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British Idealism, Complexity Theory and Society: The Political Usefulness of T. H. Green in a Revised Conception of Social Democracy

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ABSTRACT. This paper seeks to rehabilitate the central political proposals of the British Idealists, with specific reference to T. H. Green, freeing their social democratic politics from their dependence on idealist philosophical assumptions, especially those embodied in the work of G. W. F. Hegel, and justifying them in relation to models and theories of complexity that developed in the twentieth century from the physical sciences. It argues that complexity theories advance a version of holism freed from the difficulties of traditional idealist theories. It claims that the affinities between these approaches enable Green’s arguments for social democracy in the 19th century, to be restated on grounds that are more plausible today. This is pertinent as it gives useful insights into how social democratic principles can be retained in the 21st century, which is becoming increasingly characterized by systemic factors such as interconnectedness, interdependence, uncertainty, self-organization, and openness. Indeed, by re-visiting the political philosophy of British Idealism at this time, we will see that far from his own ideas being discrepant with the dominant and effective discourse on science of the day, as they were in his day, they are now congruent with it.

Keywords: T. H. Green; complexity theory; British Idealism; social democracy; holism; organicism; common good; continuance ethics

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Introduction

This paper seeks to rehabilitate the central political ideas of T. H. Green, freeing them from their dependence on the idealist ontology of G. W. F. Hegel, and justifying them in relation to models and theories of complexity that developed in the twentieth century from the physical sciences.¹ It argues that complexity theories advance a version of holism freed from the difficulties of traditional idealist theories. It claims that the affinities between these approaches enables Green's arguments for social democracy in the 19th century to be restated on grounds that are more plausible today. This is pertinent as it gives useful insights into how social democratic principles can be retained in the 21st century world, which is becoming increasingly characterized by systemic factors such as interconnectedness, interdependence, uncertainty, self-organization, and openness. Indeed, by re-visiting the political philosophy of idealists such as Green at this time, we will see that far from their own ideas being discrepant with the dominant and effective discourses on science of the day, they are now congruent with it.

Although our argument in this paper applies to idealism in general, the specific focus of the paper is on Thomas Hill Green. While idealists such as Bosanquet and Bradley are seen as significantly Hegelian in their interpretation of the state, combining as Ernest Barker says, "a Platonic conception of justice with a Hegelian conception of *Sittlichkeit*" (1928: 61), the influence of Hegel on Green has more frequently been contested.² Green we might venture is worth saving, partly due to the rich array of social democratic political insights, and partly due to the more nuanced and critical appropriation of idealist philosophical axioms. It is our aim to work through Green's arguments supporting his notion of society as a scheme of social relations, unified by the common good, then subject his concepts to critical interrogation in order to determine whether they hold in light of the principles of complexity science. By grounding Green's political philosophy within the context of a framework informed by post-quantum complexity theories, the troublesome connotations of Green's idealist philosophical underpinnings, especially the idealist origins of his organicist view of society and the state, can be avoided.³ Such a view we will argue supports the notion of Green as a radical democratic theorist rather than as a rabid statist, in general accord with many contemporary analyses.⁴ Our aim in advancing such a thesis is not simply to rehabilitate Green's political philosophy of social democracy, but to show that it can stand alone without the influence of Hegel. Jettisoning the influence of Hegel and underpinning social democracy with poststructuralist philosophical insights is thus central to the thesis that we wish to advance. Showing that new developments in scientific thinking from the quantum revolution at the start of the twentieth century lead to conclusions which can justify social democracy in a way that can usefully incorporate many of Green's political insights without falling prey to philosophical idealism is thus central to our mission.

Green, Idealism and Social Harmony

Interrogating the insights of British Idealism and demonstrating its contemporary relevance is a valuable exercise to pursue, as globalization continues to signal an ever-increasing trend towards connectedness and interdependence. This is all the more pertinent when one considers that the idealists largely wrote during a sea-change in British political history, the immediate aftermath of the industrial revolution, which was also characterized by the need to reframe the relations between the individual and collective. Many contemporary writers have now argued that Green's philosophy constitutes a viable theory of the welfare state, reconciling liberty and community in a particularly pertinent way.⁵ Without dwelling on Green's complex understanding of rights, liberty, and positive freedom, which has been explicated by writers such as Avital Simhony,⁶ this article advances a particular critique of Green, one which can, somewhat unsympathetically, be extended to British Idealism in general. This critique concerns the metaphysical grounding of the relations between the individual and collective in society. The specter of Hegel and the Absolute, as well as theological references to an overarching Spirit, do in important respects, it will be argued, plague the idealist project.

Critical views of Green's conception of society as organic and holist in relation to Hegel's use of those terms, have been discussed by Simhony (1991), Nicholson (1990, 1995), Wempe (2004) and many others.⁷ What is contended here can be seen as complementary to these studies, but will seek to re-ground the idealist aspects of Green's thought on more materialist grounds. In this sense the paper shares a parallel with L. T. Hobhouse (1918) whose project can be represented as an attempt to restate the core postulates of idealist philosophy in more materialist scientific terms. It explores whether models of complexity science in the twentieth century can provide a useful formulation and understanding of part-whole relations, which could subvert the Hegelian grounding of such relations in idealist terms. In doing so, it will help to salvage Green's social democratic concepts and formulations showing that they can be validated even without an idealist justification. Moreover, it helps support Green's conception of the common good as an essential element of political society, by challenging ontological atomism, which, as Taylor (1991) asserts, cannot accommodate such a position. It thus seeks to justify Green's social democratic concepts in more materialist terms in order to further illuminate the "crucial dynamics of modern society" (Taylor, 1991: 175).⁸

Even though Hegel's influence on Green is well-documented, as noted above, it is contested as to exactly how much influence, as well as its specific nature. Green's friend and pupil, R. L. Nettleship, cites Green in his *Memoir* as commenting that Hegel represented "the last word in philosophy" (Nettleship, 1906: 126; citing Green, 1894, vol. iii: 143). Yet he also acknowledges that the influence of Hegel upon Green was no simple reproduction of Hegel's ideas but "was the result of a sympathetic study of Kant and Hegel" (Nettleship, 1906: 118). It can be noted also that Green himself never claimed to *be* Hegelian, although he certainly acknowledged the influence of Hegel on his writings. Amongst more contemporary writers, such

as Peter Nicholson (1990), the view is maintained that Green's conception of society is ontologically similar to Hegel's absolute idealism.⁹ Ben Wempe also notes "the central position Hegel occupied" (2004: 5) in Green's very early writings and lecture notes. "It is evident from his manuscripts that Green saw an idealist position in metaphysics as a necessary starting point for his philosophy" (2004: 2–3). This was especially so, says Wempe, "in the fields of ... ethics ... politics, religion, and epistemology" (2004: 5–6).¹⁰ Hence, although it might not be possible to identify Green as Hegelian in any total or unambiguous sense, his writings arguably fall within its remit due to his metaphysical position in several important senses. In Green's *Memoir*, Nettleship claims that "central to [his] conception is that the universe is a single eternal activity or energy, of which it is the essence to be self-conscious, that is, to be itself and not itself in one" (1906: 109). Despite one's ability to uncover Green's core liberal leaning, as articulated regarding his emphasis upon freedom and democracy, the inclusion also of a religious tone in his writing does raise questions regarding his conception of society. As Nettleship again remarks, it can lead the reader to "recognize the constant recurrence ... of a single idea ... that the whole world of human experience is the self-communication or revelation of an eternal and absolute being, and that dependence upon and identity with such a being is the source at once of the infinite littleness and the infinite greatness of man" (1906: 129). Nettleship also notes that the Green draws sympathetically on both Kant and Hegel in his critique of Aristotle's metaphysics. As Nettleship expresses it, Green maintains that Aristotle is not "thorough-going with his 'idealism,' but allowed his conception of reality as the work of intelligence to be crossed by a 'dualism' which leaves something real and yet unintelligible" (1906: 50).¹¹

Compounding such a view, Green speaks directly about the "[t]he spiritual progress of mankind" and the "development of self-realization through ... an endless series of events," which, to be intelligible, need to be "relative to something beyond itself" (Green, 1906: sect. 185). Green's metaphysical commitment to the conception of an "eternal self-consciousness" further reinforces a traditional idealist reference. Eternal self-consciousness constitutes "a will to betterment or to a fuller realization of the self that is the source of the customs and institutions of society" (Muirhead, 1924a: 170). As Harris and Morrow observe (1986: 3), it developed in opposition to growing empiricist currents that were gaining traction at his time of writing and manifested itself through the individual and her relations with others (Green, 1906: sect. 182).

The notion of a spiritual idea and its teleological development in time remains central to Green's ontology and resonates in several passages of the *Prolegomena to Ethics*:

But the idea as it is in the individual man, however infinite and unfilled, is a communication in germ or principle of the idea as it is in God, and the communication is the medium through which the idea as in God

determines the progressive development of human capacities in time (1906: sect. 192).

It is only because we are consciously objects to ourselves that we can conceive a world as an object of a single mind, and thus as a connected whole. It is the irreducibility of this self-objectifying consciousness to anything else, the impossibility of accounting for it as an effect that compels us to regard it as the presence in us of the mind for which the world exists (1906: sect. 182).¹²

What we witness here may well appear as sufficient to warrant charging Green with teleology, divine guidance, and a dialectical progression in history through objective stages in consciousness toward the absolute, albeit typically not explicitly dressed in Hegelian prose.¹³ Green takes from Hegel and Kant a primary focus on will as both actual and normative (i.e. good) and which realizes an end culminating in an ideal. The ideal self is embedded in the empirical self and becomes unified in the normative ideal of mankind, expressed as a single ideal. This benevolent and general disposition trumps the selfish motives and subordinates egoism to an identity of the collective moral ends of mankind. In this, writers like Prichard, in *Duty and Interest*, maintained that in asserting an identity between persons, Green essentially denies the thesis of the separateness of individuals.¹⁴

Green supplements and possibly moderates the nature of his idealism by an emphasis on the moral integrity of the individual as part of his thesis concerning the central importance of free moral activity within society. This has led some to see Green as less of a committed idealist than others associated with idealism of his day, such as Bradley and Bosanquet. Ernest Barker (1928) offers one such interpretation. Whereas the ultimate origins of idealist theory of the state maintained its highest expression in Plato, and later Hegel, Green was also influenced by Aristotle and Kant. As Barker writes:

But the individual nevertheless remains the basis of all his thought. Green is not trammled by any idealization of the majesty of the State; he is more of an Aristotelian than a Platonist, and more of a Kantian than a Hegelian (Barker, 1928: 58).

While Bradley and Bosanquet are claimed to represent a more thorough-going Hegelian perspective, Green's commitment to Kant's more subjective view of morality as "a self-imposed imperative of duty" saw a strong commitment to the protection of individuality while simultaneously avoiding any charge of individualism, says Barker (1928: 25). As Barker argues, "Kant ... had little idea of the corporate life of a national State. The free will of the individual is the core of his thought" (1928: 26). Green draws on Kant and acknowledges that the individual is a necessary element in society, which on one hand appears to mirror the liberal tenant of the separateness of persons, but on the other, does not embrace a typically atomist conception of social structure or general ontology. Hence, he states that it is a fallacy to think of:

the history or development of mankind, as distinct from the persons whose experiences constitute that history, or who are developed in that development; whether in the achievements of great nations at special epochs of their history, or in some progress towards a perfect organisation of society, of which the windings and back-currents are too complex for it to be surveyed by us as a whole (Green, 1906: sect. 184).

Therefore, individuals are constituted by society, where Green, mirroring modern communitarians, argues that:

The fallacy lies in the implication that the individuals could be what they are, could have their moral and spiritual qualities, independently of their existence in a nation ... it is none the less true that the life of the nation has no real existence except as the life of the individuals composing the nation, a life determined by their intercourse with each other, and deriving its peculiar features from the conditions of that intercourse (Green, 1906: sect. 182).

A similar partial exoneration of Green from a Hegelian conception of idealism is put forward by L. T. Hobhouse (1918) in *The Metaphysical Theory of the State*.¹⁵ In this, Green is celebrated over Bosanquet and Bradley who in Hobhouse's view are far more Hegelian. Hobhouse, from his *Elements of Social Justice*, claimed that in Green "we get most of the cream of Idealism and least of its sour milk" (1922: 41n). Such a view parallels the interpretation provided by Barker above.

R. M. MacIver (1926) is another who sees Green as influenced less by Hegel, and less idealist than the other British Idealists. One domain where Green's Hegelianism appears qualified is that Green made it clear that he was defending liberty and morality within the context of a democratic society. He took pains to distinguish the realm of law and the state from that of morality. Whereas political obligations are subject to the constraints of the state through force; moral duties, following Kant, cannot be. The state for Green exists solely for the removal of obstacles that impede free moral activity by individuals or groups within society. In Green, as MacIver notes:

The state has a limited sphere and cannot be identified with the whole activity of society. Since law must act through external sanction, it should refrain from touching those activities whose value is conditional on the motive or spirit with which they are performed. Thus, the whole creative side of human thought and endeavor, including religion and morality in its proper sense, are outside the sphere of the state (MacIver, 1926: 470).

As MacIver argues, Green was writing in the context of a democratic state and sought to articulate distinct limits of state activity, sought to resist absolutist conceptions and clearly differentiated the sphere of *state* activity from that of *community* (see MacIver, 1926: 470). Hegel represented what MacIver calls the absolutist con-

ception of sovereignty which conceived of the state as a “mystical unity” (p. 470). In this sense, it engulfed and was identical with the whole of society, including civil society, which both came to be represented under the single term of the state (the “State” for Hegel). In such a conception the margins for liberty are extremely limited.

The state was also for Hegel characterized as a living organism; that is, as a “supra-person” or “greater mind” whose will and purpose transcends that of the individuals who comprise it. As such, the state “is ultimate and rooted in the nature of personality” (MacIver, 1926: 447). In this representation, says MacIver, the state becomes a “living person” which manifests “a unity in its own self-consciousness” (1926: 450). In contrast to this, says MacIver, “Green remains on the verge of the modern problem of sovereignty” (1926: 471). This was premised on the transition from absolutism and the remnants of still present echoes of the doctrine of the divine right of kings that influenced Hegel in his responses to the Prussian state, and the newly founded institutions of democracy that characterized England in the time of Green. Hegel wrote on the threshold of an absolutism that had triumphed over much of Europe, including Germany and Prussia, where the king had been a divinely appointed head of the nation, commanding passive obedience from his subjects. Through a variety of forces, including economic and political rebellion (in England in 1215, 1644, 1689) as well as extensions of the franchise (in England, 1832, 1867 and 1884) the slow process of reconstituting society and the state along democratic lines had been institutionally embedded. Green wrote in the context of an already established representative democracy and was indeed its enthusiastic defender (MacIver, 1926: 141).

Green thus supplemented Hegel with a modern conception of the state as limited jurisdiction which had developed out of the feudal communalism and religious absolutism and become differentiated from them and from the community or civil society. As MacIver is at pains to point out, for Green, “it became clear that the state was not the community, but the way in which the community was organized” (1926: 472). In this, the state “had to accept the status of an association, one among others, no matter how essential its service” (1926: 472). Sovereignty thus appears in a different form as the state must be seen in reference to both negative and positive limits, viewed as but one of many associations.¹⁶ Green was undoubtedly also aware of new studies in jurisprudence which defined associational status in relation to articles of incorporation proscribing limits, powers and responsibilities. While legally, corporations are held to be “persons” or “subjects” who have rights and responsibilities (in tort, for instance), and in this sense constitute a “unity,” in the context of the reformulation of sovereignty within a context of democracy, such a unity does not derive from a spiritual source, or constitute its essence in any mystical sense, but from civil society. In this sense, as MacIver points out, Hegel’s “group mind,” as articulated by some within the idealist tradition, influenced by Gierke or Maitland,¹⁷ gives way to the very different concept of the corporation (MacIver, 1926: 474).

Notwithstanding MacIver's defense of Green in relation to Hegel, a defense which positions MacIver alongside Barker and Hobhouse in considering Green as less influenced by Hegel than Bradley or Bosanquet, important residues of Hegelian influence remain. For Nicholson all the British Idealists are uniform in their dependence on Hegel. Moreover, all are deeply impressed by Hegel who ... is the predominant philosophical influence upon their thought" (Nicholson, 1990: 5). Hobhouse is dismissed outright as the propagator of a myth: "The political philosophy of the British Idealists is far more homogeneous – not to say homogenized – than Hobhouse admits" (Nicholson, 1990: 199). In particular, says Nicholson, "Bosanquet is repeating Green's ideas with only a little reworking and extension of them" (1990: 199). Although Barker's argument, which parallels Hobhouse's, is not referred to by Nicholson, it too would clearly be kicked into the long grass as exemplifying "[that] interpretation that sets Green on one side and Bradley and Bosanquet on the other" (Nicholson, 1990: 5).

In Nicholson's view, while Green is impressed by other writers besides Hegel, including Plato, Aristotle, Spinoza, and Kant, "all of them constitute a single tradition, a tradition which Hegel has filtered and shaped so that it culminates in his system" (Nicholson, 1990: 63). Hence, "Green's interpretation of Kant ... is very much Hegel's interpretation" (1990: 62). More than this, Green sees Hegel as superior to Kant, or as having "corrected" Kant. To underscore this point, Nicholson claims to cite Green from an early lecture he gave on the importance of history: "Thus by Hegel's Moral Philosophy, we can explain Kant's."¹⁸ Green agrees with Hegel that Kant's morality is too formal and too subjective. For Hegel it was the object to be willed, rather than the actor's motive that determines the moral nature of the act. As translated into Green's moral theory the imperative becomes: "seek the Common Good!" which "treats oneself and everyone as ends" and "is autonomous" in that "it gives universal law to itself" (Nicholson, 1990: 61).

Nicholson's view finds an earlier echo in J. H. Muirhead.¹⁹ In comparing Green to Bradley, whose essay "My Station and Its Duties" is seen as quintessentially idealist, Muirhead proffers the view that:

Green's statement of the theory and Bradley's comes partly from the difference in approach, partly from the more critical attitude that Green adopted to Hegelian terminology and his determination to express what was true in it in home-spun English, but chiefly from a certain difference in temperament and experience.... But the essential features of the theory are the same in both. Like Bradley's, Green's social and political philosophy is merely the other side of his ethics. It is fundamentally a theory of the will (Muirhead, 1924a: 170).²⁰

If we examine what Green wrote on Hegel himself, while in many respects it supports Nicholson's view, a more nuanced and critical perspective is obtained, making it possible to understand how disputes over the influence of Hegel in Green's work arise. As Ben Wempe (2004) notes, Green's attitude to Hegel shifted from a very positive tribute in his early article, "Popular Philosophy in Its Relation

to Life,”²¹ to moving away from Hegel in certain respects to a greater focus on Kant over time, although as Wempe notes, the later focus is still generally structured by Hegelian views.²²

This more distanced view of Hegel is manifest in his review of a book by the eminent Scottish theologian, John Caird (see Caird, 1880). Here, Green restates his idealism as the priority of thought as it stands opposed to materialistic explanations (Green, 1911: 138–146). While seeing thought as “the *prius* of all things” (1911: 140) and while criticizing empiricism and naturalism on this basis, he is critical of the way that Caird expresses his Hegelianism. Caird says that “as spiritual beings our whole conscious life is based on a universal self-consciousness, an absolute spiritual life, which is not a mere subjective notion or conception, but which carries with it the proof of its necessary existence or reality” (1911: 141). Green here accuses Caird of “intellectual jugglery” (1911: 141) which “makes us feel the need still more strongly for a reconsideration of certain points in Hegel’s doctrine” (1911: 142). The key concept that is problematic is “thought,” and Green criticizes Caird for accepting Hegel’s identification of the real and thought. This indeed is the “chief fault” with Caird’s book (1911: 143).

