vaccine if it were mandated by employers (48.1%) than they were to agree with a statement indicating they would get vaccinated (71.5%)[16].

Two studies exploring factors associated with intention to get a COVID-19 vaccine found that intention differed when participants were asked to consider different types of mandates. For example, in a sample of adults from Kuwait (N = 6943), more respondents were willing to receive a COVID-19 vaccine if it was mandatory for travel than if their government made vaccines compulsory or if it was a mandatory job requirement (39.8% vs 33.1% vs 29.8% respectively)[28]. Antwi-Berko et al used mixed methods to understand vaccine acceptance among a sample of Ghanaian-Dutch, Hindustani-Dutch, and Afro Surinamese-Dutch[30] participants (N = 160). Based on survey data, they found that 69.6% of participants were willing to accept a vaccine under a COVID-19 vaccine passport system whereas only 28.3% were willing to get a COVID-19 vaccine if mandatory vaccination was a travel requirement.

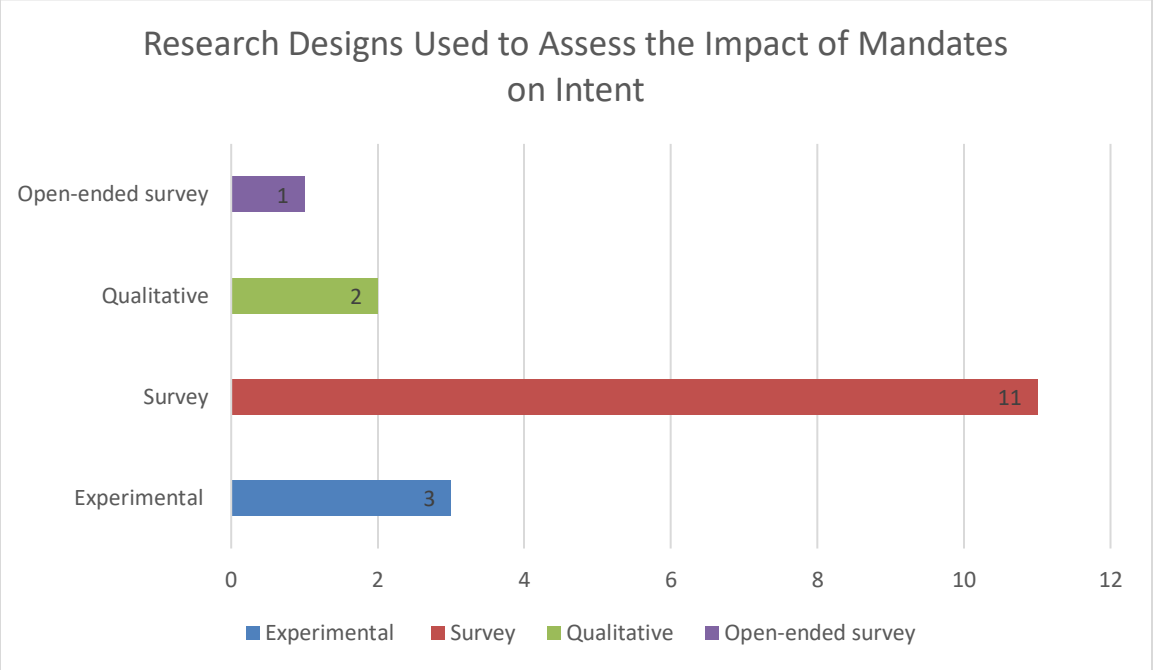
Qualitative research

A qualitative survey study (N = 867) exploring motivations to receive vaccines among those who expressed some degree of hesitancy found that several respondents indicated they would get vaccinated if required by their employer, schools, or to volunteer[34]. Another study explored the views of 29 focus group participants regarding COVID-19 vaccines and found that many held negative views regarding vaccine passports. Many indicated they would get vaccinated if vaccine passports were implemented but would feel forced into getting vaccinated. Many saw mandates as an infringement on privacy and human rights[43]. A third study reporting on qualitative interviews with nurses (N = 18) found that most would likely receive an influenza vaccine if their employer mandated it as this was seen as preferable to losing their job[41].

Summary: a potential impact on intention to get vaccinated

The findings from the identified studies suggest there is a complex relationship between vaccine mandates and intention. The three experimental studies suggest that vaccine mandates may increase intention to get vaccinated but only under certain conditions (e.g., highly

efficacious and free vaccines). The quantitative survey research suggests there is an association between vaccine mandates and intention and that some types of mandates may lead to greater intention to get vaccinated than others. For example, Ghanian, Hindustani and Surinamese Dutch participants were more likely to accept a vaccine if it was required to access to public spaces than if it was required for international travel. However, there were too few studies to identify a distinct trend. There was also survey evidence to suggest that vaccine mandates may decrease vaccine intention, may have polarizing effects, and may differentially impact certain groups[56].