In the absence of a demonstration or proof, “which Caird and no one else has been able to provide, our idealism, though one may wish it to be ‘absolute,’ remains merely ‘subjective’” (1911: 143). Caird merely assumes that subjective thought transcends itself to unite with a universal reason. His reader will be wondering “what this thought is which seems to be and to do anything and everything” (1911: 143). Instead of asking how we know the world and its contents, Caird is led backwards through an introspective study to thought. Ultimately, Caird, being faithful to Hegel, also makes an illegitimate jump “from the power of conceiving to the reality of that which is conceived – God” (1911: 144).

While this might support that Green’s appropriation of Hegel is more partial and limited, Green’s own attempts to resolve the difficulties do not altogether convince one that he has abandoned the Hegelian ship. After asserting the importance of relations of things that can only be united by a thinking consciousness, Green appears to swear allegiance to Hegel on transcendental faith rather than through empirical demonstration:

But when we have satisfied ourselves that the world in its true or full reality is spiritual, *because no other supposition is in its unity explicable*, we may still have to confess that a knowledge of it in its spiritual reality – such a knowledge of it would be a knowledge of God – is impossible to us. To know God, we must be God (1911: 145) (emphasis added).

If we are charitable to Green, here, he could be seen as falling back into subjective as opposed to absolute idealism, in that “the unifying principle of the world is indeed in us; it is our self” (1911: 145). Moreover, Green speaks of the “partiality of our knowledge,” the “infirmity of our discursive understanding” and the “confusions of language” (1911: 145). He is manifesting a high degree of circumspection, whilst

trying to avoid falling into what he clearly sees as a trap. The differences between him and Caird appear to grow less and less, however, and Green admits such differences between the two of them may appear as “insignificant” (1911: 146). Indeed, they appear to come down to *method* rather than *conclusion*:

It comes to this, that in his method, though not in his conclusion, we think he has been too much overpowered by Hegel. We suspect that all along Hegel’s method has stood in the way of an acceptance of his conclusion, because he, at any rate, seemed to arrive at his conclusion as to the spirituality of the world, not by interrogating the world, but by interrogating his own thoughts (1911: 146).

The differences become more difficult to see, however, as Green continues:

That there is one spiritual self-conscious being, of which all that is real is the activity or expression; that we are related to this spiritual being, not merely as parts of the world which is its expression, but as partakers in some inchoate measure of the self-consciousness through which it at once constitutes and distinguishes itself from the world; that this participation is the source of morality and religion; this we take to be the vital truth which Hegel had to teach (1911: 146).

This statement appears to implicate Hegel’s central argument of *Geist*, formulated by Green as an “eternal self-consciousness” which progressively manifests itself in advancement of knowledge in history. At the same time, we can see that Green manifests a certain reticence toward Hegel, and it may be, as Mander states, that like the other British Idealists, Green “turned to Hegel as a battering ram to use against the prevailing metaphysics of naturalism and individualism....” (Mander, 2013: 174). Green ends his commentary on Caird by saying that “[i]t still remains to be presented in a form which will command some general acceptance among serious and scientific men” (Green, 1911: 146). He suspects, interestingly, that the breakthrough may well come from someone who does not “drink too deep of Hegel” (1911: 146).

Holism, Relational Holism, Organicism

The intuition that provides the impetus for this paper, was that one of the central contributions of the idealists, including Green, was the advocacy and defense of a social-democratic vision of society; a defense that constituted an important theoretical and practical contribution to justifications for the welfare state and expanding the role of the state in a society previously dominated by laissez-faire. Given the paucity of readily available social and philosophical theories, it is understandable why Green turned to Hegel and idealism more generally, as the various theories provided a counterweight to the increasing empiricist, mechanistic, reductionist and atomistic trends that were dominant in science, philosophy and politics in the

nineteenth century. It is in this respect that David Brink introduces our topic by suggesting that many core features of Green's ethics and politics can be defended independently of his idealist metaphysics (Brink, 2003: xiv).

Holism in Hegel's conception was teleological in the sense that the whole had purposes to which the parts were but appendages. Wars, conflicts, evil, were but "moments" in the dialectic which would achieve resolution and progression at a higher level. The whole therefore took precedence over the parts in the sense that it was the state and society as a unity that sought realization and development, and that the individual person or event was but an instance or moment of the dialectic. For Hegel, unity is integral and essentially the product of a spiritual source. The development of the state, to which all individuals are servants, is part of God's larger plans (see Hegel, 1953, 1956, 1967, 1975, 1977; Kojève, 1969). Despite Green adopting a more secular language and tone than his contemporaries, it is possible, as Richter has claimed, to see how his "theory that *God* is immanent in the universe, in the sense of being its constituent principle..." could permeate his conception of society, and thus be problematic (1956: 457).

Avital Simhony (1991) has usefully distinguished Green's conception of "society-part" relations from Hegel's variant of "classical holism" by referring to it as "relational organicism." Although Simhony acknowledges that "[o]rganicism and holism are usually employed as interchangeable terms ... [i]ndeed ... frequently drawn in terms of individualist versus organic models of society" (1991: 515), she proceeds to distinguish "relational organicism," which she defends on behalf of Green, from "holistic organicism," which adheres to the classical doctrine of holism (for her purposes, Bosanquet, but for our purposes, Bosanquet's teacher, Hegel). The features that characterize classical holism, says Simhony, are essentially those that we have ascribed to Hegel, above, and which result in a "lopsided view of social relations" where "the whole is prior to the parts and hence is more real than them," and where "the whole determines the nature of the parts which, in turn, cannot be understood if considered in isolation from the whole. This results in a whole which is not identical with the sum of its parts and has a will separate from and superior to the particular wills." In contrast to this, Simhony defines "relational organicism," which she attributes to Green, but not Bosanquet, as asserting a "double relation: the mutual interdependence of whole and parts, and the mutual interdependence of the component parts" (Simhony, 1991: 515–6).²³

While Simhony's distinction is valuable and substantively pertinent, we would dispute that Green can be qualitatively distinguished from Bosanquet (or Hegel) in terms of the conception of holism, as she puts forward. Simhony, we would argue, is similar to Hobhouse, MacIver and Barker in understating Green's Hegelian inheritance, and in failing to see how Green's conception of holism "nests" within the broader Hegelian movement of Spirit that pervades his project as a whole.²⁴ Having said this, we think Simhony's distinction is valuable as a statement of the position that Green *ought to have adopted*. We will claim below that when Green wrote, Hegel was the only paradigm on offer, today a new theoretical framework

exists which can provide an alternative to Hegel and which develops the conception of holism Simhony identifies with Green, in an even richer and more nuanced way. Indeed, several further characteristics of a reformulated conception of holism can be added once we consider it from the viewpoint of quantum and post-quantum complexity theories.

We wish to depart from Simhony in a further way. While accepting the theoretical point made concerning the substance of “relational organicism,” we would rather retain the term “relational holism” while being careful to differentiate it from the classical and Hegelian metaphysical conceptions. The term organicism in our view is too closely connected to the classical idealist tradition and as a metaphor carries unfortunate connotations. It tends to convey the classical ideas associated with idealism that reality contains an active, immaterial, force, entelechy, or *élan vital*, or comprising an essential immaterial element in thought or consciousness, as with Kant. While debate can be had over how far Green and the idealists subscribed to the organic conception of society, the concept can be viewed as problematic for important reasons. As Hobhouse remarks, “In what terms we are to describe the reality of social wholes is a standing difficulty of sociology. They are ... [o]f organic character, yet, if we speak of them as organisms, we are liable to confound them with animals or plants, which they are not. Essentially, they are unities of mind” (Hobhouse, 1918: 131). The suggestion here is that societies are not organic, i.e., living creatures. The parts, or constituent individuals, are not limbs which are reliant, or at the bequest, of a central unity. The specific model of part and part-whole relations is thus inappropriate. While in that it conveys holism, and is against reductionism, it is valuable; in that it sees the universe, either metaphorically or literally, as a living being, it is inaccurate. It also conveys the fixed form and model of the internal relations of living creatures to all physical and chemical reality. Plato, the father of classical idealism, was an early proponent of the world as an intelligent living being in *Timaeus*. The model was also prominent amongst the German Romantics, where the classical model of idealism was also strongly rooted, alongside other undesirable bedfellows, such as vitalism.

Organicism also furthers Hegel’s project within the context of Green’s theory by representing the state as a single mind or personality, as noted above. Through the analogy to the physical organism, Hegel effectively represents the state as a living person, embodying its unity in its own self-consciousness which “transcends that of the individual minds or persons who compose it” (MacIver, 1926: 449–50). In this sense, organicism requires subservience of the parts justified in terms of the historical and teleological dialectic which subordinates the development of the parts to the development of the whole. Rather than use the metaphor of organicism, and while acknowledging with William Shakespeare and C. S. Lewis, that words are but names, our own preference for a non-Platonic, non-Hegelian form of “relational holism” will draw inspiration from twentieth century post-quantum theories of complexity science. The virtue of this approach is that it reinstates a conception of holism, largely congruent with Simhony’s virtuous renamed model of organicism,

that can today be legitimated in accord with dominant movements and developments in science, is thoroughly materialist in that it sees a world constituted solely through physical and chemical processes, and recognizes no vital spirits, entelechies, essences, spiritual substances or unities.

Justifying Social Democracy based on Complexity Science

Central to representing the world as a complex dynamical system is to understand it as pertaining to an interdisciplinary approach to non-linear processes of change in both nature and society. Although complexity research takes its origins from its applications in physics, chemistry, mathematics and the “hard” sciences, undergoing its formative development in the 1970s, building out of the quantum revolution at the start of the twentieth century, during the last two decades it has exerted an effect on the social sciences as well. Today complexity research is generating a “quiet revolution” in both the physical and social sciences.²⁵

Central to complexity theories are the rejection of an exclusive emphasis upon either reductionism or holism. Whole and parts must be represented in interaction. The compositional rules are neither Aristotelian (in terms of substances) nor Cartesian (in terms of an additive or compositional model). Neither description nor explanation can therefore be achieved exclusively in terms of either parts or wholes but must be grasped as a system in process. The system comprises both linear and non-linear interactions. In accepting non-linear interactions, we can postulate that wholes are in certain instances, more than the sum of the parts, in that collective entities can act differently to the parts, exert forces independent of the parts (downward causation), theorize power differentials and assemblages in terms of a theory of forces, manifesting a commitment to a thesis of the unity of science. This is a thesis now widely accepted and indeed ascendant in the new sciences of complexity, as recently promulgated by Nobel prize winning scientists such as Ilya Prigogine, or more recent science writers and cosmologists, including Paul Davies, John Brockman, Lawrence Kraus, Seth Lloyd, Lee Smolin, Karen Barad, and Alexander Wendt, to name just a few.²⁶

Complexity theory presents a new relational holism that avoids the spiritualistic and dialectical connotations of classical holism. Classical holism was deficient in terms of its blindness to the parts as well as in its ignorance of complex processes of change and order. It also avoids constructing a fixed model of systems or wholes premised upon an invariant order or hierarchy. In this sense, complexity holism, which viewing parts and whole in interaction and mutual interdependence, does not posit any pre-ordained hierarchy of control or order, such as monism, which Hegel succumbs to by positing the whole as an ultimate reality to which the parts (individuals) are only dialectical moments, or aspects. Complexity makes no universal assertions that the whole is necessarily “greater” or “more real” than the parts. Expressed within the language of quantum theory, it might be said that relational holism rests upon the entanglement of potentialities in nonlocal contexts. While the

parts do not simply reflect the whole, they are also not wholly subject to reduction. It thus conceptualizes a systems or network approach which functions as both ontology and epistemology in that it conjectures that this is the way the world is, and the only viable way in terms of which it can be understood.²⁷

Charles Taylor makes the point that “[t]aking an ontological position does not amount to advocating something; but at the same time, the ontological does help to define the options which it is meaningful to support by advocacy” (1991: 161). In this spirit, we maintain that the new complexity revolution can resolve several problems for Green enabling a rejection of classical holism informed by Plato and Hegel. This enables core Hegelian assumptions around unity, the absolute, the equation of reason and reality, state and society, the ethical and the political, the ideal and the actual, to be firmly rejected. Although Barker, MacIver and Hobhouse all give Green credit for his practical support for democratic values and the more moderate, cautious and secular style of presentation, the fact that commentators like Nicholson and Muirhead reject such analyses,²⁸ finding that Hegel is still closeted deep within the “Trojan horse” that Green is riding upon, makes a new approach enabled by complexity of both practical and theoretical importance. Nicholson and Muirhead remain unconvinced because they have “worked out” that the incorporation by Green of some key Hegelian axioms will seep through to contaminate his philosophy overall no matter how much the reasonableness of his style may contribute toward camouflaging the matter.

Two key ideas of complexity theory which reinforce these views include *organization* and *emergence*. Both these conceptions are necessary supplements to the ideas of interrelations and interactions in order to form a composite model of relational holism. The idea of organization entails that complex systems organize and change through the interaction of parts and whole at different levels, from atoms to the cosmos, while also drawing on external resources, such as energy and information. Developmental regularities and laws operate because of the location of elements within a system, i.e., relationally, and are contingent and evolutionary.

Of relevance to both organization and emergence, complexity theorists also typically represent the world as stratified, characterized by levels or sub-systems, interconnected by interactions. Within each level, different rules apply. Collective entities (e.g., brains, society) manifest properties (thinking) that the individual components (neurons and synapses) do not. Different entities are constituted by different elements that form a whole. Elements are related within the whole through organization, which as Edgar Morin says, comprises “a structure of relations between components to produce a whole with qualities unknown to these components outside the structure. Hence, organization connects parts to each other and parts to the whole” (Morin, 1999: 115). Morin cites Dilthey to emphasize that “a whole cannot be understood except by understanding its constituent parts, which cannot be understood except by understanding the whole” (1999: 115). Within complex systems, the interconnectedness of part and whole means that interactions of various sorts will define relations at various levels. Interactions characterize relations, both at the

microscopic (organisms, cellular life) and macroscopic levels. Such interactions can be of qualitatively different types, both linear and non-linear, and “multi-referential” in Morin’s sense (Morin, 1992: 47). Types of interactions that typify complex systems may be complementary or competitive, physical, biological, psycho-social, anthropological, economic, political, or so on. For Morin:

Interactions (1) suppose elements, beings or material objects capable of encountering each other; (2) suppose conditions of encounter, that is to say agitation, turbulence, contrary fluxes, etc.; (3) obey determinations/constraints inherent to the nature of elements, objects or beings in encounter; (4) become in certain conditions interrelations (associations, linkages, combinations communications, etc.) that is to say give birth to phenomena of organization.... (1992: 47).

The thesis that the properties of wholes cannot be accounted for in any simple additive sense as an aggregation of its component parts constitutes an ontological principle as relevant to the social sciences as to physics and chemistry. New properties arise through the interactions of parts through the process of *emergence*. Emergents are defined as “the simple effects of combined actions” (Morin, 2008: 100). Such processes operate within open systems where parts and wholes are linked in a dynamic and precarious and unstable tension. Systems comprise “poly-relational circuits” made up of “elements,” “interrelations,” “organization” and “whole.” As such, the system is “a totality of polycentric dispersion” where small perturbations can derail and effect the whole (2008: 104). Society can be viewed in such a model as a complex dynamical system. In such a conception, the process of emergence is “at the very heart of the theory of the system” (2008: 105). Within systems, “emergents blossom” (2008: 102). As Morin explains:

all systems comprise an immersed, hidden, and obscure zone, teeming with stifled potentialities. The duality between the immersed and the emergent, the potential and the actual, the repressed and the expressed, is the source, in the great living and social polysystems, of scissions and dissociations between the sphere of the parts and that of the whole (2008: 102).

As such, “[t]he system ... is neither ‘form’, nor ‘content’, nor elements conceived in isolation, nor the whole itself, but all of these linked in and through the organization that transforms them” (2008: 107). Within any system, both the macro-structure and micro-structure of parts interact, mutually affecting each other, and permitting indefinite recombination, thus ensuring new entities and structures to emerge. Language, the brain, consciousness, and life, can be seen as emergent phenomena. It is through interactions at different magnitudes, which push a system beyond a threshold, that ontological emergence takes place, and it is this that defeats the possibilities of reductionism.²⁹ Emergence, says Morin, “implies a rootedness in what is non-reducible and non-deducible, in what in physical perception, resists our understanding and our rationalization” (Morin, 2008: 105). Because relations

and occurrences are contextual and contingent, it is not possible to predict macro properties from a knowledge of the micro and vice versa. It also defeats the possibilities of universal laws as constituting a sufficient explanation for events – context is all. In this systems paradigm, the dynamic and non-linear assert themselves alongside the static and linear, and non-equilibrium and equilibrium operate as both temporary and intermittent. Additive and linear models are now supplemented by non-additive, dynamic and non-linear ones. The ontological idea of a closed universe, an idea which came out of the Middle Ages, and which still characterized Hegel's thought, became replaced, as Alexander Koyré (1965, 1968) notes, by the conception of an open universe characterized by infinite possibilities, uncertainty, and chance.

Once understood thus, many of Green's insights, regarding his notion of "eternal self-consciousness," or "common good," can be adapted and revised to be given expression in terms of an ontology of purely material processes within a complexity perspective. Idealism is replaced by materialism as life and thought are seen as emergent from purely physical and chemical processes. Individuals are seen as constituted through social and historical processes in history. While language and discourse are necessary mediums through which all knowledge claims are made, this is not to say that they constitute the *prius* of all things in the sense that they constitute those things, or that they have greater reality than those things, or that they constitute the only reality. Indeed, to say that we can only know the world through discourse, is not to say that the world is not there independent of discourse. For discourse theorists, the matter of how knowledge is rendered reliable through language would work, not through introspection, digging further down into thought, or through transcendence, whereby minds can link with a unified spiritual intelligence (God), but by working outwards to the objects represented through discourses, language systems and minds, despite the difficulties. The methodological task would become how we can best legitimate our knowledge claims given the frequent and uncertain lack of synchronization between discursive and non-discursive, as well as the distorting relativities associated with social structures, discourses themselves, as well as through individual and collective "minds" in history. Although we are not intending to do justice to such a defense here, discourse theorists may have recourse to various forms of argument, of which the following two types strike us as potentially fruitful but of which neither would overcome the problems associated with uncertainty and relativism in any total sense. Firstly, both may presuppose transcendentally the necessary existence of the non-discursive objects of existence as a condition for our being able to think and know and survive and exist in the first place. Secondly, as with naturalists, positivists and empiricists, discourse theorists could conjecture that some sort of either reliable or unreliable knowledge accrues through the methodological triangulations of multiple forms of checking and testing in history.