Vaccine mandates and impact on psychological reactance

We identified nine studies[44,46–52,58] related to psychological reactance (anger and resistance that results from perceived threats to freedom) and vaccine mandates. All but one study (Porat et al. 2021) reported results based on hypothetical mandates. Six studies explored reactance in response to COVID-19 vaccine mandates[44,46,48–51] and two studies collected data before the COVID-19 pandemic[47,58]. Studies reported on data collected during the pandemic were conducted between April 2020 – May 2021. Eight studies were conducted with samples from the general population[44,46–49,51,52,58] and one study explored the views of care home workers[50]. None of the identified studies included Canadian samples. Table 1 summarizes the main findings from these studies.

Experimental research

Five studies used experimental and quasi-experimental methods to gather data on whether vaccine requirements incite reactance and in turn impact intention or willingness to be vaccinated. Four of these studies found evidence to suggest that compulsory vaccines incite reactance which in turn negatively impact vaccine acceptance. For example, one study assessed how pre-existing vaccine intentions influenced the association between vaccine mandate and reactance. Sprengholz et al. conducted two experiments with German (N = 973) and American (N = 1394) adults to assess the impact of vaccine mandates and vaccine scarcity on reactance[48]. They found that those with pre-existing low intention to get vaccinated against COVID-19 expressed more reactance when they were in a vaccine mandate experimental condition as opposed to an unrestricted or scarce vaccine condition. They also found that those with higher levels of reactance who were in the vaccine mandate condition rated higher in measures of activism, intent to avoid COVID-19 vaccines, and lower in intentions to obtain other vaccinations (e.g., chicken pox) and engage in protective behaviours (e.g., getting tested for COVID-19).

Another study by Sprengholz et al. sought to assess the impact of COVID-19 vaccine mandate attitudes on reactance and uptake of other vaccines[59]. They conducted three studies to explore these relationships. In the first study, they conducted a cross-sectional survey with a representative sample of German adults (N = 4050) and found that support for mandates decreased from April to October 2020 and that confidence in vaccine safety was the strongest predictor of support for a vaccine mandate. In the second study they conducted an experiment with German adults (N = 993) and found that compared to those in a voluntary vaccine condition, those in the mandatory vaccine condition experienced more reactance (i.e., experiencing greater frustration, annoyance and perceived threats to freedom) when they held negative views toward mandates and when they were not informed about the importance of high vaccination rates (e.g., economic and health benefits). A moderated mediation analysis revealed that reactance negatively impacted subsequent hypothetical intention to get the influenza vaccine when COVID-19 vaccines were hypothetically mandated. However, receiving information about the benefits of high vaccination rates on the economy and herd immunity reduced reactance to mandated vaccines. In a third study they conducted an experiment with a representative American sample (N = 579) that excluded healthcare workers and found that reactance under a mandatory vaccine condition was greater when the mandatory vaccine policy was self-relevant (i.e.,., applying to all citizens and therefore relevant to participants vs applying to healthcare workers only) than when it was not.

Two studies conducted prior to the pandemic also support the finding that reactance negatively impacts vaccine acceptance. Betsch and Bohm found that in a sample of university students (N = 297), those with negative attitudes toward vaccination who were in an experimental compulsory vaccine condition, felt angry and were less likely to accept a subsequent voluntary vaccine than those in the voluntary vaccine condition[58]. Similarly, Sprengholz and Betsch found that selective mandates (i.e., making some vaccines compulsory and others voluntary) increased anger and reactance, which in turn decreased intent to vaccinate[47]. However, providing participants with an explanation of population-level immunity attenuated the impact of reactance on vaccination. These authors conducted a moderated mediation analysis and found that participants who experienced anger in response to a selective vaccine mandate and were *not* provided with a herd immunity explanation were less willing to accept a hypothetical vaccine for a fictitious disease.

One experimental study did not find support for the negative impact of psychological reactance on vaccine uptake. Albarracin et al. conducted three quasi-experiments and one experiment with American participants who were recruited from the Prolific, Mechanical Turk, and Qualtrics platforms (N = 299 – 606) and found that participants in a required vaccine condition (i.e., required for work, school, or travel) were more likely to accept a hypothetical vaccine than those in voluntary and control conditions[44]. They also found that when they introduced a social norm condition suggesting that 70% of other employees were vaccinated, those in the required vaccine condition reported stronger intentions to get vaccinated irrespective of personality trait reactance levels as measured by the short form of the Hong Psychological Reactance Scale.

Survey research

Two studies used quantitative survey methods to assess the impact of vaccine mandates on two concepts related to psychological reactance: control aversion and autonomy frustration. Schmelz conducted a quasi-experimental survey with German participants (N = 4799) to assess how public health restrictions impact intrinsic motivation and engagement with public health behaviours (i.e., getting vaccinated). Previous research has demonstrated that intrinsic motivation can be "crowded out" when enforcement and incentives are introduced[60–62]. Crowding out is similar to "control aversion" where enforcement and incentives diminish voluntary commitment. Schmelz aimed to assess how likely participants were to use a contact tracing app, to get a COVID-19 vaccine, limit social contacts, wear masks, and limit travel when these measures were either highly recommended or mandated by government[52]. They found that participants were more likely to agree to abide by all public health measures under voluntary conditions than mandatory conditions, suggesting public health mandates may incite control aversion.

Porat et al. conducted a cross-sectional survey with adults from the UK (N = 681) and Israel (N = 677) to explore how vaccine passports (i.e., that would allow access to public spaces to those who are vaccinated) may impact motivation and vaccine intention[46]. Specifically, they drew from self-determination theory to explore how three motivational needs may be impacted by mandates and may affect intention to get vaccinated: the need for autonomy (a sense of meaning and choice over one's life), competence (feeling capable of achieving goals and overcoming challenges) and relatedness (feeling cared for by others, trusted, understood). They found that when participants' need for autonomy and need for relatedness was frustrated, they were less willingness to get vaccinated[46]. They also found that autonomy frustration was the strongest predictor of willingness to get vaccinated and was greater among Israeli participants

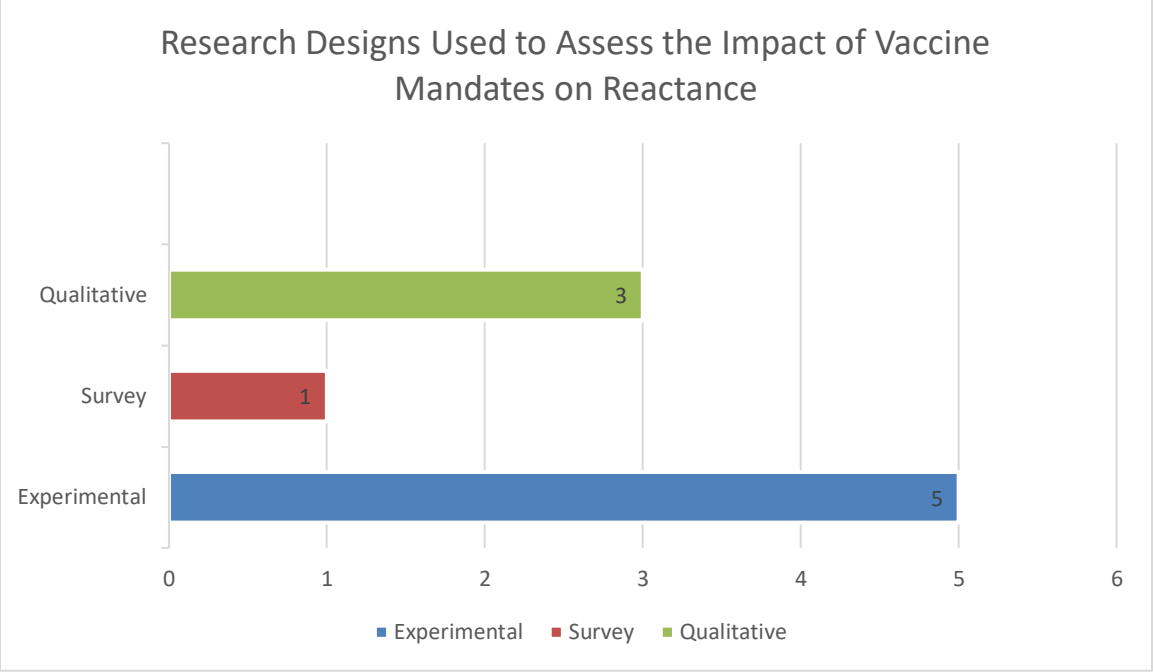
where passports had been implemented for months compared to participants from the UK where passports were not implemented.

Qualitative research

Two studies report on qualitative research relevant to understanding reactance in response to vaccine mandates. We identified two qualitative studies in preprint related to reactance. One study reported on care home workers' (N = 10) views of COVID-19 vaccine mandates[50]. This study was conducted prior to an announcement that care home workers in the UK would be mandated to get a COVID-19 vaccine as a condition of employment and so captures participants anticipatory views. The authors found that care home workers opposed vaccine mandates, as they viewed compulsory vaccine policies as an infringement on their freedom. They expressed anger and a sense of betrayal about being forced to get vaccinated when many had refused to get vaccinated due to mistrust in authorities. While some participants indicated they would unwillingly accept a vaccine to remain employed, others would rather leave a job they enjoyed than abide by mandates. The second qualitative study reported on the views of a purposive sample of vaccine hesitant participants in the UK (N = 50)[51]. Participants held mixed views regarding vaccine mandates and passports; those who intended to accept a vaccine suggested mandates may be acceptable in some contexts, whereas both intenders and hesitators viewed mandates as coercive and a threat to autonomy. Those who disagreed with mandates believed personal choice and informed consent were essential.