From the perspective of political theory, and in terms of Green, complexity modeling of social structure not only provides for a new model of relational holism

which conceptualizes part-part and part-whole relations in a novel and dynamic way, but such a model enables a resolution to many of the problems Green inherits from Hegel. The ideal of “perfection,” supported as it is by an idealist ontology, can give way to a more empirically grounded concept of “sustainable development” and to “the continuation of life on fair and equitable terms.” The thesis on the “separateness of persons,” on which some criticize Green because he makes all rights depend upon social recognition, is overcome by a complexity understanding which although it subscribes to the social and historical construction of selfhood, defends individuality as emergent within the whole as a consequence of differential material processes occurring in space and time.³⁰ In the context of Prigogine’s understanding of space/time as real, individuation proceeds within the whole simultaneously with historical and social constitution. Every step forward subjects the individual to new and novel experiences which necessarily differentiates her from the group in an irreversible way, instant by instant. The configuration of possible pathways or bifurcations expands infinitely outwards from conception onwards. It is this model of “differential development” that assures the “separateness of persons” even within a social constructionist ontology of the formation of subjects. In this model, apart from the quest to survive, there is no teleology to history, no set end or ideal of perfection to which history tends, and no linear process or model of “self-realization” by which individuals develop.

Complexity can also theorize the common good in a way that side-steps Hegel. This is to represent it not as a metaphysical unity but solely as reflecting shared interests which need not deny individual or group differences. As all individuals are individuated within the whole through space/time development and unavoidable differentiation, they will also have unique individual characteristics and qualities. In this sense individuation is unavoidably emergent within the whole. The picture in politics and society is more akin to the model suggested by Hobhouse where the social tradition is not the product of one will or the state, but the product of diverse, innumerable wills, “acting sometimes in concert, sometimes in opposition to each other” (Hobhouse, 1918: 43). In that any political or social system must to some extent constitute a unity, in the sense that the orderliness of a system depends upon it, such a unity is constituted at the material limits necessary for survival as they impose themselves on life. The role of the state is but one institution involved in the tasks of government and is charged with managing potential threats and facilitating futures on behalf of citizens whose own interests everywhere are those of constraining disorder and managing uncertainty. Importantly, in this sense, the degree and extent of unity comes from without, not within. It is purely a response to contingent material circumstances. As there is no automatic progression, or necessary dialectical process, and as complex systems can lead anywhere (witness climate change), it is necessary that citizens elect a government to manage and organize on their behalf.

Ideas of the state and the common interest can also be *re*-theorized within complexity theory on this basis. The idea of the monolithic state gives way to a

conception of the governmental and is seen as one “subsidiarity” amongst others, ranging from the national to the global and involved in a cross-checking and overlapping multiplicity of powers representing divergent constituencies in both civil society and the global polis. This is essentially the conception that MacIver, noted above, maintained was already present in Green. As MacIver suggests in decidedly non-Hegelian terms, for Green, the state was quite distinct from civil society (see MacIver, 1926: 470–472). In that the state constitutes an association amongst associations, it is constrained by law, and subject to “definite limits, definite powers and responsibilities” (1926: 473). Unity in this view comes not from spiritual higher being but from constraints necessitated from the material world outside. Again, this is like MacIver’s view of Green: “The state does certainly stand for the unity of society, for that basis of order which reflects the common needs and the common nature of social beings” (1926: 477). Complexity justifies both negative and positive roles for the state: negative; to protect rights within a system; positive; to establish the general conditions for stability, sustainability and security of all. This entails attention to infrastructures, climate change, as well as issues such as health and education. The state represents common interests in so far as these are the shared concerns of citizens, and only on matters ratified by constitutions or by the democratic mandate of citizens.

Ultimately, what dictates common interests amongst peoples are the shared uncertainties and concerns faced within precarious and hostile environments which impact on everyone, indeed, on all of life. What is clear is that complexity constitutes an ontological program that supports a revised social-democratic model of a welfare state, increasingly, on a global basis. Hence, the project of social democracy need not go down by tying itself inseparably to Green’s creaky quasi-Hegelian ship. In an interconnected world, the collective manifests itself as a necessary dimension of personhood, which contemporary quantum and post-quantum complexity science, as well as poststructuralist political philosophy, now acknowledge.

If an ethic is necessary to steer the ship of state – and of course it is – it is purely and simply a constructed ethic to best ensure the continuance of life as mandated by life itself.³¹ Importantly it is not based in willing, or motives, or even from the will for its own sake, or a good will, but moves the explanation toward an obviously agreed goal of the survival and well-being of humanity on the logically tight maxim that the survival of all is a necessary precondition for the survival and well-being of each. That there exists an immanent impetus to survive and maintain well-being within limits sustainable for all appeals to the interests of all in a non-exclusive and non-competitive way. In this way, a common good also expresses the interests of all and thereby reconcile differences between one’s own good and that of others. In complexity terms, as people are interdependent, we can say that interests overlap, and the survival and well-being of one presupposes the survival and well-being of all. As crises surrounding population growth, nuclear proliferation, terrorism, security, or climate change, become more acute, this implication of interdependence becomes more acute. Continuance thus is both a practical ideal

and supports a moral ideal which treats all life forms as ends in themselves within a context of equality and democracy.

Continuance must be conceptualized as an unending process rather than an end in itself. Its value to ethics is that it offers a criterion that is independent of conventional usage, and while it rules some pathways out, will inevitably result in multiple lines and pathways of possibility. Duties and plans will be contingently calculated and fomented, as will the list of virtues to be esteemed. Because discourse is frequently out of synchronization with the real world, the calculus of continuance must always be provisional, tentative and revisable. While in this sense it dissents from offering a model of perfection for man, it offers instead rules for a sustainable future contextually adjusted to the possibilities and challenges of time and place in the present. To ask, either at an individual or societal level, as to which path or action best facilitates survival and being-well for all, provides a broad objective to be pursued, and, unlike Kant, a substantive moral and practical criterion which assists in distinguishing between good and evil and which leaves what cannot be resolved to democratic deliberation and adjudication. Continuance ethics thus constitutes a non-Hegelian and non-Kantian constructivist ethic for a global age.

Common interests and the imperatives of continuance also justify rights. As for Green, complexity theory constitutes rights as historical and defined by social recognition. They are tied to continuance, limited by continuance and justified by continuance. For this reason, they are limited rather than absolute; provisional rather than immutable. The state maintains rights, and rights such as liberty may well come into conflict with the imperatives of continuance which the state must uphold in the interests of all. Rather than freedom consisting in conformity to the state, however, conflicts between individuals, groups and the state must be mediated and resolved through publicly accessible democratic processes of law. These are necessary in that they assert and protect the integrity of each part within the whole. A socially maintained system of rights, including property rights, is essential for the development of human personality. This can include capitalism, if appropriately regulated, which can allow for the opportunities, the expression of liberty, to facilitate survival and well-being of each and all. While individual interests must respect the common good, unlike for Hegel, actions are not performed for the sake of goodness or perfection directed by an inner essence or telos. Rather “self-realization” as a “potential” directed toward an end gives way to a more modest conception of sustainable development which is publicly deliberated and mandated and which can incorporate a measure of liberty by which individuals and groups can pursue their own goals and purposes in their own way. Continuance in this sense occupies an enlarged harm principle which incorporates systems, policies and structures necessary for the good of all.

Because complexity gives us understandings about the unpredictable and interdependent nature of the world, politics and authority become the art, therefore, of complexity management. Intervention becomes necessary at times to solve common problems. As Neil Harrison notes, politics in this sense becomes conceptualized as

“the process by which the institutions governing collective behavior are organized” (2006: 188). More recently, a similar point has been reinforced by Ma who argues that theories of institutionalized politics are premised on complexity theory formulations of the world (Ma, 2007: 57–78). In this sense, from the point of view of politics, we must conceptualize the authority of the state as with forms of authority in general as normatively indispensable to a complexity approach, because, as Harrison puts it, “authority operates through formal and informal institutions. Informal institutions, like cultural practices, are shared meanings and emerge from agent interactions mediated through prior states of such institutions” (Harrison, 2006: 188). Complexity thus gives us a representation of the world which saves agency and choice, as well as accident and error, but which necessitates at the same time that it be managed in the interests of all.

Following from this, several additional but related insights regarding political management are generated. Because of uncertainty and the inability to predict accurately in open environments, politics can plausibly be represented *inter alia* as the art of managing the unexpected and of regulating boundary issues between individuals and groups in terms of their interaction. This would suggest a positive role for the state, an argument which is strengthened by the fallibility of humans and the limitations or difficulties associated with individual human reason in response to the complexity of environments. In that this is so, complexity mitigates against the individualism of the classical liberal tradition, for individuals are conceptualized as insufficient and dependent upon other people and upon the systems and structures of social and political support. Such an approach has enormous implications for an ethics of action in world affairs especially regarding issues such as conscience, moral responsibility and individual and group accountability in situations where prediction and control are elusive. Due to restrictions of space, our focus here, however, is confined mainly to the political and to the implications of complexity for social democracy in both national and global contexts. Because complexity places emphasis upon each individual’s insufficiency in the face of precarious and unpredictable environments, then the normative implication for politics suggests an institutional-regulative approach controlled through meaningful democratic processes. Of possible assistance here is the approach described in the late nineteenth and early twentieth century by the welfare state liberals, from Mill to Keynes, including Green, but also Hobhouse, Hobson, Ritchie, James Seth and many others which, as we face a precarious and uncertain future, might be profitably adapted, also, to new global contexts and conditions.

Conclusion

Our study reveals that in many senses Green understood the complex model of society and became increasingly critical of Hegel’s theology and his organicist model of society and the state. Although we have found that Green’s philosophical underpinnings are cross-cut with Hegelian ideas, it is our central argument in this

paper that the project of social democracy can be rearticulated in the light of complexity science, and most of Green's ethics and politics can be adapted accordingly. Complexity offers a way to rearticulate his philosophy to provide a more neutral model of society. There is a shift instantiated here, we might summarise, away from the tradition from Plato to Hegel, in terms of their concern with "Truth," to a renewed concern with "life" and its sustainability. If social democracy needs a political ethic in the absence of Hegel, it is perhaps simply a constructivist one of continuing life in terms of survival and well-being of life itself. While this will not solve all conflicts, or problems, it can, we believe, provide a general direction for the community and its governmental institutions to travel. It is in this model, because of complexity, that politics, institutionalisation and social democracy become *necessary*. Institutionalization, and a positive state, we can say, are a normative consequence of a complex world where the future is precarious, dangerous and uncertain. It is through such institutions, including the state, that complexity is managed and by which the present is channeled to the future. Not only can we justify social democracy on the basis of complexity, but it provides for an ontological framework that can subtend communitarian political models premised upon mutual interdependence and relational holism whilst allowing for uncertainty, unintended consequences, unpredictability, novelty, creativity, uniqueness, and allowing for the public goods of liberty, security and stability. While a much fuller account and justification may be called for, we have sought in this article to present a skeletal account for the purposes of demonstrating the feasibility of the project and its rich potential for normative political theory in general.

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Author Contributions

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

NOTES

1. These theories developed from the 1960s, with cybernetics, the 1970s, with catastrophe theory, the 1980s with chaos theory and developed from the 1990s with various forms of dynamical systems theory, incorporating insights from the earlier approaches. They included developments such as "complex adaptive systems" in Santa Fe, in America, and traversed developments in both quantum and post-quantum science and philosophy in

Europe, including the works of Werner Heisenberg, Erwin Schrödinger, and Neils Bohr. Later on, in the second half of the twentieth century, a complexity approach to science was advanced by Ilya Prigogine at the Solvay Institute for Physics and Chemistry, in Belgium, as well as characterizing the philosophical perspectives of writers like Gilles Deleuze, Michel Foucault, Alain Badiou, and others. A diverse array of complexity perspectives now occupies the field, including systems theories (Luhmann, Morin), and quantum (Barad, Wendt) and post-quantum (Prigogine) perspectives. For basic introductory accounts which encompass a range of positions, see Mitchell (2009), Érdi (2008), Hofstadter (1979, 1995, 2007), Holland (1992, 1998), Kauffman (1993, 1995, 2002, 2008), Lewin (1992), Maturana and Varela (1980), Nicolis and Prigogine (1989), Poincaré (1914), Poundstone (1984, 1992), Prigogine (1980, 1997, 2003), Simon (1962), Von Bertalanffy (1950, 1969), Von Neuman (1966), Wiener (1948). Our approach follows Prigogine closely.

2. Recent scholarship has tended to conclude that the influence of Hegel on Green has been significant although there are variations as to how much. Ben Wempe (2004) maintains that Hegel is central to Green's writings from very early on in his career, and that Green's whole project must be viewed as Hegelian. He bases his claim on a translation of the *Philosophische Propädeutik* which was found amongst Green's unpublished papers in the Balliol College Library (Wempe, 2004: 24). Peter Nicholson (1990, 1995) also maintains that Green was influenced by Hegel but adds: "that it is by no means clear how Hegelian Green is: and this is not a question Green would have thought important" (1995: 61). It is to Nicholson's view that we subscribe in that Green was also influenced by Kant and Aristotle. The influence of Hegel was nevertheless considerable and even when Hegel is not directly invoked, his thought frequently operates as a background influence on the development of Green's concepts (e.g., "self-realization," the "common good") as well as on his thought more generally.

3. This is the term that Avital Simhony uses to describe Green's holistic conception of society. See Simhony (1991): 515–535). The conception will be discussed further below.

4. See especially Anderson (1991), Leighton (2008), Morrow (1981), Tyler (2003).

5. Simhony (2001); Nicholson (1990); Harris and Morrow (1986).

6. Simhony (1993: 28–54; 2001, passim; 2003: 269–287).

7. In addition to the writers cited in the text, there is a significant additional recent literature on Green and Hegelianism, including works by Boucher (1997, 2000), Dimova-Cookson (2003), Leighton (2008, 2016), Mander (2013), Tyler (2003), Simhony (2001), Vincent (1986), and others, which differs on the exact degree of influence of Hegel on Green but in all cases maintains that there was considerable influence. Our argument concurs with this assessment, especially in relation to Green's writings on idealism, as well as on his ethics, politics and epistemology. We will seek to tease out the nuances of Green's dependence on Hegel further below.

8. The value presupposition which the authors accept is derived from poststructuralism, especially the work of Michel Foucault, and maintains that if Green's social-democratic formulations and concepts depend on Hegel and idealist philosophy for their very existence, then they are doomed. By showing that they do not depend on Hegel but are in fact justified by the changed nature of science itself, we aim to show that Green's social democratic insights are justified, and that more individualistic conceptions of liberalism, associated with Locke, for instance, discredited. Based upon the same postulate, idealism is seen as a bad and materialism and science are seen as legitimate modes of explanation.

9. Nicholson (1990: 25, 60, 62, 234n5, 236n5, 244n15, 341). Nicholson says that “Green’s interpretation of Kant, in particular, is very much Hegel’s interpretation” (1990: 62).

10. The influence of Hegel was particularly marked in his early writings but Wempe maintains continued throughout his mature period of scholarship, albeit without explicit reference in his mature works (see 2004: 13–14 especially). Wempe traces the influence back to Green’s unpublished lecture notes in the *Propädeutik*, initially intended as a textbook for philosophy teachers (see Wempe, 2004: 25–29).

11. Green’s article on Aristotle appears first in the *North British Review*, reproduced in *Works* (1894: 46).

12. See also sects: 153 and 186 for further illustrations.

13. Explicit mention of Hegel is notably absent in Green’s major works, such as the *Prolegomena* and the lectures on *Political Obligation*, where Hegel is not explicitly mentioned. Nettleship says that “while he regarded Hegel’s system as the ‘last word in philosophy,’ he did not occupy himself with the exposition of it, but with the reconsideration of the elements in Kant of which it was the development” (1906: lxxxv).

14. Prichard is cited by Nicholson (1990: 69) from “Duty and Interest,” written in 1929: 70–71, 124–5, republished Prichard (1968).

15. Hobhouse (1918: 24, 83, 99, 118–25).

16. See, for instance, Green (1986: sect. 141). Here Green says that an individual may have rights without being a member of a state at all. He says that the state does not create rights but that rights are derived from some other forms of social relation. For Green, forms of association like the “family,” “society” and “other forms of community” “precede and are independent of the formation of the state,” yet once the state is established, they constitute part of it. Hence, Green speaks of the “the state being for its members the society of societies” where “all ... claims ... are mutually adjusted,” asserting a view of the state consistent with MacIver’s representation.

17. See Gierke (1900); Maitland (2003).

18. Green cited in Nicholson (1990: 62, n51). Nicholson claims to cite Green from “Lectures on History and Moral Philosophy” (p. 104). He states (1990: 317) in a bibliographical note that the reference comes from one of F. H. Bradley’s notebooks (I A I) that Bradley made of Green’s lectures. These are located in Merton College, Oxford. Also see the Green, *Prolegomena to Ethics* where the same view is pervasive, especially sect. 247 where it is explicitly stated. Whether it is Hegel’s view is contentious.

19. Muirhead (1924b: 233–241; 1924c: 361–368).

20. This is the clearest expression of his view, repeated also in his other works.

21. This article, titled “Popular Philosophy in Relation to Life,” was published initially in the *North British Review* 48, 1868: 133–162. It is reprinted in Green (1894, vol. iii). We are indebted to Vincent’s comparative book review for alerting us to the pertinence of Wempe’s study. See Vincent, (2006: 487–508).

22. See Vincent (2006: 492).

23. Although Thomas claimed that Green did not use the concept of “social organicism,” Simhony observes, correctly, that Green uses the concepts of “organism,” “moral organism” and “social organism” in various places. See Thomas (1987: 258); Green (1986: sects. 123, 125–6, 154–5); Green (1894), and Green (1906: sect. 184). Notwithstanding these uses, Green uses the actual term “organism” rarely. He does, however, defend a form of relational holism of the sort we describe, adapted from Simhony’s model of relational

organicism in her article: “Idealist Organicism: Beyond Holism and Individualism” (see Simhony 1991).

24. We would claim that Nicholson (1990) supports our view. Robert Stern (2007: 115–153) also supports it. Green, says Stern (2007: 144–147) in comparison to Bradley and Bosanquet, “accepted a conception of the ‘concrete universal’ that is more properly Hegelian than any we have discussed so far.” Stern admits that Green’s use of Hegel was to enable him to resist Lockean empiricism, especially sensory experience, and that he also departed from a straightforwardly Platonic conception of universal as defining the class or form of particulars, preferring a view of abstraction that emphasizes the complex mutual interdependence of the universal and particulars, where the one exists in the many, and the many in the one. See Stern (2007: 144–9); and Kemp Smith (1927: 137–157 and especially 144–145) for further treatment of this point.

25. The phrase “quiet revolution” is drawn from a description by Stuart Kauffman (2008: Preface). Although a range of new complexity approaches are now on offer, it is not possible to compare, or defend, different complexity ontologies or concepts, such as emergence, from its detractors in the context of this article. Although there are notable differences between approaches, what unites the range of quantum and post-quantum approaches on offer are a range of common implications for politics and social ontology and an attempt to unify physical and social ontologies. The approach in this article, thus, must necessarily be schematic.

26. Prigogine (1980, 1997); Prigogine, and Stengers (1984); Davies (1989); Brockman (2014); Krauss (2014) Smolin (2013); Barad (2007); Wendt (2015). The post-quantum complexity theory of Ilya Prigogine et al. has been especially significant in our writing of this article. The recent revival of quantum approaches (Wendt, 2015) reinstates forms of vitalism and panspsychism which, while contentious, cannot be debated in the context of this article.

27. Both quantum and post-quantum approaches see phenomena are irreducibly holistic. As Wendt (2015: 62) notes, although there is a lot of debate as to how holism is to be understood, some form of holism seems essential, necessitated by our social constitution, because “our entanglement from birth in social structures, human minds are not fully separable” (2015: 33). “Non-separability refers to the fact that the states of quantum systems can only be defined in relation to a larger whole” (2015: 33). The entanglement of quantum entities produces new emergent realities not predictable from their constituent parts. One way of representing this in terms of the language of quantum theory is to say that every quantum entity has a wavelike and a particlelike aspect, where the wavelike aspect is indeterminate. There is no attempt, as in Hegel, to see the interconnectedness as expressing any form of mystical unity (see Hegel, 1977, Preface especially).

28. Nicholson (1990); Muirhead (1928: 82–87; 1924a: 166–175; 1924b: 233–241; 1924c: 361–368).

29. Kauffman (2008, chap. 3–5) cites a “quiet rebellion” within science against adherence to reductionism. He notes various Nobel Laureates, such as Philip W. Anderson (1972), Robert Laughlan (2005), and Leonard Susskind (2006) who argue for emergentism and against reduction to physical laws to explain life processes, or forms of social organization.

30. As noted above, note 3, Prichard criticizes Green on the issue of the “separateness of persons” which he sees as a central issue of morals. MacIver also suggests it (1926: 470, fn. 1). Nicholson defends Green, however (1990: 68–70; also see 85–87). Also see Carritt (1935); Plamenatz, (1968); Williams (1985).

31. See Olssen (2009, 2010).

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Implementing Digital Vaccine Passports to Control the Spread of COVID-19: Law, Rights, and Ethics

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ABSTRACT. Employing recent research results covering the implementation of digital vaccine passports to control the spread of COVID-19, and building our argument by drawing on data collected from Access Now, Becker, CNN, and Royal Society, we performed analyses and made estimates regarding the ethical and legal acceptability of COVID-19 vaccine passports. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

Keywords: COVID-19; digital vaccine passport; law; rights; ethics

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1. Introduction

COVID-19 vaccine passports may assist in discontinuing additional health and socioeconomic detriments brought about by lockdowns, consequently providing distinct and shared health, economic, and social upsides. (Osama et al., 2021) COVID-19 immunity passports are digital or physical documents confirming that a person has been infected and is presumably immune to SARS-CoV-2. People owning a digital vaccine certificate may be exempt from physical limitations and may resume their daily life. (Phelan, 2020) Even though travel eligibility represents the main concern currently, certain use of COVID-19 vaccine passports to control access to social and recreational raves, places of business, and schools is expected. (Hall and Studdert, 2021)

2. Conceptual Framework and Literature Review

Any COVID-19-related documentation that restricts individual freedoms in conformity with biology may emerge as a platform for limiting human rights, intensifying unfair preference and undermining public health. (Kofler and Baylis, 2020) The ethical acceptability of COVID-19 vaccine passports calls into play its uses and policy goals and the procedures established to diminish imaginable harms and discontinue unbalanced challenges on non-certified persons and infringement of individual liberties and rights. (Voo et al., 2021) The introduction of COVID-19 immunity passports may gradually destroy civil liberties as such societal unfairnesses may escalate if effective vaccines are not accessible on a large scale. (Liew and Flaherty, 2021) Governments should take into account all the ethical aspects when making decisions as regards COVID-19 vaccine mandates or passports for gatherings, employment, travel, etc. (Forman et al., 2021) COVID-19-related public health limitations that restrict freedoms and socially relevant undertakings should be adjusted to incontestable risk, especially when the restrictions are tough, wide-ranging public sentiment requires certain loosening, or easing the restrictions would assist traceable persons. (Hall and Studdert, 2021) Individual-targeted schemes derived from antibody testing (e.g., COVID-19 immunity passports) are nonviable considering existing discrepancies in knowledge and technical impediments, while generating relevant nondiscriminatory and legal concerns, even if such obstacles are amended. (Phelan, 2020) If COVID-19 immunity passports are introduced, the vaccine might be perceived as compulsory, as individuals who will not be vaccinated are likely to have their freedom to travel restricted. (Schlagenhauf et al., 2021)

3. Methodology and Empirical Analysis

Building our argument by drawing on data collected from Access Now, Becker, CNN, and Royal Society, we performed analyses and made estimates regarding the ethical and legal acceptability of COVID-19 vaccine passports. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

4. Survey Methods and Materials

The interviews were conducted online and data were weighted by five variables (age, race/ethnicity, gender, education, and geographic region) using the Census Bureau's American Community Survey to reflect reliably and accurately the demographic composition of the United States. Any survey which did not reach greater than 50% completion was removed from subsequent analysis to ensure quality. The data was weighted in a multistep process that accounts for multiple stages of sampling and nonresponse that occur at different points in the survey process. Test data was populated and analyzed in SPSS to ensure the logic and randomizations were

working as intended before launching the survey. To ensure high-quality data, data quality checks were performed to identify any respondents showing clear patterns of satisficing. The cumulative response rate accounting for nonresponse to the recruitment surveys and attrition is 2.5%. The break-off rate among individuals who logged onto the survey and completed at least one item is 0.2%. Sampling errors and test of statistical significance take into account the effect of weighting. Question wording and practical difficulties in conducting surveys can also introduce error or bias into the findings of opinion polls. The sample weighting was accomplished using an iterative proportional fitting process that simultaneously balanced the distributions of all variables. Stratified sampling methods were used and weights were trimmed not to exceed 3. Average margins of error, at the 95% confidence level, are +/-2%. The design effect for the survey was 1.3. For tabulation purposes, percentage points are rounded to the nearest whole number. The precision of the online polls was measured using a Bayesian credibility interval. Confirmatory factor analysis was employed to test for the reliability and validity of measurement instruments. Descriptive statistical analysis and multivariate inferential tests were undertaken for the survey responses and for the purpose of variable reduction in regression modeling. Multivariate analyses, and not univariate associations with outcomes, are more likely to factor out confounding covariates and more precisely determine the relative significance of individual variables. Independent *t*-tests for continuous variables or chi-square tests for categorical variables were employed. An Internet-based survey software program was utilized for the delivery and collection of responses. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. An informed e-consent was obtained from individual participants. Study participants were informed clearly about their freedom to opt out of the study at any point of time without providing justification for doing so.

5. Results and Discussion

Governments may introduce COVID-19 immunity passports, issued to individuals who have recuperated and tested positive for antibodies to SARS-CoV-2, aiming to overturn the economic failure generated by the current pandemic. (Kofler and Baylis, 2020) COVID-19 vaccine passports would seemingly be digital and necessitate access to private medical records, and thus emerge relevant issues as regards internet access, expenses of coming into possession of and maintaining the passports, in addition to addressing privacy and data protection. (Osama et al., 2021) The adoption of immunity certification is debatable due to unpredictability concerning whether extended immunity really operates for persons who have recovered from COVID-19 and issues regarding the consistency of the advocated serological test approach for detecting immunity. (Voo et al., 2021) (Tables 1–4)

Table 1 The impact of COVID-19 digital vaccination certificates on human rights (relevance, %)

Proposals for digital vaccine certificates aim to digitally link the vaccination status of an individual with a government-provided digital identity or to create a separate digital identity framework for recording and authenticating a person’s vaccination status.	92
As people around the world get vaccinated and as their vaccination status gets linked to digital identities associated with them, governments and private organizations may allow or disallow access to services and spaces on the basis of an individual’s COVID-19 vaccination status, excluding and discriminating against those who have not received a vaccine.	91
Beyond a certificate serving as proof of a person’s vaccination status, it also contributes to distributing agencies’ ability to document progress, avoid duplicate vaccinations, and facilitate proper administration of multi-dose vaccines.	90
It is not clear that existing infrastructure for vaccine certification is insufficient for the needs related to distributing and verifying recipients of COVID-19 vaccines, nor that digital certificates would necessarily add value from a public health perspective.	89
We do not know which countries will recognize various vaccines, the impact of new COVID-19 variants, the efficacy of vaccination in reducing transmission, how long a vaccine will be effective, etc. This is not a stable foundation upon which to build digital infrastructure.	88
Policymakers should prioritize protecting the rights and needs of people who are most vulnerable in any plans for vaccine distribution and certification, in particular when a demand to certify vaccination would impact people’s access to fundamental rights and freedoms.	88
Marginalized and vulnerable populations (the poor, the stateless, migrants, and refugees, among others) will likely be among the last to receive vaccinations, if they are able to get them at all. Even individuals in communities with easy access to the vaccine may not be able to get it due to medical conditions or other restrictions public health authorities put in place.	87
Making these COVID-19 digital vaccination certificates mandatory for travel would have severe consequences for individuals crossing borders out of necessity, such as refugees, migrants, and people who travel to get specialized medical care, and would systematically disadvantage everyone around the world living in countries with limited access to COVID-19 vaccines.	87
Denying or granting access to services and spaces domestically may impact people’s ability to access essential services, pursue their livelihood, and participate in civic life. People who have a health condition or cannot be vaccinated due to other restrictions imposed by health authorities will likely face exclusion, along with those who are unable to access the internet or an internet-connected device. Unless there are clear safeguards to prevent it, use of digital vaccine certificates may interfere with the freedom of peaceful assembly and association, and could block essential movement for social, racial, economic, and environmental justice.	86
Digital vaccine certificates should not become a barrier to public health objectives or lead to discriminatory outcomes for people who are not connected	86

or are deliberately disconnected from the internet.	
Most digital vaccine certificates currently under consideration would significantly expand the amount of data collected about a person’s vaccination status, as well as generating ongoing new data about, for example, when and where the person has used the certificate, opening the door to both mistakes and abuses that impact people’s privacy, and creating a valuable target for cyber attacks. Information from these certificates could be copied to create fraudulent documents if security standards are not robust enough. A digital vaccine certificate may be integrated into a centralized digital identity system or serve as the basis for a new health identity infrastructure.	86
Proposals for digital vaccine certificates have either a weak or outdated data protection framework, or none at all. Approaches using centralized storage of information (especially without adequate checks and balances for sharing of data within and between governments) can create mammoth yet fragile systems that put both individuals’ privacy and data security at risk.	85
Governments should not use COVID-19 as an excuse to expand mass or targeted surveillance practices. No one should have to compromise their fundamental right to privacy in order to maintain access to essential services or freedom of movement.	85
The COVID-19 vaccination drive should not be used to entrench or further advance dangerous centralized digital identity systems, nor to create new health identity systems.	84
Data regarding a person’s vaccination status, or any additional data generated by a digital vaccine certificate (such as the locations a person has shown proof of vaccination), should not be weaponized against them.	84
A person’s agency to give consent is severely compromised if a COVID-19 digital vaccine certificate (either on its own or integrated into a centralized digital identity system) is the easiest way to get a vaccine or to be allowed to fully participate in daily life.	84

Sources: Access Now; our survey among 4,700 individuals conducted January 2021.

A false-positive outcome may result in persons altering their behavior while still being at risk of COVID-19 infection, plausibly becoming infected, and unintentionally transmitting such a contagious virus to other individuals. (Phelan, 2020) COVID-19 vaccine passports constitute certifications of vaccination that decrease public health constraints for their bearers. (Hall and Studdert, 2021) Ethical concerns as regards of various limitations on individual liberties and its adoption mechanisms (Androniceanu, 2021; Lăzăroiu et al., 2017; Mihăilă, 2017; Popescu Ljungholm and Olah, 2020) are associated with issuing immunity certification to relieve certain people from restrictive measures throughout the COVID-19 crisis. (Voo et al., 2021) Authorities would lift limitations on persons who are assumed to have COVID-19 immunity, allowing them to go back to work, to interact, and to move over long distances. (Kofler and Baylis, 2020) COVID-19 immunity passports may bring about unreasonable incentives (e.g., nonimmune people may expose themselves to infection premeditatedly). (Liew and Flaherty, 2021)

Table 2 A COVID-19 vaccination certificate is an imperfect passporting tool (relevance, %)

To place greater confidence in vaccine certification, more information is needed about: the efficacy of vaccines in preventing infection and transmission by the currently circulating viruses, including genetic variants, and duration of protective immunity (both to illness and infectiousness) to determine frequency of vaccine passport renewal.	92
The uses of vaccine passports need to be clearly defined as they carry the risk that they could be used to discriminate in hiring or access to restaurants, health care centers, sporting or cultural events, insurance companies, or housing applications or other services.	90
Core ethical concerns require scrutiny including: testing whether vaccine passports are inclusive, have clearly defined uses and minimum data collection, appropriate sharing and who gains access to the information; where and how vaccine certification will be linked to other types of data; and avoidance of discrimination and exacerbating existing inequalities (e.g., vaccine hesitancy in certain groups, pregnant women, differential roll-out or access, digital divide).	89
Individuals should understand the utility of vaccine passports and monitor public acceptance and experiences. Unintended behavioral responses and resistance could arise if uses are not transparent, making it essential to monitor impacts on vaccine hesitancy, trust, incentives and responses and in communication strategies.	88
An ideal passporting test will have high predictive value, i.e., those who test positive or negative will be correctly identified. If the intention of the test is to certify that a person is immune to COVID-19 (protected from illness), then a positive test result should guarantee that immunity. Such a test should also be sensitive, i.e. it would include all subjects who are immune.	87
Vaccination, rather than antibody testing, is most likely to satisfy the requirements of a passport with regard to protection from illness, but not necessarily protection from infectiousness.	86
To place greater confidence in vaccine certification, more information is needed about (1) vaccine efficacy, particularly with regard to preventing infectiousness and SARS-CoV-2 transmission, including protection against genetic variants, and (2) the duration of protective immunity (both to illness and to becoming infectious) to determine how frequently a vaccine passport would have to be renewed.	86
The rate at which immunity wanes, and the rate at which SARS-CoV-2 escape mutants emerge, will influence the types of vaccine that can be used and certified in any locality, and the how often vaccination certificates would need to be renewed.	85
The introduction of vaccine and any digital health passports raise multiple legal questions across a spectrum of human rights, data privacy, domestic, equality, COVID-19 and labor laws.	85
As the virus, variants, and vaccines may change, the certification system needs to have in-built resilience to allow for multiple vaccines, duration of immunity, different responses to variants and efficacy levels.	84
Verification needs to be possible on and offline, be portable within and across borders, with common global standards, determination of who accesses	84

immunization records, and be able to confirm that data is accurate and not falsified.	
Clarity on how and where the vaccine passport will be used such as travel, work, leisure activities, medical or employment.	83

Sources: Royal Society; our survey among 4,700 individuals conducted January 2021.

Table 3 The use of COVID-19 vaccine passports, or proof of COVID-19 vaccination, may affect health privacy protections (relevance, %)

Vaccine passports should be required to receive public services or access facilities.	89
A vaccination app would be useful but should not be mandatory to enter any event or facilities	88
Businesses should require passports of customers to prove they have been vaccinated against COVID-19.	86
Any vaccine passport initiatives will violate freedom of movement and healthcare privacy.	84

Sources: Becker; our survey among 4,700 individuals conducted January 2021.

Table 4 Do individuals vaccinated against COVID-19 need proof of immunization in the form of a vaccine passport? (relevance, %)

A vaccine passport could reward people for getting vaccinated by allowing them into a crowded concert or ballgame, and offer them peace of mind that the person next to them has been immunized too, thus helping to make crowded places safer.	89
Individuals will obtain an encrypted digital copy of their immunization credentials to store in a digital wallet of their choice	88
People who want to travel abroad may be required to have a vaccine passport to enter certain countries, or it may help them avoid quarantine once they arrive.	87
Some use of passports to regulate access to social and recreational gatherings, workplaces, or schools is imminent.	86

Sources: CNN; our survey among 4,700 individuals conducted January 2021.

Individuals from states that cannot implement COVID-19 immunity passport schemes may be declined entry those countries that mandate them. (Liew and Flaherty, 2021) If COVID-19 vaccine passports are implemented, specifications for person who cannot be immunized on diverse grounds should be stipulated. (Forman et al., 2021) Because vaccination for COVID-19 will not be mandatory in nearly all states, an upside such as the prospect of travelling may stimulate individuals to get vaccinated. (Raus et al., 2021) COVID-19 immunity passports may configure promising social (Bratu, 2020; Lăzăroiu, 2017; Mihăilă and Martin, 2020; Popescu Ljungholm, 2020), political, and economic (Davidson, 2020; Lăzăroiu et al., 2020; Pelau et al., 2021; Scott et al., 2020) reverberations, particularly for marginalized communities. (Liz, 2021) COVID-19 vaccination passports will not lead to the discontinuing of mask wearing and physical distancing recommendations during flights. (Schlagenhauf et al., 2021)

6. Conclusions and Implications

COVID-19 antibody certificates do not bring about additional groundless discriminations (Hyers, 2020; Lăzăroiu et al., 2021; Platt, 2021; Tucker, 2021) or exacerbate current inequalities. (Raus et al., 2021) COVID-19-related immunoprivilege constitutes a grave and immediate threat to marginalized communities. (Liz, 2021) Governments will have to vaccinate a large proportion of their populations swiftly to take forward the present pandemic and will have to preserve high rates of immunization against COVID-19 subsequently. (Forman et al., 2021) If individuals are immune to COVID-19 and represent no risk to others, they should have their liberties restored just as they do not affect the greater good (Jiménez, 2020; Lyons and Lăzăroiu, 2020; Pop et al., 2021) and thus people are assented to play a part in the common good. (Brown et al., 2021) As limitations, this article focuses only on the implementation of digital vaccine passports to control the spread of COVID-19. Further research should consider whether COVID-19 vaccine passports should be banned.

Compliance with ethical standards

Animal studies statement verification

This article does not require animal studies verification.