Summary

Experimental research on reactance provides some evidence to suggest that vaccine mandates incite psychological reactance and, in turn, negatively impact intention to get vaccinated, though one study found evidence to the contrary. Importantly, vaccine and vaccine mandate attitudes are associated with the experience of reactance, such that those with negative views toward vaccines and mandates are more likely to experience reactance and decreased vaccine acceptance. The survey research results suggest that vaccine mandates impact concepts related to psychological reactance – autonomy frustration and control aversion – and suggest that these are also negatively associated with vaccination intention. There is also some evidence to suggest that communicating the benefits of high rates of vaccination may attenuate the negative impact of reactance on vaccine intention.



Vaccine mandates and impact on Trust

Four studies were relevant to understanding the relationship between vaccine mandates and trust[52–55]. All four studies focused on COVID-19 mandates. Three discussed hypothetical vaccine mandates[52,53,55] and one described the impact of a COVID-19 passport announcement on participant views[54]. Studies reported on data collected between April 2020 and November 2021. Three studies reported on findings from the general population[52–54] and one study reported on the views of healthcare workers[55]. None of the identified studies included Canadian samples. Table 1 summarizes the main findings from these studies.

Survey research

Jørgensen et al conducted a large representative survey of Danish participants' (N = 24934) views regarding vaccine mandates[54]. They compared survey responses from vaccinated and unvaccinated participants before and after a press conference where government officials announced the re-introduction of a vaccine passport. They found that unvaccinated participants experienced a decrease in trust in how the pandemic was being managed. Using difference-in-differences analyses, the authors further demonstrated that key elements of the press conference (i.e., announcing the passport mandate, condemning unvaccinated citizens, emphasizing the threat of the pandemic) functioned to further widen gaps between vaccinated and unvaccinated residents in trust, collective action motivation (i.e., cooperative behaviour), and perceived threat to self and society.

Two survey studies sought to assess the impact of vaccine mandates on two related concepts: crowding out intrinsic motivation and control aversion. Schmelz sought to explain control aversion (when enforcement diminishes voluntary commitment) by identifying relevant covariates, and identified trust as an important factor. They found that the more mistrust

participants had in government institutions and in government communications regarding COVID-19, the more control aversion they reported across all five public health measures (contact tracing app, COVID-19 vaccines, limiting social contacts, wearing masks, and limiting travel). Conversely, the more trust participants expressed in the government, the more likely they were to agree to public health measures irrespective of whether they were voluntary or mandatory. Paradoxically, those with greater control aversion were also more likely to agree that most people could be trusted. The authors interpreted this finding as suggesting that those with greater control aversion believe people can be trusted to adhere to public health measures without coercive measures. The authors contend that public health mandates may then be experienced as a sign of government mistrust of the public.

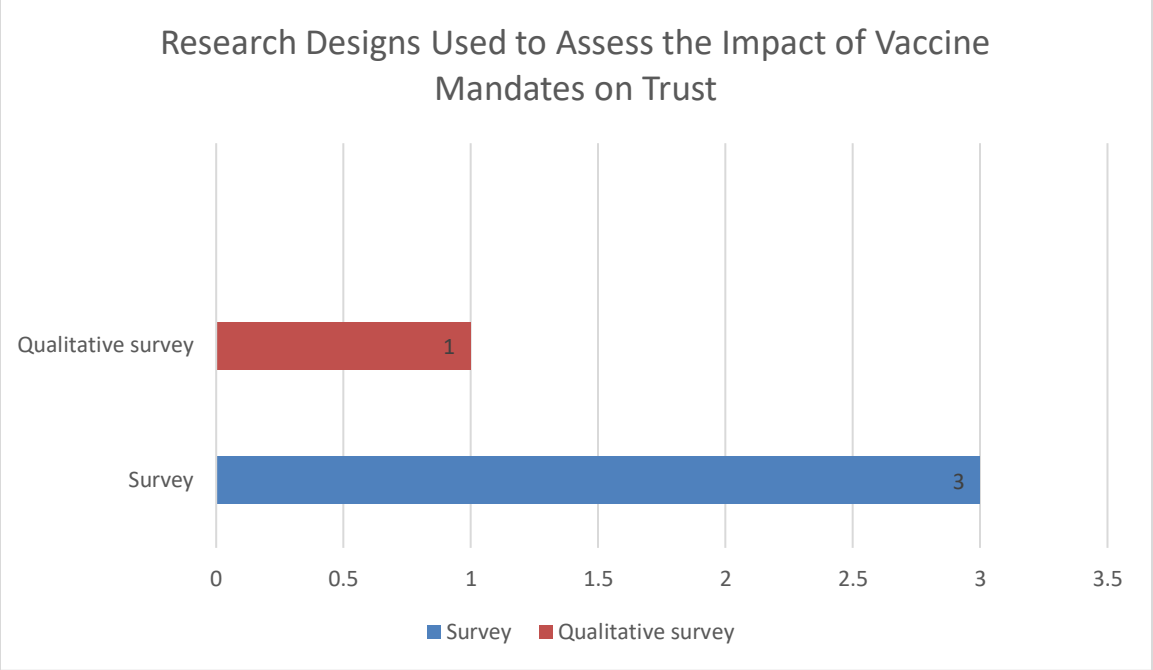
Another study examined participant views on government mandated COVID-19 vaccines (i.e., legally requiring vaccines). Schmelz and Bowles found that German survey respondents (N = 2653) who had more trust in public institutions were more likely to support both mandated and voluntary COVID-19 vaccines[53]. In fact, trust in public institutions was the strongest predictor of support for either a voluntary or a mandated vaccine. The relationship between public trust and support for mandates, however, was partially explained by a belief held by those who mistrust public institutions that vaccines were ineffective and that mandates restricted their freedoms. Those who felt that mandates restricted their freedoms were more likely to express decreased support for compulsory vaccines but not for voluntary vaccines. The authors suggest that mandates effectively "crowd out" intrinsic motivation to engage in an altruistic act by restricting freedoms, provoking psychological reactance, and eroding trust. This interpretation was partially supported by the finding that those who reported greater altruism were more likely to support voluntary vaccines but not mandated vaccines.