Identifiable images and data statement verification

This article does not require identifiable images and data statement verification.

Code availability

This project has employed statistical analytical techniques standard in all statistical packages.

Data and materials availability

All research mentioned has been published and data is available from respective outlets. The statistics that support the findings of this study can be found in the supplementary material of this article. Note: The publisher is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing content) should be directed to the corresponding author for the article.

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Author contributions

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

Conflict of interest statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Ethical Management and Implementation of COVID-19 Immunity Passports and Vaccination Certificates: Lawfulness, Fairness, and Transparency

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ABSTRACT. This paper analyzes the outcomes of an exploratory review of the current research on the ethical management and implementation of COVID-19 immunity passports and vaccination certificates. The data used for this study was obtained and replicated from previous research conducted by Ada Lovelace Institute, Ipsos, SchengenVisaInfo.com, The Serco Institute, Survation, and Verywell. We performed analyses and made estimates regarding whether COVID-19 immunity passports would risk exacerbating discrimination in law. Data collected from 4,800 respondents are tested against the research model. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

Keywords: COVID-19; immunity passport; vaccination certificate; ethics; law

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1. Introduction

While the intrinsic worth of COVID-19 vaccine passports may be unquestionable, implementation will necessitate ethical rationales and practical ways out that do not separate out the underprivileged, the less technically knowledgeable, and individuals from low- and middle-income economies. Without COVID-19-related mitigation schemes and complementary solutions, the discomforts endured by marginalized and ill-protected communities (Cunningham, 2021; Lăzăroiu, 2017; Nelson, 2020; Popescu et al., 2020) will be aggravated by the continuation of discrimination. (Osama et al., 2021) COVID-19 immunity passports may moderate the responsibility on governments to implement strategies that support economic, housing, and health rights throughout society by supplying a perceived swift solution. (Phelan, 2020)

2. Conceptual Framework and Literature Review

The relevance of the COVID-19 immunity certificate furthers the seeking of already immune individuals. (Eichenberger et al., 2020) The social and political consequences of a large-scale COVID-19 immunity certificate scheme would have a determinate sustainability. (Greely, 2020) COVID-19 vaccination passports are related to equity concerns taking into consideration large-scale restrictions to vaccine access, leading to imminent intensification of discrimination. (Schlagenhauf et al., 2021) It would be overhasty and quite improbable to implement an official government strategy demanding broad use of COVID-19 vaccine passports. (Hall and Studdert, 2021) As poor economies are in the throes of the repercussions of the COVID-19 pandemic, an unbiased extensive distribution of vaccinations will not become concrete shortly. (Voigt et al., 2021)

3. Methodology and Empirical Analysis

The data used for this study was obtained and replicated from previous research conducted by Ada Lovelace Institute, Ipsos, SchengenVisaInfo.com, The Serco Institute, Survation, and Verywell. We performed analyses and made estimates regarding whether COVID-19 immunity passports would risk exacerbating discrimination in law. Data collected from 4,800 respondents are tested against the research model. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

4. Survey Methods and Materials

The interviews were conducted online and data were weighted by five variables (age, race/ethnicity, gender, education, and geographic region) using the Census Bureau's American Community Survey to reflect reliably and accurately the demographic composition of the United States. Any survey which did not reach greater than 50%

completion was removed from subsequent analysis to ensure quality. The data was weighted in a multistep process that accounts for multiple stages of sampling and nonresponse that occur at different points in the survey process. Test data was populated and analyzed in SPSS to ensure the logic and randomizations were working as intended before launching the survey. To ensure high-quality data, data quality checks were performed to identify any respondents showing clear patterns of satisficing. The cumulative response rate accounting for nonresponse to the recruitment surveys and attrition is 2.5%. The break-off rate among individuals who logged onto the survey and completed at least one item is 0.2%. Sampling errors and test of statistical significance take into account the effect of weighting. Question wording and practical difficulties in conducting surveys can also introduce error or bias into the findings of opinion polls. The sample weighting was accomplished using an iterative proportional fitting process that simultaneously balanced the distributions of all variables. Stratified sampling methods were used and weights were trimmed not to exceed 3. Average margins of error, at the 95% confidence level, are $\pm 2\%$. The design effect for the survey was 1.3. For tabulation purposes, percentage points are rounded to the nearest whole number. The precision of the online polls was measured using a Bayesian credibility interval. Confirmatory factor analysis was employed to test for the reliability and validity of measurement instruments. Descriptive statistical analysis and multivariate inferential tests were undertaken for the survey responses and for the purpose of variable reduction in regression modeling. Multivariate analyses, and not univariate associations with outcomes, are more likely to factor out confounding covariates and more precisely determine the relative significance of individual variables. Independent *t*-tests for continuous variables or chi-square tests for categorical variables were employed. An Internet-based survey software program was utilized for the delivery and collection of responses. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. An informed e-consent was obtained from individual participants. Study participants were informed clearly about their freedom to opt out of the study at any point of time without providing justification for doing so.

5. Results and Discussion

The degree of protection attributed by vaccination, especially against new COVID-19 variants, is not comprehensible, nor is the likelihood for viral transmission by individuals who have been vaccinated. Showing partiality towards the vaccinated will unfairly disadvantage persons having religious or philosophical disagreements to vaccination. A consonant proposal to rigorously certifying vaccination is needed. (Hall and Studdert, 2021) COVID-19 immunity passports may bring about corruption (Krizanova et al., 2019; Lyons and Lăzăroiu, 2020; Nica, 2018; Russell, 2020) and inferred discrimination. (Phelan, 2020) (Tables 1–8)

Table 1 Do you think those eligible for a COVID-19 vaccine should have to prove that they've been vaccinated before doing the following activities? (yes, %)

Travel internationally	69
Go to a school	56
Attend a concert/sporting event	55
Go into their office/workplace	55
Travel between states	53
Sit indoors at a restaurant/bar	46
Attend religious service/church	43
Shop indoors	39

Sources: Verywell; our survey among 4,800 individuals conducted January 2021.

Table 2 Entry bans and other travel restrictions as quarantine, testing, and COVID-19 vaccine certificates have mostly affected couples and families

96%	would consider travelling as soon as the travel restrictions are lifted.
88%	claim they desperately need to take a trip outside their country.
76%	claim that the first trip they would take once the borders reopen would be to visit family members and friends.
57%	believe that despite the spread of the virus and its mutation, it is not very risky to travel abroad right now.
30%	believe they will be able to travel outside their country this year.
74%	agree that couples have suffered most as a result of these measures.
66%	believe that the most effective form of preventing the spread of COVID-19 when travelling is by obliging travellers to test upon arrival.
63%	think COVID-19 vaccination should become obligatory for travel.
84%	are familiar with vaccination certificates.

Sources: SchengenVisaInfo.com; our survey among 4,800 individuals conducted January 2021.

Table 3 Views on limiting activities involving large groups of people only to those who have been vaccinated

57%	say only people who have been vaccinated should be allowed to do things that involve larger groups of people – public transit, flying, attending cultural/sports events.
43%	say that limiting activities only to those who have been vaccinated is unfair to those who are ineligible, are waiting for a vaccine or choose not to be vaccinated.

Sources: Ipsos; our survey among 4,800 individuals conducted January 2021.

Table 4 Support for COVID-19 vaccine passports to allow social gatherings (yes, %)

Seeing friends and family is such a core tenet of life that citizens should not need a vaccine passport to do so?	22
Why bother when one can engage in social gatherings without going through the rigmarole of obtaining a vaccine passport?	26
Would (like during the current national lockdowns) we expect the police and the general public to ensure that social gatherings are not taking place in people's homes without the proper vaccine passports?	34

Sources: The Serco Institute; Survation; our survey among 4,800 individuals conducted January 2021.

Table 5 Before progressing further with plans for COVID-19 vaccine passports, governments and public health experts should... (relevance, %)

set scientific pre-conditions, including the level of reduced transmission from vaccination that would be acceptable to permit their use; and acceptable testing regimes (accuracy levels and timeline).	86
model and test behavioral impacts of different passport schemes (e.g., in combination or in place of social distancing). This should examine any “side effects” of certification (such as a false sense of security, or impacts on vaccine hesitancy), as well as responses to changing conditions (for example, vaccines’ efficacy against new mutations).	84
compare vaccine passport schemes to other public health measures in terms of necessity, benefits, risks and costs, or alternatives – e.g., offering different guidance to vaccinated and non-vaccinated populations without requiring certification; investing in public health measures; or greater incentives to test and self-isolate.	82
develop and test public communications about what certification should be understood to mean in terms of uncertainty and risk.	79
outline the permitted pathways for calculating what constitutes “lower risk” individuals, to build into any passport scheme, including: vaccine type; vaccination schedule (gaps between doses); test types (at home or professionally administered); natural immunity/antibody protection; and duration of reduced risk following vaccination, testing and infection.	78
outline public health infrastructure requirements for successful use of a passport scheme, which might include access to vaccine, vaccination rate, access to tests, testing accuracy, or testing turnaround.	77

Sources: Ada Lovelace Institute; our survey among 4,800 individuals conducted January 2021.

Table 6 A COVID-19 vaccine, certificate or passport should only be required... (%)

for a few months.	33
until at least the end of the year.	34
for the next several years.	25
Indefinitely.	8

Sources: Ipsos; our survey among 4,800 individuals conducted January 2021.

COVID-19 testing and vaccination status certificates may address coherently freedoms of movement and commerce (Bratu, 2021; Lambovska et al., 2021; Mihăilă et al., 2016; Pop et al., 2021; Walker et al., 2020), while possibly configuring a subcategory of uncertified individuals working illegally and being poorly paid with no benefits, thus exacerbating inequalities and systemic issues. (Spisak and McNulty, 2021) COVID-19 immunity passports may exacerbate discrimination in law and subvert the right to health of persons and affected communities by the unconventionally generated incentives. (Phelan, 2020) The large-scale aim of COVID-19 immunity passports is to impose limits on movement: any scheme for immunity certification should encompass a recognition and monitoring system. (Kofler and Baylis, 2020)

Table 7 Whether and how to implement digital vaccine passports to control the spread of COVID-19 (relevance, %)

COVID status certification schemes or vaccine passports would allow differential access to venues and services on the basis of verified health information relating to an individual’s COVID-19 risk, and would be used to control the spread of COVID-19.	92
Vaccine passports are part of extensive societal systems, like a public-health system that includes test, trace and isolate services, behavioral guidance on mask wearing and social distancing, or a wider biometrics and digital ID ecosystem.	90
The approval and roll-out of effective vaccines re-energized the idea of restoring personal freedoms and societal mobility based on COVID-19 vaccine passports.	88
Those who are certified as unable to transmit the virus are allowed to take part in activities that would normally present a risk of transmission. Being able to take part in such activities, see family and friends and visit hospitality and entertainment venues will have a positive effect on wellbeing and mental health.	87
The use of certification to provide those who have been vaccinated with greater access to society could incentivize vaccination among those who are able to be safely immunized.	86
Enhancing the freedoms of those who have a passport to do things that would otherwise be restricted due to COVID-19 (always noting that granting permissions for some will, in relative terms, increase the loss of liberty experienced by others).	87
Supporting industries struggling in lockdown (and the wider economy) by enabling phased opening, for example in entertainment, leisure and hospitality.	89
A passport scheme will allow people to travel for business and pleasure, with economic benefits (particularly for the tourism industry) and social advantages (reuniting families or holidays).	91
Any COVID-19 status certificate or “vaccine passport” allows stratification of people by COVID-19 risk and therefore allows a more fine-grained approach to preserving public health, keeping the community safer with fewer restrictions.	87
Vaccine passports allow only those who pose an acceptably lower risk to others to take part in activities that would normally present a risk of transmission	86
Different vaccines have different levels of efficacy when it comes to protecting both the person receiving the vaccination and anyone they come into contact with. This is partly due to vaccines having different levels of effectiveness, based on differently underlying technologies.	83
Any vaccine passport system would need to be dynamic, taking into account the differing efficacy of various vaccines, known differences in efficacy against certain variants and the change in efficacy over time, as well as representing the effect of the vaccine on the individual carrying a vaccine passport.	86
There may be a danger in seeing COVID-19 vaccine passports as a silver bullet returning us quickly to normality, with passports suggesting false binaries (yes/no, safe/unsafe, can access/cannot access) and false certainty, at a time when governments need to be communicating uncertainty with humility and encouraging the public to consider evidence-based risk.	84
While vaccine passports could make people more confident in some areas, e.g., by providing reassurance to vulnerable people who have been	83

isolating, it could also slow down the return to normality by suggesting to some that their fellow citizens are a permanent threat.	
Vaccine passport schemes could undermine public health by treating a collective problem as an individual one.	82
COVID-19 vaccine passport schemes bring political, financial and human capital costs that must be weighed against any benefits, crowding out more important policies to reopen society more quickly for everyone, such as vaccine roll-out, test, trace and isolate schemes, and other public health measures.	81
Governments should have a better understanding of vaccine efficacy and transmission, durability and generalizability, and evidence that use of vaccine passports would lead to reduced transmission risk by vaccinated people and low “side effects.”	80
Whether governments choose to issue some kind of COVID-19 status certification, sanction private companies to do so or ban discrimination on the basis of certification altogether, individuals will make judgments based on the health information underlying potential schemes in informal settings such as gathering with friends or dating.	79

Sources: Ada Lovelace Institute; our survey among 4,800 individuals conducted January 2021.

Table 8 COVID-19 vaccine passports could be a shot in the arm for the hospitality sector, but there are questions of implementation and resource. (yes, %)

Might appetite amongst pub, restaurant, and café owners be dimmed having already spent significant sums during the preceding year to make premises COVID-19 secure?	76
Would the costs associated with vaccine passports, such as technology and additional staff training, put them off?	74
Or, if vaccine passports were at the discretion of hospitality owners, would any bother enforcing them if that immediately cancels out a meaningful proportion of their potential clientele, i.e., those without the passports, who in the first instance might be younger people?	72

Sources: The Serco Institute; Survation; our survey among 4,800 individuals conducted January 2021.

Electronic certification incorporated into a smartphone app should be proof against fraud, and adequate for contact tracing, retesting, and modifications of COVID-19 immune status. (Kofler and Baylis, 2020) The upsides of COVID-19 vaccine passports should not be distributed unjustifiably, and all countries should make a concerted effort (Dawson and Potcovaru, 2020; Lăzăroiu et al., 2020; Nica, 2017; Riley et al., 2021) to ensure there is full availability. (Osama et al., 2021) By reproducing current discriminations (Carter et al., 2021; Lăzăroiu et al., 2017; Mitchell, 2021; Popescu, 2017; Wallin and Sandlin, 2020), the use of COVID-19 immunity passports may intensify the harm imposed by COVID-19 on already ill-protected communities. (Phelan, 2020) People with immunity require a tried and tested COVID-19 certificate, associated with having antibodies or having passed through the illness, and that substantiates the relevance of the resource. (Eichenberger et al., 2020)

6. Conclusions and Implications

While vaccine supply is still insufficient, treating with partiality individuals who are gained immediate access is morally debatable. Even after supply impediments become loose, degrees of vaccination among racial groups and underprivileged communities may maintain unreasonably low. Schemes granting social advantages in conformity with state of health may result in inequitable COVID-19-related discrimination. (Hall and Studdert, 2021) Labeling individuals according to their COVID-19 status may demarcate the immunoprivileged from the immunodeprived. (Kofler and Baylis, 2020) As there is no large-scale access to the vaccine yet, restricting individual freedom in keeping with vaccine access would do a disservice to less developed countries and minority communities where vaccine distribution may lack in speed. (Schlagenhauf et al., 2021) Current socioeconomic, racial, and ethnic imbalances may be indicated by the administration of COVID-19 certification, regulating who can access antibody testing or be favorably positioned in the queue for certification, in addition to the difficulties of the application process. (Phelan, 2020) As limitations, this article focuses only on the ethical management and implementation of COVID-19 immunity passports and vaccination certificates. Further research should consider the social and political consequences of large-scale COVID-19 immunity certificate schemes.

Compliance with ethical standards

Animal studies statement verification

This article does not require animal studies verification.

Identifiable images and data statement verification

This article does not require identifiable images and data statement verification.

Code availability

This project has employed statistical analytical techniques standard in all statistical packages.

Data and materials availability

All research mentioned has been published and data is available from respective outlets. The statistics that support the findings of this study can be found in the supplementary material of this article. Note: The publisher is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing content) should be directed to the corresponding author for the article.

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Author contributions

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Conflict of interest statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Would It Be Ethically Problematic to Introduce Mandatory Vaccination for COVID-19?

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ABSTRACT. The purpose of this study was to empirically examine whether it would be ethically problematic to introduce mandatory vaccination for COVID-19. Building my argument by drawing on data collected from Ada Lovelace Institute, Censuswide, Ipsos, Morning Consult, Promoleaf, The Serco Institute, Survation, and Verywell, I performed analyses and made estimates regarding when mandatory vaccination is most reasonable. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

Keywords: ethics; COVID-19; mandatory vaccination; health; autonomy; freedom

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1. Introduction

Disallowing a large-scale mandatory public policy or a banning on all private uses of COVID-19 certification constitutes a somewhat uncomplicated call. The character of favored activities and the profile of the supervisory body are significant for assessing the seemliness of scheme moves. (Hall and Studdert, 2021) COVID-19 mandatory vaccination may be ethically justified if the risk to public health is serious, the freedom from doubt in safety and validity is significant, the predicted feasibility of mandatory vaccination is more relevant than the range of possible choices, and the penalties or expenses for nonacceptance are comparable. (Savulescu, 2021) Companies that demand physical attendance, accommodate vulnerable customers, or both may take into account COVID-19 mandates with adjustments on medical, religious, or disability grounds. (Gostin et al., 2021)

2. Conceptual Framework and Literature Review

Citizens of less developed economies cannot get vaccinated, are not associated with the technologies facilitating a release from the risks of the COVID-19 crisis, and confront additional limitations on their freedom of movement due to vaccine passports and related travel restrictions. (Voigt et al., 2021) Migrants should be assimilated into regional, national, and worldwide SARS-CoV-2 vaccine schemes to decrease morbidity and mortality, while restricting transmission. (Al-Oraibi et al., 2021) Legal COVID-19 mandates indicate unambiguous policy backing for immunizations, likely boosting resources for a vaccine infrastructure, but may subvert public support, bringing about a resistance and possibly diminishing vaccine uptake. (Gostin et al., 2021) Whether vaccines are mandated, public authorities should grasp how to alter behaviors as regards COVID-19 vaccine hesitancy to ensure that knowledgeable decision-making routines are being put into effect. (Griffith et al., 2021) With the increasing lack of confidence of individuals in COVID-19 vaccines, mandatory vaccinations may constitute a problematic situation to public entities who aim to implement it. (Vergara et al., 2021) COVID-19 immunization certificates made available by public entities using approved vaccines should represent evidence of immunity for airlines and national authorities. (Petersen et al., 2021) Discriminatory access to COVID-19 vaccines constitutes an irresponsible public health practice. (Beyrer et al., 2021)

3. Methodology and Empirical Analysis

Building my argument by drawing on data collected from Ada Lovelace Institute, Censuswide, Ipsos, Morning Consult, Promoleaf, The Serco Institute, Survation, and Verywell, I performed analyses and made estimates regarding when mandatory vaccination is most reasonable. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

4. Survey Methods and Materials

The interviews were conducted online and data were weighted by five variables (age, race/ethnicity, gender, education, and geographic region) using the Census Bureau's American Community Survey to reflect reliably and accurately the demographic composition of the United States. Any survey which did not reach greater than 50% completion was removed from subsequent analysis to ensure quality. The data was weighted in a multistep process that accounts for multiple stages of sampling and nonresponse that occur at different points in the survey process. Test data was populated and analyzed in SPSS to ensure the logic and randomizations were working as intended before launching the survey. To ensure high-quality data, data quality checks were performed to identify any respondents showing clear patterns of satisficing. The cumulative response rate accounting for nonresponse to the recruit-

ment surveys and attrition is 2.5%. The break-off rate among individuals who logged onto the survey and completed at least one item is 0.2%. Sampling errors and test of statistical significance take into account the effect of weighting. Question wording and practical difficulties in conducting surveys can also introduce error or bias into the findings of opinion polls. The sample weighting was accomplished using an iterative proportional fitting process that simultaneously balanced the distributions of all variables. Stratified sampling methods were used and weights were trimmed not to exceed 3. Average margins of error, at the 95% confidence level, are +/-2%. The design effect for the survey was 1.3. For tabulation purposes, percentage points are rounded to the nearest whole number. The precision of the online polls was measured using a Bayesian credibility interval. Confirmatory factor analysis was employed to test for the reliability and validity of measurement instruments. Descriptive statistical analysis and multivariate inferential tests were undertaken for the survey responses and for the purpose of variable reduction in regression modeling. Multivariate analyses, and not univariate associations with outcomes, are more likely to factor out confounding covariates and more precisely determine the relative significance of individual variables. Independent *t*-tests for continuous variables or chi-square tests for categorical variables were employed. An Internet-based survey software program was utilized for the delivery and collection of responses. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. An informed e-consent was obtained from individual participants. Study participants were informed clearly about their freedom to opt out of the study at any point of time without providing justification for doing so.

5. Results and Discussion

By laying the foundations of COVID-19 vaccination-related travel scheme, official entities can set up criteria for tried and tested proof of vaccination that may develop shortly from public-private collaborations in the travel industry, and subsequently extend to social and recreational gatherings. (Hall and Studdert, 2021) COVID-19 mandatory vaccination is extremely reasonable when there are upsides to both persons and as regards preventing transmission. (Savulescu, 2021) COVID-19 vaccination passports should support, not exclude and isolate, less developed economies (Grayson, 2020; Lyons and Lăzăroiu, 2020; Pop et al., 2021; Svabova et al., 2020), without consideration of their endeavors in combating and controlling the transmission of such a contagious disease. (Voigt et al., 2021) Migrant and displaced groups should be unambiguously and discerningly integrated in COVID-19 vaccination plans, consequently acknowledging the interconnection between migrant health and public health and fortifying the sharing of essential public health information to such marginalized communities and involving them in health systems to tackle large-scale chronic inequities. (Al-Oraibi et al., 2021) (Tables 1–9)

Table 1 Do you think people should have to prove that they've been vaccinated? (yes, %)

Democrat	71
Independent	52
Republican	45
Had COVID-19 Vaccine	74
Did not	32
Gen Z	43
Millennials	66
Gen X	58
Boomers	54
Silent	56
Man	66
Woman	54

Sources: Verywell; my survey among 4,900 individuals conducted February 2021.

Table 2 If a company does require a COVID-19 vaccine, who should pay? (%)

Company	61
Government	27
Individual	12

Sources: Promoleaf; Censuswide; my survey among 4,900 individuals conducted February 2021.

Table 3 You said you think your company should require people to be vaccinated in order to travel for business, do you think this should be extended to their family/members of their household? (%)

Yes	81
No	13
Not sure	6

Sources: Promoleaf; Censuswide; my survey among 4,900 individuals conducted February 2021.

Table 4 How comfortable are you allowing the following to access your personal health data and vaccination record? (%)

	Very comfortable	Somewhat comfortable	Not very comfortable	Not at all comfortable
Your doctor	51	39	7	3
Your employer	24	42	19	15
US government	22	39	19	20
Private companies (e.g., technology companies, airlines, hotels, etc.)	17	34	25	24

Sources: Ipsos; my survey among 4,900 individuals conducted February 2021.

Table 5 The use of COVID-19 vaccine passports to enable a return to office life poses some major questions for businesses. (yes, %)

Would vaccine passports create two-tiers of employees divided between those that can obtain them and those who cannot?	96
Would the latter group feel that their career prospects are stunted because they do not have a vaccine passport?	95
Would additional infrastructure be required at office entrances to vet vaccine passports?	92
Would the cost of vaccine passports be passed onto employees?	91

Sources: The Serco Institute; Suvation; my survey among 4,900 individuals conducted February 2021.

Table 6 Protection against future risks and mitigation strategies for global harms (relevance, %)

The introduction of COVID-19 vaccine passports may pave the way to normalizing individualized health risk scoring, and could be open to scope creep post-pandemic, including more intrusive data collection or a wider sharing of health information.	89
Governments should consider the risk of infrastructure passing to future governments with different political agendas, and how tools introduced for pandemic containment could be repurposed against marginalized groups or for repressive purposes.	94
Despite international coordination, there are significant inequalities of access to vaccines resulting in extreme differences in local manifestations of the virus, both in terms of health and economics.	96
Wealthier countries rolling out vaccine passports could further contribute to exacerbating global inequalities, by incentivizing vaccine hoarding.	94

Sources: Ada Lovelace Institute; my survey among 4,900 individuals conducted February 2021.

Table 7 Do you think those eligible for a COVID-19 vaccine should have to prove that they've been vaccinated? (yes, %)

	Parents	Those without kids
Overall	67	53
Before going to a school	60	52

Sources: Verywell; my survey among 4,900 individuals conducted February 2021.

Allowing certain freedom from restrictions to establish rules (Clark, 2020; Lăzăroiu et al., 2017; Peters, 2020; Robinson, 2020) that clarify access in conformity with customers' COVID-19 vaccination status to sports competitions, concert locales, clubs, restaurants, and bars would be adequate, serving large-scale endeavors (Coatney and Poliak, 2020; Lăzăroiu, 2017; Phillips, 2021) to stimulate vaccine uptake. (Hall and Studdert, 2021) A mandatory scheme of ethically warranted COVID-19 vaccination cannot be clarified until the character of the vaccine, the seriousness of the issue, and the inferable expenses/upside of the range of possible options are not evaluated. (Savulescu, 2021) The implementation of COVID-19 mandates among populations that do not support vaccination on a large scale may be detrimental. (Gostin et al., 2021)

Table 8 Any vaccine passport system will require maintenance, repair and updating in order to remain functional and continue to serve its intended purpose as conditions change around them. (relevance, %)

<p>If a vaccine passport system is intended to be temporary, then its obsolescence should be designed in from the start. Legislation and plans should contain sunset clauses, and the costs of closing the system down factored into budget planning.</p>	88
<p>Businesses that require vaccinations for customers or employees will need systems and additional resource for reviewing vaccine passports, which could create a financial burden for businesses already struggling with depleted financial reserves as they try to reopen.</p>	89
<p>While almost all countries have chosen to make vaccinations freely available to all as they become eligible, schemes that rely on testing could impose additional costs on users of the system. The more widespread a scheme is, the more burdensome any repeat costs could become on those who must rely on testing that is not freely available.</p>	92
<p>One possible public health reason for introducing a COVID-19 vaccine passport system would be to encourage uptake of COVID-19 vaccines, in order to reach herd immunity faster. This calculation will be specific to different countries, as rates of vaccine hesitancy vary greatly and the strength of incentivization may also vary substantially.</p>	89
<p>While some digital systems may be able to reuse existing vaccination records with minimal additional work on the part of frontline health staff, non-digital solutions and obtaining proof of exemption (and authorizing some digital schemes) could place additional strain on general practitioners and family doctors, worsening other health outcomes.</p>	91
<p>COVID-19 vaccine passport schemes will require interoperable standards, particularly in the context of international travel and border control, and especially if governments allow private actors to develop a diversity of certification applications.</p>	88
<p>Those responsible for standard setting in COVID-19 vaccine passport systems will need to decide which tests, vaccinations and dosing regimens will be accepted within a specific, and often geographically contained, certification system.</p>	91
<p>Any digital vaccine passport scheme that successfully restricts and permits access to certain rights and freedoms will inevitably prompt attempts to defraud it. The greater the differentials in access, the stronger the incentive will be. Steps will need to be taken to ensure any vaccine passport scheme is not vulnerable to fraud or accusations of fraud.</p>	92
<p>Counterfeit vaccine passports could undermine the public health rationale for certification by allowing those at a potentially high risk of transmission to engage illegitimately in riskier activities, creating a situation similar to if there were no certification at all. Those unaware of counterfeit vaccine passports might make inaccurately low risk assessments of situations and not use other, more informal mitigations (such as social distancing).</p>	94

Widespread counterfeits could undermine public confidence in vaccine passports if individuals no longer trust any other individual’s certification to be valid and become more suspicious of others’ claims to be vaccinated, recovered, or otherwise at a relatively lower risk to themselves and others.	93
Anyone developing a COVID-19 vaccine passport scheme should consider a series of design principles at all stages of developing a system, protect against digital discrimination, be clear about how vaccine passports link or expand existing state data systems.	94
If a government does want to move ahead with a COVID-19 vaccine passport scheme, it should clarify its own role, be clear about the relationship between a COVID-19 vaccine passport scheme and wider plans for digital identity, and design systems that are as accessible as possible.	88
There are broad social benefits that flow from loosening restrictions on social distancing and passports might help do this safely.	86
Only those who will not transmit the virus are able to take part in activities that would normally present a risk of transmission.	87

Sources: Ada Lovelace Institute; my survey among 4,900 individuals conducted February 2021.

Table 9 Adults were asked whether they support or oppose the following (%)

	Support	Don’t know	Oppose
Giving people digital proof that they have been vaccinated	67	11	22
Requiring people who have been vaccinated to carry proof	56	10	34
Allowing employers to require that employees show proof of vaccination before working	54	10	36
Requiring people who have been vaccinated to carry digital proof	49	14	37
Allowing businesses to require proof of vaccination for anyone who enters their stores	44	12	44
Allowing businesses to ban unvaccinated customers from entering their stores	39	15	46

Sources: Morning Consult; my survey among 4,900 individuals conducted February 2021.

The organizational level requires configuring inclusive settings in which judicious COVID-19-related (re)testing, vaccination, and certifications constitute the quantifiable and formally supported results. (Spisak and McNulty, 2021) Incongruous public health decisions may lead to periodical waves of COVID-19, and consequently public health schemes or programs, vaccine development, and evaluation policies (Balica, 2019; Keane et al., 2020; Misiaszek, 2020; Popescu et al., 2021) should be judiciously assessed. (Zhang et al., 2021) Individuals have a moral responsibility to be vaccinated against COVID-19, by furthering their own health and the community upside of vaccination, while countries should work hard (Duncan et al., 2021; Lăzăroiu et al., 2020; Platt, 2020) to discontinue the grave ramifications of the pandemic. (Largent and Miller, 2021)

6. Conclusions and Implications

The furtherance of COVID-19-related (re)testing and vaccination in companies, operating conjointly with government-backed safety nets, strengthens prevailing tendencies of mutual benefit and confidence. (Spisak and McNulty, 2021) To adequately combat the COVID-19 crisis and assist individual patient recovery, effective and protective vaccines are required, together with schemes that foster long-term personal protective behaviors. (Zhang et al., 2021) Considering the perceived risks of the COVID-19 vaccines, introducing a mandatory policy would be practically and ethically debatable. (Savulescu, 2021) The objective of risk communication is to shape decision-making by complying with individual choice, but COVID-19 mandates disregard personal autonomy significantly. (Gostin et al., 2021) Paying individuals to get vaccinated against COVID-19 may be an adequate scheme if it were required to attain herd immunity, but such an approach is dispensable and challenging. (Largent and Miller, 2021) As limitations, this article focuses only on whether it would be ethically problematic to introduce mandatory vaccination for COVID-19. Further research should consider the implementation of COVID-19 mandates among populations that do not support vaccination on a large scale.

Compliance with ethical standards

Animal studies statement verification

This article does not require animal studies verification.

Identifiable images and data statement verification

This article does not require identifiable images and data statement verification.

Code availability

This project has employed statistical analytical techniques standard in all statistical packages.

Data and materials availability

All research mentioned has been published and data is available from respective outlets. The statistics that support the findings of this study can be found in the supplementary material of this article. Note: The publisher is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing content) should be directed to the corresponding author for the article.

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Author contributions

The author confirms being the sole contributor of this work and approved it for publication.

Conflict of interest statement

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Would COVID-19 Testing and Vaccination Status Certificates Erode Civil Liberties?

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ABSTRACT. Empirical evidence on whether COVID-19 testing and vaccination status certificates might erode civil liberties has been scarcely documented in the literature. Using and replicating data from Ada Lovelace Institute, Censuswide, Ipsos, Patch, Promoleaf, and Verywell, I performed analyses and made estimates regarding mechanisms for unflinching and precise COVID-19 certification. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

Keywords: COVID-19; testing; vaccination status; certificate; passport; civil liberty

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1. Introduction

Getting tested, taking measures to prevent infection, and getting vaccinated against COVID-19 constitute public interest. (Spisak and McNulty, 2021) Vaccine passports supply confirmation that an individual has been vaccinated against COVID-19, got a negative test result, or recovered from such a contagious disease in the immediate past, and assist in reconfiguring the economy and society swiftly; protect lives by decreasing the risk of persons getting infected; and cut down the transmission chains, consequently diminishing the prospect for the virus to move forward escalated virulence. (Van Oosterhout, 2021) The reduced positive predictive value of serological tests in the environment of decreased population seroprevalence and flawed test accuracy may result in numerous false-positive COVID-19 passport holders. (Larremore et al., 2021) COVID-19 vaccine passports connecting the interval to herd immunity would scale up both liberty and safety, and soundly bring about a reestablishment of some sort of normalcy. (Cope and Stremitzer, 2021)

2. Conceptual Framework and Literature Review

If employed for worldwide travel, immunity certificates are not similar to health certificates confirming a negative COVID-19 status derived from diagnostic testing, which certain states have made available to decrease the risk of imported cases after reinstating international tourism subsequent to the beginning of the pandemic. (Voo et al., 2021) COVID-19 testing and vaccination status certificates are instrumental in a swift revival of commerce, entertainment, and travel, must be scientifically reliable and the least provisional choice, and must be carried out without bias. (Gostin et al., 2021) Individuals' apprehensions as regards the safety of a COVID-19 vaccine include the conviction that vaccine development has been time-pressed and consequently unsafe, while the interval for testing the vaccines is perceived as expeditious. (Momplaisir et al., 2021) Establishing a COVID-19 vaccine passport regime would be appropriate on civil-liberty standards until societies attain herd immunity and unvaccinated persons would constitute a minor threat to other individuals, and differentiating by vaccination status would be more difficult to legitimize. (Cope and Stremitzer, 2021) Mechanisms for unfailing and precise COVID-19 certification are relevant, but their development is to a great degree a technical problem (Lăzăroiu et al., 2017; Nica, 2017; Snake-Beings, 2020) and should not thoroughly hinder a sensible scheme. (Hall and Studdert, 2021)

3. Methodology and Empirical Analysis

Using and replicating data from Ada Lovelace Institute, Censuswide, Ipsos, Patch, Promoleaf, and Verywell, I performed analyses and made estimates regarding mechanisms for unfailing and precise COVID-19 certification. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

4. Survey Methods and Materials

The interviews were conducted online and data were weighted by five variables (age, race/ethnicity, gender, education, and geographic region) using the Census Bureau's American Community Survey to reflect reliably and accurately the demographic composition of the United States. Any survey which did not reach greater than 50% completion was removed from subsequent analysis to ensure quality. The data was weighted in a multistep process that accounts for multiple stages of sampling and nonresponse that occur at different points in the survey process. Test data was populated and analyzed in SPSS to ensure the logic and randomizations were working as intended before launching the survey. To ensure high-quality data, data quality checks were performed to identify any respondents showing clear patterns of satisficing. The cumulative response rate accounting for nonresponse to the recruitment surveys and attrition is 2.5%. The break-off rate among individuals who logged onto the survey and completed at least one item is 0.2%. Sampling errors and test

of statistical significance take into account the effect of weighting. Question wording and practical difficulties in conducting surveys can also introduce error or bias into the findings of opinion polls. The sample weighting was accomplished using an iterative proportional fitting process that simultaneously balanced the distributions of all variables. Stratified sampling methods were used and weights were trimmed not to exceed 3. Average margins of error, at the 95% confidence level, are +/-2%. The design effect for the survey was 1.3. For tabulation purposes, percentage points are rounded to the nearest whole number. The precision of the online polls was measured using a Bayesian credibility interval. Confirmatory factor analysis was employed to test for the reliability and validity of measurement instruments. Descriptive statistical analysis and multivariate inferential tests were undertaken for the survey responses and for the purpose of variable reduction in regression modeling. Multivariate analyses, and not univariate associations with outcomes, are more likely to factor out confounding covariates and more precisely determine the relative significance of individual variables. Independent *t*-tests for continuous variables or chi-square tests for categorical variables were employed. An Internet-based survey software program was utilized for the delivery and collection of responses. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. An informed e-consent was obtained from individual participants. Study participants were informed clearly about their freedom to opt out of the study at any point of time without providing justification for doing so.