Qualitative survey research

Woolf et al conducted a qualitative survey study where healthcare workers in the UK (N = 3235) responded to one open-ended question about employer COVID-19 vaccine mandates. They found that healthcare providers who trusted their organization to respond to a concern about unsafe clinical practices were less likely to support a vaccine mandate (OR 0.78; 95%CI 0.63 – 0.96)[55].

Summary of research on effect of mandates on trust

There is some evidence to suggest that vaccine mandates may impact trust in government institutions and government communications regarding COVID-19. Trust is also a critical factor associated with both intention to get vaccinated and support for vaccine mandates. There appears to be a relationship between trust, reactance, and intention, though this relationship is not well understood. Based on limited research, greater trust in governments may help support vaccine mandates, however, vaccine mandates may also harm trust between governments and the public.



Section 2: Factors explaining observed associations between vaccine mandates, trust, reactance, and intention to get future vaccines

Two studies used theories to identify predictors of intention to receive COVID-19 vaccines prior to international travel. Radic et al sought to test the strength of an expanded Norm-Activation Model in explaining participants' intention to get vaccinated before international travel (see Radic et al for full model)[35]. The model suggests that awareness of consequences (e.g., impact on health) is positively related to ascribed responsibility, which positively impacts personal norms and, in turn, has a positive impact on intent to get the COVID-19 vaccine before international travel. Ascribed responsibility was also thought to produce anticipated pride which in turn informs personal norms and impacts intention. They conducted a survey with an international sample (N = 1221) and found strong support for the model, which explained 89% of the variance in intent to receive a COVID-19 vaccine before travel. They also found that mass media coverage had a positive impact on awareness of consequences and a direct impact on intent to vaccinate before travel. They did not, however, find evidence to support a relationship between ascribed responsibility and anticipated pride. The authors suggest this may due to the absence of choice, given that COVID-19 vaccines are required for international travel.

Similarly, Suess et al. examined the utility of the Health Belief Model for explaining the intent to vaccinate before travel and support for travel mandates. They conducted a survey with American adults (N = 1478) and found that participants' trust in information provided by governments, scientists, and the media about the risk of COVID-19 was significantly associated with their perceived susceptibility to, and severity of, COVID-19 infection. Perceived risk was

associated with perceived benefits of the vaccine for travel, which predicted willingness to vaccinate prior to travel as well as the belief that others should also vaccinate before travel. All together, these constructs predicted support for COVID-19 travel-related vaccine mandates. These effects were stronger for those who travelled frequently.

Section 3: Co-interventions delivered alongside vaccine mandates to increase trust or reduce psychological reactance

Two studies described evidence to suggest that presenting participants with explanations of the benefits of high rates of vaccination (e.g., economic benefits, population-level immunity) may help attenuate the impacts of reactance on subsequent vaccine intention[48,59]. These two studies are described in section 1. We did not find any literature assessing interventions to increase trust when vaccines have been mandated.

General discussion

We identified 29 studies related to vaccine mandates and their potential impact on, intention, reactance, and/or trust.

Seventeen studies were relevant to vaccine mandates and intention to get vaccinated. Based on the included studies, the effect of vaccine mandates on intention to get vaccinated remains inconclusive. Findings available to date range from intention increasing with mandates, decreasing with mandates, or unaffected by mandates; perhaps most compelling, there is evidence suggesting that the effect of mandates on intention to get vaccinated worked best for people with pre-existing positive views about vaccines but may undermine intention for those with less supportive pre-existing attitudes toward vaccines.