5. Results and Discussion

A COVID-19 vaccination passport and an immunity certificate are demanded documents for worldwide travel, particularly whether antibody-mediated or T-cell-mediated immunity and vaccination supply a similar level of protection. (Voo et al., 2021) COVID-19 testing and vaccination status certificates provide health and economic upsides until attaining herd immunity, and supply evidence of vaccination without offering additional medical information. (Gostin et al., 2021) An inferior positive predictive value indicates a significant proportion of false positive tests, resulting in a fusion of legitimately seropositive and seronegative persons who carry COVID-19 immune passports. (Larremore et al., 2021) A COVID-19 vaccination scheme will operate coherently together with public health surveillance and contact tracing, so as to locate individuals who have been in close contact with people contaminated with certain variants to decrease their transmission. (Van Oosterhout, 2021) Aspects that would offer individuals increased trust in the safety and adequacy of a COVID-19 vaccine encompass infrequent reports of detrimental side effects in persons who take it at the outset, unambiguousness as regards the vaccine development mechanisms, and a large-scale conjoint vaccine development endeavor. (Momplaisir et al., 2021) (Tables 1–8)

Table 1 The continued use and expansion of a COVID-19 vaccine passport system (relevance, %)

The greatest impact of developing COVID-19 vaccine passport systems may not be that the core of the system is directly expanded into a permanent form of digital identity: the implementation of the system might set precedents and norms that influence and accelerate the creation of other systems for identification and surveillance.	88
Legal mechanisms and social and ethical norms will shape any adoption of COVID-19 vaccine passport systems.	92
Ethical evaluations of COVID-19 status certification systems will require acknowledgment of uncertainty, risk and the inherent unfinished nature of the technology.	87
Even with the most privacy-preserving technology, health data could come into contact with different actors, who may have different levels of experience and trustworthiness in handling personal data.	94
Private companies who offer COVID-19 vaccine passports may have commercial incentives to monetize any personal data they collect.	89
Vaccine passports can become a legitimate tool to manage COVID-19 at a domestic, national scale, as well as supporting safer international travel.	96

Sources: Ada Lovelace Institute; my survey among 5,600 individuals conducted February 2021.

Table 2 How much do you agree or disagree with the following about COVID-19 vaccine passports or similar health data certificates? (%)

	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree	Not sure
All travelers entering USA should be required to have a vaccine passport.	54	26	8	8	4
They would be effective in making travel and large events safe.	42	36	9	8	5
All large public venues such as concert halls and stadiums should require a vaccine passport.	41	32	12	11	4
I expect they will be widely used in USA by the end of the year.	35	35	13	9	8
Shops, restaurants, and offices should require a vaccine passport.	33	30	17	14	6

Sources: Ipsos; my survey among 5,600 individuals conducted February 2021.

Table 3 Public confidence will be crucial to the success of a COVID-19 vaccine passport system (relevance, %)

There are sensitivities involved in building technical systems that require personal health data to be linked with identity or biometric data for many countries.	89
A system that is seen as trusted and legitimate could bolster hopes that it might encourage vaccination and uptake of booster shots, or inspire more confidence in spaces that require vaccination or testing to enter.	94
Public support for vaccine passports varies based on the particular details of proposed systems (including how they will establish status and in which settings), and concerns about discrimination and inequality.	91
Deeper methods of public engagement will be needed to properly understand opinion, perceived benefits and risks, and the trade-offs the public is willing to make.	88

Sources: Ada Lovelace Institute; my survey among 5,600 individuals conducted February 2021.

Table 4 Adults are increasingly getting accustomed to vaccination, while adjusting to loosening restrictions and business reopenings nationwide.

82%	are likely to support vaccine passports in situations where other forms of verification already exist, like international travel.
11%	would definitely not agree to take a free COVID-19 shot.
58%	think that people should have to prove they've been vaccinated
24%	reject the idea of having to prove vaccination status.
17%	think that hesitancy toward vaccine passports may stem from ethical considerations.
89%	think that requiring proof of vaccination can place people who don't have easy access to technology like smartphones at a disadvantage, as many vaccine passports are built around digital apps, and can punish people who may not yet have easy access to the vaccines or who are wary of the U.S. health system.
87%	think that vaccine passports designed as digital apps raise concerns about the security of a user's medical information.

Sources: Verywell; my survey among 5,600 individuals conducted February 2021.

An immunity passport is dissimilar from a vaccination or a negative COVID-19 test certificate as demanded in worldwide travel, as only individuals having a record of exposure to SARS-CoV-2 should receive an immunity certificate. (Voo et al., 2021) Governments can confirm and control the COVID-19 vaccination status while demanding evidence of vaccination for access to particular rights. (Gostin et al., 2021) Popular health beliefs as regards a COVID-19 vaccine have been triggered by mistrust (Gavurova et al., 2021; Lăzăroiu et al., 2020; Miller, 2020; Pop et al., 2021) concerning how vaccines are manufactured and delivered, personal experiences while getting other vaccines, and their ability to bring about infection. (Mompalaisir et al., 2021) Although increased grasp is required of the character and level of immunity that COVID-19 vaccination provides, risk for serious diseases is considerably diminished. (Hall and Studdert, 2021)

Table 5 Would you be in support of or against COVID-19 vaccination passports? (%)

	16–24	25–34	35–44	45–54	55+
Definitely in support of	24	33	53	50	54
Somewhat in support of	20	27	25	26	19
Neither in support of nor against	24	18	5	6	9
Somewhat against	15	9	6	7	3
Definitely against	12	10	9	8	11
Not sure	5	3	2	3	4

Sources: Promoleaf; Censuswide; my survey among 5,600 individuals conducted February 2021.

Table 6 Before progressing any further with COVID-19 vaccine passports, governments should (relevance, %)

Publish, and require the publication of, impact assessments – on issues including data protection, equality and human rights.	87
Offer clarity on the current legality of any use, in particular relating to laws regarding employment, equalities, data protection, policing, migration and asylum, and health regulations.	92
Create clear and specific laws, and develop guidelines for all potential user groups about the legality of use, mechanisms for enforcement and methods of legal redress for any vaccine passport scheme.	88
Support cooperation between relevant regulators that need to work cooperatively and pre-emptively.	84
Make any changes via primary legislation, to ensure due process, proper scrutiny and public confidence.	83
Develop suitable policy architecture around any vaccine passport scheme, to mitigate harms identified in impact assessments.	82

Sources: Ada Lovelace Institute; my survey among 5,600 individuals conducted February 2021.

Table 7 Passport backers contend that inoculations should be required at a variety of businesses. (%)

Restaurants	72
Bars	76
Gyms	73
Theaters	75
Professional sporting events	73
Professional concerts	72
Large ceremonies (like graduations, proms or weddings)	75
Public transportation (like buses, lightrails, subways or commuter trains)	77
Private buses (like Megabus or Greyhound)	76
Long-haul trains (like Amtrak)	75
Domestic flights	73
International flights	75
Religious facilities	66
Amateur sporting events (like recreational or school sports)	63
Amateur concerts (like school orchestras)	62

Sources: Patch; my survey among 5,600 individuals conducted February 2021.

Table 8 The purpose and intended effect of COVID-19 vaccine passport schemes (relevance, %)

Governments should state the purpose and intended effect of any COVID-19 vaccine passport scheme, to give clarity both to members of the public as to why the scheme is being introduced and to businesses and others who will need to implement any scheme and meet legal requirements in frameworks like data protection.	94
It is hard to model, assess or evaluate vaccine passports at a general level so governments will need to state the purpose of any system, what it will be used for and, crucially, what will not be included in any such system, i.e., if particular groups will be exempt, or if particular settings will be off-limits.	92
Countries should require proof of vaccination, proof of recovery or negative COVID-19 test results as a requirement for entry.	81
Countries will have an obligation to provide their citizens with proof of vaccination in order to allow them to travel to countries that require it.	96
The question of COVID-19 vaccine passport systems for international travel is resolving around standard-setting, ensuring equity and establishing the duration of the scheme.	93
Vaccination could be a primary control in ensuring the safety of most workplaces.	94
If the certification scheme demonstrably improved the safety of staff compared to existing COVID-19 mitigation measures, government and employers have an obligation to introduce such schemes to protect their employee's right to life and right to respect for private and family life.	93
Governments need to define clearly where the use of COVID-19 vaccine passport schemes will be acceptable and the purpose behind introducing any such scheme.	92
Governments should consult with representatives of workers and employers and issue clear guidance on the use of COVID vaccine passports in the workplace, to reduce the burden on employers to make these difficult decisions and ensure that workers are not at the mercy of poor decisions by individual employers.	95
Governments should define where the use of certification will never be acceptable, such as to access essential services, and what exemptions will be permitted, e.g., for those who are unable to be vaccinated.	94

Sources: Ada Lovelace Institute; my survey among 5,600 individuals conducted February 2021.

Enabling mass immunity and privileging the vaccinated from limitations constitute the most effective liberty-restricting approach for discontinuing the COVID-19 pandemic by use of herd immunity. (Cope and Stremitzer, 2021) COVID-19 vaccine-related information should both tackle issues as regards the vaccine and its development and strengthen the upsides of the vaccine. (Guidry et al., 2021) Determining information by use of an education and modeling system that typifies honesty may improve authorities' strategic interactional endeavors (Buckner, 2020; Lăzăroiu and Adams, 2020; Nica, 2018; Throne and Lăzăroiu, 2020) in developing public trust (Coleman, 2021; Parker et al., 2021; Vătămănescu et al., 2020) that is pivotal in furthering vaccination against COVID-19. (Vergara et al., 2021)

6. Conclusions and Implications

COVID-19 immunity certificates enable individuals proven to have antibodies to continue normal life and are instrumental in restoring the economy. (Greely, 2020) Access to COVID-19 vaccines is consolidating swiftly, and particular endeavors are being made to cover underprivileged communities. (Hall and Studdert, 2021) Vaccine efforts should surpass communications campaigns rectifying inaccuracy as regards a COVID-19 vaccine to direct attention to reinstating public trust (Gray-Hawkins and Lăzăroiu, 2020; Mircică, 2020; Rommer et al., 2020) in government bodies. (Guidry et al., 2021) Authorities who deliberately get vaccinated against COVID-19 boost the degree of confidence among individuals as openness for the vaccine safety is concrete. (Vergara et al., 2021) COVID-19 vaccination passport policies associated with worldwide travel may expand prevalent inequalities and subvert wide-ranging solidarity. (Voigt et al., 2021) Asylum seekers and undocumented migrants have been immoderately impacted by the pandemic, with likely relevant obstacles to accessing vaccines. (Waterman, 2021) As limitations, this article focuses only on whether COVID-19 testing and vaccination status certificates might erode civil liberties. Further research should consider the health and economic upsides provided by COVID-19 testing and vaccination status certificates.

Compliance with ethical standards

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This article does not require identifiable images and data statement verification.

Code availability

This project has employed statistical analytical techniques standard in all statistical packages.

Data and materials availability

All research mentioned has been published and data is available from respective outlets. The statistics that support the findings of this study can be found in the supplementary material of this article. Note: The publisher is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing content) should be directed to the corresponding author for the article.

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Author contributions

The author confirms being the sole contributor of this work and approved it for publication.

Conflict of interest statement

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Behavioral Responses and Inequalities in Vaccine Uptake against COVID-19

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ABSTRACT. The aim of this paper is to synthesize and analyze existing evidence on behavioral responses and inequalities in vaccine uptake against COVID-19. Using and replicating data from APA, de Beaumont, KFF, ICF, Medscape, McKinsey, and Statista, we performed analyses and made estimates regarding sentiments toward COVID-19 vaccines. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

Keywords: COVID-19; vaccine passport; certificate; hesitancy; public confidence; ethics

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1. Introduction

To attain herd immunity, large-scale administration of COVID-19 vaccines is needed, requiring relevant synergy with the affected people. (Hussain et al., 2021) Sentiments toward COVID-19 vaccines are inconstant and mirror external events and internal emotions. (Larson and Broniatowski, 2021) Suitable post-marketing surveillance systems may assist in furthering confidence and uptake in COVID-19 vaccines. (Forman et al., 2021) Any system of COVID-19 vaccine passports may be biased. (Tanner and Flood, 2021)

2. Conceptual Framework and Literature Review

Governments and public health agencies should grasp public sentiments toward COVID-19 vaccines, articulating informational campaigns and designed policy interventions. (Hussain et al., 2021) Being hesitant or unconvinced when confronted with a plausible safety risk is not equivalent with being anti-vaccine. (Larson and Broniatowski, 2021) Financial incentives may be morally critical if needed to surmount obstacles to COVID-19 vaccination. (Largent and Miller, 2021) Individuals who are hesitant about a COVID-19 vaccine are typically less cognizant of the public health upsides of vaccination, do not think they have a significant risk of illness, have reservations about the adequacy of a vaccine, are concerned about latent repercussions, or feel apprehensive that it has been developed quite swiftly. (Freeman et al., 2021) Large-scale vaccine control of the COVID-19 pandemic is associated significantly with the capacity to monitor present and subsequent immune escape variants. (Ørskov et al., 2021)

3. Methodology and Empirical Analysis

Using and replicating data from APA, de Beaumont, KFF, ICF, Medscape, McKinsey, and Statista, we performed analyses and made estimates regarding sentiments toward COVID-19 vaccines. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

4. Survey Methods and Materials

The interviews were conducted online and data were weighted by five variables (age, race/ethnicity, gender, education, and geographic region) using the Census Bureau's American Community Survey to reflect reliably and accurately the demographic composition of the United States. Any survey which did not reach greater than 50% completion was removed from subsequent analysis to ensure quality. The data was weighted in a multistep process that accounts for multiple stages of sampling and nonresponse that occur at different points in the survey process. Test data was populated and analyzed in SPSS to ensure the logic and randomizations were

working as intended before launching the survey. To ensure high-quality data, data quality checks were performed to identify any respondents showing clear patterns of satisficing. The cumulative response rate accounting for nonresponse to the recruitment surveys and attrition is 2.5%. The break-off rate among individuals who logged onto the survey and completed at least one item is 0.2%. Sampling errors and test of statistical significance take into account the effect of weighting. Question wording and practical difficulties in conducting surveys can also introduce error or bias into the findings of opinion polls. The sample weighting was accomplished using an iterative proportional fitting process that simultaneously balanced the distributions of all variables. Stratified sampling methods were used and weights were trimmed not to exceed 3. Average margins of error, at the 95% confidence level, are +/-2%. The design effect for the survey was 1.3. For tabulation purposes, percentage points are rounded to the nearest whole number. The precision of the online polls was measured using a Bayesian credibility interval. Confirmatory factor analysis was employed to test for the reliability and validity of measurement instruments. Descriptive statistical analysis and multivariate inferential tests were undertaken for the survey responses and for the purpose of variable reduction in regression modeling. Multivariate analyses, and not univariate associations with outcomes, are more likely to factor out confounding covariates and more precisely determine the relative significance of individual variables. Independent *t*-tests for continuous variables or chi-square tests for categorical variables were employed. An Internet-based survey software program was utilized for the delivery and collection of responses. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. An informed e-consent was obtained from individual participants. Study participants were informed clearly about their freedom to opt out of the study at any point of time without providing justification for doing so.

5. Results and Discussion

Public confidence in COVID-19 vaccines may become decreased by unconfirmed concerns in relation to vaccine safety that bring about skepticism. (Hussain et al., 2021) Modalities of hesitancy cover postponement in receiving a vaccine due to anxiety as regards safety concerns, apprehensions because of individual or community experiences, and inquiries about COVID-19 vaccines. (Larson and Broniatowski, 2021) A mix of natural and vaccine-based immunity is feasible: extensively imposed restrictions justify once individuals at risk of serious outcomes of infection have been vaccinated, but hospitalization rates are not as age contingent as the mortality ones, while immune senescence may leave elderly unprotected even after vaccination. (Ørskov et al., 2021) As persons and families experience difficulties, some individuals may feel they have to accept a vaccine so as to buy food or pay rent. (Largent and Miller, 2021) (Tables 1–9)

Table 1 The role of attitudes toward vaccines in the public’s willingness to accept an FDA-approved vaccine for COVID-19 (%)

Attitude toward vaccination	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree	Don’t know/ Not sure
Some vaccines are linked to long term health problems.	26	23	20	8	23
Natural infection is safer than vaccines for providing immunity.	33	25	17	8	17
There is little risk of getting the disease from the vaccine.	7	17	36	30	10
Some vaccines may cause learning disabilities, such as autism.	37	17	16	8	22
Some vaccines have ingredients that could be harmful.	19	20	30	14	17
Vaccines are given to prevent diseases that most people are not likely to get.	24	26	26	16	8
Overall, vaccines are very safe.	5	10	42	37	6
Overall, vaccines are very effective.	4	6	40	45	5
Vaccines are important for my health.	4	6	37	49	4
My being vaccinated is important for the health of others in my community.	3	7	37	48	5
The information I receive about vaccines from government health agencies is reliable and trustworthy.	4	15	44	27	10

Sources: ICF; our survey among 5,700 individuals conducted January 2021.

Table 2 What would motivate you to get vaccinated the most? Select all that apply. (%)

If I had more data about long-term side effects from the vaccine.	93
If getting vaccinated was the only way I was able to get back to living my life the same way as before COVID-19.	96
If getting vaccinated will guarantee the economy will fully reopen.	95
If I won’t need to wear a mask in public or be bothered by people to wear one.	92
If my own personal doctor recommended getting the vaccine.	83
If I’m required to get vaccinated to fly or travel.	88

Sources: de Beaumont; our survey among 5,700 individuals conducted January 2021.

Table 3 Which of the following are reasons you do not want to be vaccinated?
Select all that apply. (%)

I don't believe it's effective.	89
I am concerned about the side effects of the vaccine.	95
I am scared and anxious about needles.	62
The makers of the vaccine aren't being honest about what's in it.	57

Sources: APA; our survey among 5,700 individuals conducted January 2021.

Table 4 % who say they would be more likely to get the COVID-19 vaccine if...
Select all that apply. (%)

the COVID-19 vaccine was offered to them at a place they normally go for health care.	86
airlines required passengers to be vaccinated before they could fly.	94
they only needed to get one dose of the COVID-19 vaccine.	67
being vaccinated was required to attend large gatherings such as sporting events and concerts.	89
getting vaccinated for COVID-19 was required for international travel.	92
their employer gave them paid time off to get vaccinated and recover from any side effects.	93
their employer offered to pay them an extra \$200 to get vaccinated.	91
their employer arranged for a medical provider to come to their work and administer the COVID-19 vaccine.	88

Sources: KFF; our survey among 5,700 individuals conducted January 2021.

Table 5 Which of the following topics for further education are most important to you in terms of the science behind the vaccine? Select all that apply. (%)

Differences among the COVID-19 vaccines	88
Which among multiple vaccines to administer	87
Updates on clinical trials of the COVID-19 vaccines	84
Duration of immunity following immunization with COVID-19 vaccines	89
Effectiveness of COVID-19 vaccines: transmission of disease, disease severity	94
Effectiveness of COVID-19 vaccines in persons with comorbid health conditions	96
Effectiveness of COVID-19 vaccines in people age 65 years and older	91

Sources: Medscape; our survey among 5,700 individuals conducted January 2021.

Privacy issues can be tackled (Clark, 2020; Kovacova et al., 2019; Lăzăroiu et al., 2020; Nica, 2017; Popescu, 2017) by implementing COVID-19 passport choices that adequately protect personal data. (Tanner and Flood, 2021) Being COVID-19 vaccinated so as to receive a financial incentive subverts the moral significance of the act (Duncan, 2020; Lambovska et al., 2021; Mihăilă et al., 2016; Nica et al., 2020; Valle, 2020), but it is morally suitable to offer payment to vaccinated individuals to compensate moderate vaccine-related costs or as a indemnification for the time and endeavor expended to be vaccinated, comparable to the reasonable payment provided to citizens called for jury duty. (Largent and Miller, 2021)

Table 6 Which statement do you agree with the most?