Of the nine studies identified related to psychological reactance (i.e., anger and resistance in response to perceived threats to freedom), six studies suggest mandatory vaccines are likely to incite psychological reactance particularly among those who hold negative views toward vaccines and vaccine mandates. However, one study suggested vaccine mandates were associated with increased vaccination intention irrespective of trait level psychological reactance. Findings from qualitative research suggest that even when participants strongly disagree with mandates and express sentiments that align with psychological reactance, they may still opt to get vaccinated. Two studies also provide some evidence that communicating the public health and economic benefits of high rates of vaccination may help attenuate the negative impacts of psychological reactance on subsequent vaccine uptake. While this is in keeping with the need to address beliefs about consequences, more research is needed to better understand the relationship between vaccine mandates, reactance, and intention.

The relationship between trust and mandates is likewise not well studied. Our search only identified four relevant studies. These studies suggest the relationship between trust and vaccine mandates may be bidirectional. Vaccine mandates may negatively impact trust between citizens and governments. However, when trust is already present, citizens may demonstrate greater support for vaccine mandates than when they do not trust their governments.

Overall, our synthesis suggests there remains much to be learned about vaccine mandates, intention, reactance, and trust. More research is needed to understand under what conditions vaccine mandates do and do not promote vaccination, for whom vaccine mandates work best, how intrinsic motivation is related to psychological reactance and intention, and how trust between governments and the public develops and can be fostered within (and beyond) settings where mandates are considered and implemented.

Table 1. Summary of findings from published studies included in this report

Authors	Year	Country	Design	Sample	Demographic details	Data collection period	Type of mandate and co-interventions	Main findings
Mandates and intention to get vaccinated								
Wang et al.[39]	2021	China	Experiment	General population N = 873	Age: 71.36% between 18-24 Gender: 62.54%	August 2020	Hypothetical "Health code" COVID-19 vaccine local travel and public space app	○ Health code phone app mandate significantly increased willingness to vaccinate when hypothetical vaccine efficacy was greater than 60%
Sotis[36]	2021	United States	Experiment	General population N = 4000	Age: NR Gender: 58%	May 15th 2021	COVID-19 travel mandate	○ Status quo and peer-effect combined nudges improved support for travel mandates ○ Nudges did not negatively impact intent to vaccinate given travel mandate
Sprengholz et al.[42] (preprint)	2021	Germany	Experiment	General population N = 782 Unvaccinated sample	Age: M = 44.01, SD = 15.66 Gender: 52% F	April 2021 Negative tests required to attend cultural events	Hypothetical COVID-19 vaccine passport grants access to greater freedoms in public spaces or does not lead to more freedoms	○ Legal incentives (greater freedom in public spaces) did not impact intent to vaccinate
de Figueiredo et al.[56]	2021	United Kingdom	Cross-sectional survey	General population N = 17611, representative sample	NR	April 2021	COVID-19 vaccine passports for travel and access to public spaces	○ Almost half of respondents would be no more inclined to get vaccinated under domestic or travel mandates ○ Almost half would be more likely to get

								vaccinated under domestic or travel mandates ○ Black, unemployed, part-time employed, and participants who spoke a language other than English would be less likely to accept a vaccine despite mandates
Alshahrani et al.[29]	2021	Kingdom of Saudi Arabia	Cross-sectional survey	General population N = 758	Age: 32.6% between 25-34 Gender: 40%	January 2021	COVID-19 travel mandates	○ Participants were more likely to accept a vaccine if required for travel (OR: 16.52; 95% CI:10.23–26.68, p<0.001)
Feleszko et al.[33]	2020	Poland	Cross-sectional survey	General population N = 1066	Age: 41% 46-65 Gender: 50%F	June 2020	COVID-19 travel mandate	○ 11% of participants would get vaccinated if required for travel
Radic et al.[35]	2021	International	Cross-sectional survey	General population N = 1221	Age: 39.7% 20-29 Gender: 51.7% F	December – January 2021	COVID-19 travel mandate	○ Expanded Norm-activation model predicted intent to vaccinate before international travel ○ Mass media coverage, awareness of consequences, anticipated pride, and personal norm positively impacted intent to vaccinate prior to travel
Suess et al.[37]	2022	United States	Cross-sectional survey	General population N = 1478	Age: 35.9% < 35 Gender: 48% F	November 2020	COVID-19 travel mandate	○ Health Belief Model predicted intention to get a COVID-19 vaccine prior to travel and support for vaccine travel mandates
Ulbrichtova et al.[38]	2021	Slovakia	Cross-sectional survey	Healthcare worker N = 1277	Age: NR Gender: 78%F	August-September 2021	COVID-19 employer vaccine mandate	○ Compulsory vaccinations were associated with greater vaccine acceptance

								○ Physicians were more likely to support mandates than other HCWs
Waghmare et al.[40]	2021	United States	Cross-sectional survey	Students N = 3578 (in health professions n = 1249)	Age: 62.4% >20 Gender: 67.6% F	October 2017	School mandated influenza vaccine	○ 77% of participants who were vaccinated (most due to mandate) indicated they would accept an influenza vaccine without a mandate (i.e., under voluntary conditions)
Arif et al.[31]	2022	Kingdom of Saudi Arabia	Cross-sectional survey	Healthcare workers N = 529	Age: NR Gender: 68%	May-September 2021	COVID-19 vaccine mandates	○ Vaccine mandates predicted lower vaccine acceptance among predominantly vaccinated sample
Lazarus et al.[16]	2021	International	Cross-sectional survey	General population N = 13426; 19 countries	Age: NR Gender: 53.5 F	June 2020	COVID-19 employer mandated vaccine	○ Participants were less likely to get accept a vaccine if their employer mandated it
Al-Ayyadhi et al.[28]	2021	Kuwait	Cross-sectional survey	General population N = 6943	Age: 54% >40 Gender: 66.7%	January 2021	COVID-19 travel mandates, mandatory vaccines, employer mandated vaccines	○ 39.8% would agree to get vaccinated for international travel, 33.1% agreed if it was mandated by government, and 29.8% were willing to get vaccinated if required by job
Antwi-Berko et al.[30]	2022	Netherlands	Mixed methods	General population N = 160 Focus on Ghanian, Hindustani and	Age: median 36-45 Gender: 42-52% F	January – April 2021	COVID-19 travel mandates, mandatory vaccines (general)	○ 69.6% willing to accept when vaccine passports are made mandatory, 28.3% were willing to accept vaccine as part of a travel requirement

				Surinamese residents				
Moore et al.[34]	2021	United States	Qualitative, open-ended question	General population N = 867 Vaccine hesitant sample	Age: M = 37 Gender: 60%F	April – July 2021	COVID-19 vaccine mandates (all types)	○ COVID-19 vaccine mandates of all types (e.g., employment or travel requirement) were cited as reasons to get vaccinated by vaccine hesitant participants
Williams & Dienes[43] (preprint)	2021	United Kingdom	Qualitative focus groups	General population N = 29	Age: 90% <50 Gender: 38%	March 15-April 22 2021 Vaccines rolled out to young adults	COVID-19 vaccine passports	○ Many felt passports would force them to get a vaccine and held negative views toward mandates ○ Vaccine refusers and delayers were more likely to mistrust science and government
Pless et al.[41]	2016	Switzerland	Qualitative interviews	Healthcare workers N = 18	Age: NR Gender: 78%F	Spring and fall 2012	Employer influenza mandate	○ Most participants would receive an influenza vaccine if it was mandated by their employer
Mandates and Reactance								
Sprengholz et al.[48]	2021a	United States / Germany	2 experiments	General population N = 973 Germany N = 1394 US	Age: M 33-44 SD=10-15 Gender: 40-49%F	December 2020-January 2021	Mandatory COVID-19 vaccine with fine for noncompliance (vs unrestricted or scarcity condition)	○ Participants experienced higher reactance when they had low intention to get vaccinated and were in the mandatory vaccination condition ○ Higher levels of reactance led to greater activism, vaccine avoidance, and lower intent to vaccinate in future

Sprengholz et al.[59]	2021b	United States / Germany	Survey + 2 experiments	General population N = 579-4050		April – November 2020 Before and after lockdown in Germany	Mandatory COVID-19 vaccinations for all vs for HCWs	○ Support for mandates decreased over time ○ Confidence in vaccine safety was the strongest predictor of mandate support ○ Mandating COVID-19 vaccines elicited more reactance in those with negative attitudes toward mandatory vaccines ○ Explaining importance of vaccines for economic recovery and herd immunity attenuated impact of reactance on decreased intentions to vaccinate in the future
Betsch & Bohm[58]	2016	Germany	Experiment	Students N = 297	Age: M = 23.11, SD = 3.86 Gender: 60% F	NR	Hypothetical compulsory vaccine	○ Participants with negative vaccination attitudes were more likely to feel angry when in the compulsory vaccine condition and were less likely to accept a subsequent voluntary vaccine
Sprengholz & Betsch[47]	2020	United States / Germany	Experiment	General population N = 576	Age: M=31.91, SD=5.96 Gender = 52.4%	July 2019	Mandatory vs voluntary vaccine for fictitious disease	○ Participants who experienced anger in response to selective mandates and were not given an explanation of herd immunity were less willing to get vaccinated
Albarracin et al.[44]	2021	United States	3 quasi-experiments + 1 experiment	General population N = 299-606	Age: M 32.66-50.63 (SD 10.93-19.23)	Jan-April 2021	Hypothetical mandate "required for	○ Respondents more likely to accept a vaccine when vaccines are required

					Gender: 50-55% F		work travel, or school" Study 3 specified tetanus, flu, COVID-19 vaccines	○ Required condition produced higher intentions regardless of reactance levels
Schmelz[52]	2021b	Germany	Cross-sectional survey	General population N = 4799	NR	NR Pre-vaccine approval	Compulsory COVID-19 app, face masks, distancing, and vaccine checked by government	○ Participants were more likely to agree to engage with recommended rather than mandatory public health measures ○ Control aversion occurred across all policies
Porat et al.[46]	2021	United Kingdom / Israel	Cross-sectional sruvey	General population N = 1358 (UK = 681; Israel = 677)	Age: 50% 30-59 Gender: 51% F	May 2021	COVID-19 vaccine passports / mandates (to access public spaces)	○ Autonomy frustration predicted lower willingness to get vaccinated ○ Autonomy frustration was higher in Israel where passports had been implemented
Dennis et al.[50] (preprint)	2021	England	Qualitative interviews	Care home workers N = 10	Age range: 25-61 Gender: 70%F	April 2021 Mandates introduced June 2021	COVID-19 vaccine employer mandates	○ Participants disagreed with mandates, valued freedom of choice, experienced employment mandates as betrayal ○ Many expressed anger and unwillingness to get vaccinated despite mandate ○ Many unwilling to get vaccinated due to mistrust in authorities
Stead et al.[51] (preprint)	2022	Great Britain	Qualitative interviews	Vaccine hesitant general population N = 50	Age: 72% between 30-69 Gender: 56%F	February – May 2021	COVID-19 passports and mandatory vaccination	○ Some believed mandates were acceptable in some contexts ○ Those who did not intend to get vaccinated viewed

								mandates as threat to autonomy and coercive
Mandates and Trust								
Jorgensen et al.[54] (preprint)	2021	Denmark	Cross-sectional survey	General population N = 24934	Representative sample	October 11 – November 21, 2021 Two weeks before and two weeks after vaccine passport announcement	Vaccine passport reintroduced fall 2021; absence of passport requires testing	○ Vaccine passport communication re-introduced mandate, condemned unvaccinated as "immoral", and emphasized COVID-19 was a "critical disease" ○ The gap in trust, collective action motivation, and perceived threat between vaccinated and unvaccinated increased such that, unvaccinated respondents decreased in trust, decreased in collective action motivation, and vaccinated respondents increased in reported perceived threat
Schmelz[52]	2021b	Germany	Cross-sectional survey	General population N = 4799	NR	NR Pre-vaccine approval	Compulsory COVID-19 app, face masks, distancing, and vaccine checked by government	○ Participants were more likely to agree to engage with recommended rather than mandatory public health measures ○ Control aversion occurred across all policies ○ The more mistrust participants expressed, the more control aversion they reported

Schmelz & Bowles[53]	2021a	Germany	Panel survey across time points	General population N = 2653	NR	April – November 2020 Before mandates were implemented	Government mandated COVID-19 vaccine	○ Support for mandates decreased over time ○ Participants were more likely to support vaccines when voluntary than when mandated ○ Participants who distrust public institutions were more likely to believe vaccines were not effective and that mandates impinged on their freedom
Woolf et al.[55] (preprint)	2022	United Kingdom	Mixed methods (open-ended responses coded and quantified)	Health care workers N = 3235 codable responses	Age: median = 46, IQR35-55 Gender: 74%F	Spring 2021	Employer mandate	○ HCWs who were vaccine hesitant, who were in an allied health profession, or who trusted their organization to act regarding unsafe clinical practices were less likely to support mandatory vaccines

NR – not reported

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Appendix A

Search terms		
Database	**Key word terms**	**Subject terms/MeSH terms**
MEDLINE Embase CINHAL PsycINFO Cochrane Central Register of Controlled Trials	COVID-19 vaccine/vaccines/vaccination/immunization mandates/compulsory/mandatory/passport/passports Psychological reactance/psychological reactance theory/reactance Trust COVID-19 vaccine intention/uptake vaccine/vaccines/vaccination/immunization mandates/mandatory/compulsory/passport/passports	COVID-19 COVID-19 vaccine SARS-CoV-2 vaccine SARS-CoV-2 Coronavirus Mandatory programs Immunization programs Immunization Vaccination Vaccines Public health Prevention Policy making Trust Trust (social behaviour) Psychological theory Psychological reactance Freedom Intention Intent Behavioural intention Behaviour
PsyArXiv	(vaccin* OR immuni*) AND (manda* OR requir* OR pass*)	with subject: Life Sciences; Psychiatry; Social and Behavioral Sciences.
MedXiv	(vaccin* OR immuni*) AND (manda* OR requir* OR pass*)	

Appendix B

Data extraction template

Study characteristics													
Authors	Year	Title	Aim	Design	Analysis	Time of data collection	Country	Subgroups of interest (e.g., gen pop, HCWs, public service)	Sample size	Race/ ethnicity	Age	Gender	Other demographic variables
Vaccine mandates and outcomes													
Mandate description	Vaccine type	Hypothetical / Actual mandate	Time frame	Main findings	Impact on intention / Reactance / Trust		Other factors implicated	Other findings					