Vaccines do more good than harm. It is an effective method of protection from infections	82
Vaccines bring neither significant benefit nor harm. They are useless.	7
Vaccines do more harm than good. They are hazardous.	11

Sources: Statista; our survey among 5,700 individuals conducted January 2021.

Table 7 Reasons adults may be reluctant to get COVID-19 vaccine. Select all that apply. (%)

<i>Safety/Effectiveness of COVID-19 vaccine</i>	
Too new/Wait and see	85
Side effects	88
Trials are too few or too fast	77
Fear of getting virus from vaccine	5
<i>Not needed</i>	
Low risk	48
Comparison to the flu	7
Has, or prefers, antibodies	43
Pandemic is exaggerated	17
Virus will be gone by then	5
Religious/Spiritual considerations	3
<i>Distrust</i>	
Government	67
Vaccine developers	76
Cited conspiracy theories	12
<i>Availability</i>	
High-risk populations should have priority	89
Cost concerns	7
<i>Need more information</i>	
Need to learn more before deciding	88
<i>Don't want it</i>	
Fear of needles	6
<i>Anti-vaccine</i>	
Don't believe in vaccines	86
Believe that vaccines cause harm	11
<i>Medical condition</i>	
Immuno-compromised	5
Medical issues	23
Medications with contraindication	2

Sources: ICF; our survey among 5,700 individuals conducted January 2021.

Table 8 When considering if you will get the COVID-19 vaccine, would you rather know...?

the benefits of getting the vaccine	62
the consequences of not getting the vaccine	38

Sources: de Beaumont; our survey among 5,700 individuals conducted January 2021.

Table 9 Consumer sentiment regarding potential COVID-19 vaccines. (relevance, %)

A high level of vaccine adoption is required to achieve herd immunity, even accounting for some level of natural immunity.	87
Certain strategies can help the vaccine live up to its promise, including recognizing physicians and healthcare workers as a trusted source of information.	84
As consumers' understanding of potential COVID-19 vaccines has increased with new information, so have their attitudes and perceptions of a potential vaccine, including reduced skepticism about the benefits.	85
Recognizing that the safety and efficacy evidence on the COVID-19 vaccine candidates is limited and will continue to cumulate over time (e.g., data on long-term safety, effectiveness in reducing transmission, duration of protection), consumers are likely to engage with that emerging data as they make vaccination decisions.	89
COVID-19 vaccination acceptance will play a meaningful role in the timing and confidence with which we return to a new normal.	87
The incremental economic benefits of widespread COVID-19-vaccine adoption, would be orders of magnitude higher, and the value in lives saved and negative long-term health effects avoided would be immeasurable.	93
Achieving large-scale vaccine adoption will require creating much stronger conviction among patients and influencers, providing high levels of convenience, and ensuring that vaccination is truly costless or better for consumers.	88
Full herd immunity would reduce COVID-19-related morbidity, mortality, and associated treatment costs, release pressure from states to continue related safeguarding, and enable stronger economic growth.	92
Achieving full herd immunity to COVID-19 may require a significant majority of the adult population to be vaccinated, even after considering the proportion with some level of immunity from natural infection.	88
Higher vaccine adoption would likely enable stronger economic growth by increasing confidence in the safety of economic and social activities.	93
Herd immunity could increase business confidence against the risk of COVID-19 resurgence and inspire greater investment and hiring.	71
People need to believe that the benefits of vaccination are greater than the perceived risks and costs and that the evidence supports this statement.	79

Sources: McKinsey; our survey among 5,700 individuals conducted January 2021.

Governments require mechanisms to thoroughly inspect and assess data on effectiveness and detrimental events (Kirkman, 2021; Lăzăroiu, 2018; Nelson and Neguriță, 2020; Pop et al., 2021) as COVID-19 vaccinations are introduced. (Forman et al., 2021) For persons who are at the beginning extremely hesitant, the most adequate message should focus on the personal upsides of COVID-19 vaccination. (Freeman et al., 2021) As increasingly more risk groups are vaccinated, the likelihood of hospitalization decreases (a rise in infection rates may not considerably increase hospitalizations). (Ørskov et al., 2021) Historically and socially marginalized communities are less expected to be vaccinated typically due to worse access and COVID-19 vaccine hesitancy derived from coherent disbelief in authorities and experiences of medical abuse. (Tanner and Flood, 2021)

6. Conclusions and Implications

Concrete assessments of immunizations which differentiate the COVID-19 vaccine's effect alone from that in association with nonpharmaceutical interventions (e.g., shelter-in-place orders or physical distancing) can be carried out. (Forman et al., 2021) COVID-19 has highlighted the significant deficiencies of the social safety net (Davis et al., 2020; Krizanova et al., 2019; Mihăilă, 2017; Nica, 2018; Popescu, 2018): paying a relevant amount of money as a catalyst to prevail over vaccine hesitancy and to further vaccine uptake does not constitute a judicious investment, as nearly all individuals will be enthusiastic to get vaccinated shortly in relation to the volume of SARS-CoV-2 infections and COVID-19-related hospitalizations and fatality rates. (Largent and Miller, 2021) Strongly hesitant persons may not identify the collective upsides of COVID-19 vaccination while having more significant safety concerns (Fialova and Vasenska, 2020; Lăzăroi et al., 2017a, b; Morris, 2021; Vătămănescu et al., 2020) as regards the speed of vaccine development. (Freeman et al., 2021) As limitations, this article focuses only on behavioral responses and inequalities in vaccine uptake against COVID-19. Further research should consider public confidence in COVID-19 vaccines.

Compliance with ethical standards

Animal studies statement verification

This article does not require animal studies verification.

Identifiable images and data statement verification

This article does not require identifiable images and data statement verification.

Code availability

This project has employed statistical analytical techniques standard in all statistical packages.

Data and materials availability

All research mentioned has been published and data is available from respective outlets. The statistics that support the findings of this study can be found in the supplementary material of this article. Note: The publisher is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing content) should be directed to the corresponding author for the article.

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Author contributions

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

Conflict of interest statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The Language of Misinformation Literacy: COVID-19 Vaccine Hesitancy Attitudes, Behaviors, and Perceptions

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ABSTRACT. Despite the relevance of COVID-19 vaccine hesitancy attitudes, behaviors, and perceptions, only limited research has been conducted on this topic. Using and replicating data from AP-NORC, Kaiser Family Foundation, KFF, McKinsey, Medscape, Morning Consult, Patch, Washington Post, W2O, and YouGov, we performed analyses and made estimates regarding whether vaccine hesitancy may subvert endeavors to control COVID-19. The results of a study based on data collected from 5,900 respondents provide support for our research model. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

Keywords: COVID-19; misinformation; vaccine hesitancy; attitude; behavior; perception

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1. Introduction

Communication as regards COVID-19 vaccines should be provided in a considerate way (Allen, 2020; Lăzăroiu et al., 2017a, b; Pop et al., 2021) to avoid denigrating persons who doubt inoculation by using confirmed relationships to tackle apprehensions of the vaccine hesitant. (Larson and Broniatowski, 2021) The chief grounds for purposeful COVID-19 vaccine uptake are associated with the risk of getting infected or becoming very ill from the virus and to enable the normalcy of social and family life. (Robertson et al., 2021) A scheme of paying individuals for COVID-19 vaccination should be implemented only if intended vaccine uptake is insubstantial in furthering herd immunity shortly. (Largent and Miller, 2021)

2. Conceptual Framework and Literature Review

COVID-19 vaccine-hesitant persons may assimilate content from anti-vaxx organizations while seeking for evidence to substantiate or eliminate their concerns. (Larson and Broniatowski, 2021) Partnerships between trustworthy entities may optimize the volume of instructive fact-based material as regards the safety and effectiveness of COVID-19 vaccines. (Forman et al., 2021) Incentive payments may bring about additional apprehensions and increase reluctance to COVID-19 vaccination. (Largent and Miller, 2021) Corollaries and reasons for deliberate vaccine refusal configure behaviors and attitudes (Davidson, 2020; Lăzăroiu, 2018) associated with COVID-19. (Callaghan et al., 2021) Undisputed community involvement is key to decreasing COVID-19 vaccine hesitancy. (Quinn and Andrasik, 2021) The skepticism levels of persons who are hesitant about a COVID-19 vaccine are significantly decreased by information focusing on the personal upsides of vaccination or tackling speed of development issues. (Freeman et al., 2021)

3. Methodology and Empirical Analysis

Using and replicating data from AP-NORC, Kaiser Family Foundation, KFF, McKinsey, Medscape, Morning Consult, Patch, Washington Post, W2O, and YouGov, we performed analyses and made estimates regarding whether vaccine hesitancy may subvert endeavors to control COVID-19. The results of a study based on data collected from 5,900 respondents provide support for our research model. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

4. Survey Methods and Materials

The interviews were conducted online and data were weighted by five variables (age, race/ethnicity, gender, education, and geographic region) using the Census Bureau's American Community Survey to reflect reliably and accurately the demographic

composition of the United States. Any survey which did not reach greater than 50% completion was removed from subsequent analysis to ensure quality. The data was weighted in a multistep process that accounts for multiple stages of sampling and nonresponse that occur at different points in the survey process. Test data was populated and analyzed in SPSS to ensure the logic and randomizations were working as intended before launching the survey. To ensure high-quality data, data quality checks were performed to identify any respondents showing clear patterns of satisficing. The cumulative response rate accounting for nonresponse to the recruitment surveys and attrition is 2.5%. The break-off rate among individuals who logged onto the survey and completed at least one item is 0.2%. Sampling errors and test of statistical significance take into account the effect of weighting. Question wording and practical difficulties in conducting surveys can also introduce error or bias into the findings of opinion polls. The sample weighting was accomplished using an iterative proportional fitting process that simultaneously balanced the distributions of all variables. Stratified sampling methods were used and weights were trimmed not to exceed 3. Average margins of error, at the 95% confidence level, are +/-2%. The design effect for the survey was 1.3. For tabulation purposes, percentage points are rounded to the nearest whole number. The precision of the online polls was measured using a Bayesian credibility interval. Confirmatory factor analysis was employed to test for the reliability and validity of measurement instruments. Descriptive statistical analysis and multivariate inferential tests were undertaken for the survey responses and for the purpose of variable reduction in regression modeling. Multivariate analyses, and not univariate associations with outcomes, are more likely to factor out confounding covariates and more precisely determine the relative significance of individual variables. Independent *t*-tests for continuous variables or chi-square tests for categorical variables were employed. An Internet-based survey software program was utilized for the delivery and collection of responses. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. An informed e-consent was obtained from individual participants. Study participants were informed clearly about their freedom to opt out of the study at any point of time without providing justification for doing so.

5. Results and Discussion

Individuals entirely disagreeing with vaccination (anti-vaxxers) should be differentiated from persons who have legitimate vaccine apprehensions and dilemmas (vaccine hesitators). (Brüssow, 2021) COVID-19 vaccine hesitant individuals may perceive that the government does not want to pay citizens to get vaccinated if the achievable vaccines are safe and effective. (Largent and Miller, 2021) Vaccine hesitancy may subvert endeavors (Dobson-Lohman and Potcovaru, 2020; Lăzăroiu et al., 2020) to control COVID-19. (Robertson et al., 2021) (Tables 1–11)

Table 1 Should the immunization eventually be required in schools?

91%	argue that schools should require students to get the shot when children are eligible.
97%	declare that teachers should have to show proof of inoculation to return to in-person classes.
76%	would be comfortable showing their paper immunization document or a digital pass on their smartphone.
62%	would be okay with linking their inoculation record to their personal identification card.

Sources: Patch; our survey among 5,900 individuals conducted January 2021.

Table 2 How confident are you that the COVID-19 vaccines were properly tested for safety and effectiveness? (%)

	Extremely/Very confident	Somewhat confident	Not too/Not at all confident
Vaccinated	67	27	6
Will get vaccine	35	38	27
Will not get vaccine	4	21	75

Sources: AP-NORC; our survey among 5,900 individuals conducted January 2021.

Table 3 Reasons for not getting the COVID-19 vaccine. Select all that apply. (%)

I am concerned about side effects.	79
The development of vaccines is too rushed.	54
I want to see how it impacts other people before getting it myself.	61
I am concerned about the ingredients in the vaccine	44
I don't think it would protect me.	23
Someone I know told me about a bad experience getting vaccinated.	56
I don't like getting needles.	12
The vaccine could give me COVID-19.	4
It will likely be required by my job.	12

Sources: McKinsey; our survey among 5,900 individuals conducted January 2021.

Table 4 % who say hearing each would make them more likely to get vaccinated for COVID-19

The vaccines are highly effective in preventing illness.	61
The vaccine will help protect you from getting sick.	57
The quickest way for life to return to normal is for most people to get vaccinated.	55
Millions of people have safely been vaccinated.	50
We need people to get vaccinated to get the U.S. economy back on track.	46
A doctor/health provider you trust got the vaccine.	42
There is no cost to get the vaccine.	39
A close friend/family member got vaccinated.	36

Sources: KFF; our survey among 5,900 individuals conducted January 2021.

Table 5 Specific actions to increase COVID-19 vaccination convenience (relevance, %)

<i>Frictionless</i>	
Vaccinations embedded into life activities (e.g., school, work)	89
<i>Many high-proximity sites</i>	
High number of administration sites per capita	92
Short walking distance, particularly for urban residents or employees	89
Short driving distance or short distance from public transportation	88
Sites in more distributed rural communities	85
<i>Diverse settings</i>	
Physician offices offering vaccine (including specialists)	79
Pharmacies	81
Alternative sites (e.g., in-home, drive-throughs, community centers, places of worship)	77
<i>Broad availability</i>	
Vaccine sites with extended hours (e.g., before and after work)	91
Vaccine sites with weekend hours	93
<i>Predictable, low wait times</i>	
Number of available appointments	88
Lower median wait times across sites	86
Sites with vaccination on demand	85
<i>Ease of identification and navigation</i>	
Transparent, reliable information – including wait times – for all vaccine sites	89
Omnichannel communication (e.g., via phone, Internet, app)	88
Rapid scheduling (e.g., web-based app)	87
Push reminders for second dose appointment	88

Sources: McKinsey; our survey among 5,900 individuals conducted January 2021.

Table 6 Thinking about the current situation, which of the following statements holds true for you when it comes to taking the COVID-19 vaccine? (%)

I am ready to take the vaccine as soon as it is available for my age group.	54
I am still not sure and would like to wait a few months to ensure vaccine safety.	34
I will get vaccinated only if the government/school/college/employer makes it mandatory.	12

Sources: YouGov; our survey among 5,900 individuals conducted January 2021.

Whereas most individuals identify the collective upsides and intend to be vaccinated, focusing on the personal view may have a more significant impact for the subgroup who have not initially accepted it. (Freeman et al., 2021) Health information should aim personal choices (Lăzăroiu, 2013; Popescu Ljungholm and Popescu, 2021; Sheares et al., 2020) and emphasize individual risk of COVID-19. (Shaw et al., 2021) Whereas conventional hesitancy takes place in contexts where vaccine safety is clarified while the vaccine is available on a large scale, the situation is different with COVID-19 vaccination. (Callaghan et al., 2021) Determining and grasping COVID-19 vaccine hesitancy within certain subgroups (Robinson, 2020; Stevens, 2020; Vătămănescu et al., 2020) may be pivotal in subsequent public health messaging. (Murphy et al., 2021)

Table 7 Return to daily activities varies across COVID-19 vaccine receptivity. Select all that apply. (%)

	Already vaccinated	Interested	Cautious	Unlikely
Go to a standalone retail store	56	61	57	69
Fly on an airline	21	14	14	14
Stay overnight at a hotel	28	18	21	23
Go to a dentist	51	44	37	37
Attend a get-together with people outside of my immediate family (people that I live with) indoors	17	13	19	22
Attend a get-together with people outside of my immediate family (people that I live with) outdoors	16	12	16	16
Eat at a restaurant indoors	29	29	33	41
Go to a fitness center/gym	21	14	15	12

Sources: McKinsey; our survey among 5,900 individuals conducted January 2021.

Table 8 % who say they are very or somewhat concerned about each of the following when it comes to the COVID-19 vaccine. Select all that apply. (%)

Might experience serious side effects	88
The COVID-19 vaccines are not as safe as they are said to be.	84
Might be required to get vaccine even if they don't want to	82
Might need to miss work if the side effects of the vaccine make them feel sick for a day or more	78
The COVID-19 vaccine may negatively impact their fertility in the future.	56
May be required to provide a social security number or government issued ID in order to get the COVID-19 vaccine	61
Won't be able to get the vaccine from a place they trust	43
Might have to pay an out-of-pocket cost to get the COVID-19 vaccine	47
Might need to take time off work to go and get the COVID vaccine	56
It will be difficult to travel to a vaccination site.	23
The COVID-19 vaccines contain fetal cells.	8
You should not get the vaccine if you have already had COVID-19.	39
The COVID-19 vaccines can change your DNA.	5

Sources: KFF; our survey among 5,900 individuals conducted January 2021.

Table 9 Which of the following, if any, concerns do you have about COVID-19 vaccines? Select all that apply. (%)

Adverse effects that outweigh the risk for COVID-19	79
Efficacy	76
Speed of development	67
Expedited regulatory assessment	64
Vaccines from some companies may be better than those from others	62

Sources: Washington Post; Kaiser Family Foundation; Medscape; our survey among 5,900 individuals conducted January 2021.

Table 10 % of adults are asked how they feel about getting vaccinated or having access to a COVID-19 vaccine

Optimistic	20
Relieved	14
Skeptical	9
Happy	8
Anxious	8
Confident	7
Excited	3
Afraid	7
Indifferent	4
Angry	10
Sad	8

Sources: Morning Consult; our survey among 5,900 individuals conducted January 2021.

Table 11 Opinions on vaccination fall into three segments (relevance, %)

<i>Opposers</i>	
Promulgate freedom of choice	76
Believe in the science but don't want to be mandated	72
Feel vaccines will cause defects or other health problems	19
Promote protection from God, and opt to use homeopathic remedies and rely on natural immunity	7
<i>Confident</i>	
Promote and cite science	88
Believe in the goal of broad immunity	68
Follow policies and guidelines	79
Proselytize protection	77
Believe everyone needs to contribute	86
<i>Fence-sitters</i>	
Unsure of the science	76
Unsure of the long-term possible side effects	79
Prefer to watch and wait	81
Skeptical of vaccine development; worried it was too fast	77

Sources: W2O; our survey among 5,900 individuals conducted January 2021.

The incessant emergence of additional COVID-19 variants with significant vaccine escape capacity would have adverse consequences for health and wellbeing of individuals (Green, 2020; Rogers, 2021) and would bring about additional economic ramifications while initiating more revaccination/booster campaigns. (Forman et al., 2021) Grasping whether certain subgroups of the population tend to be COVID-19 vaccine hesitant will assist in the configuration of vaccination schemes to ensure suitable population coverage to attain herd immunity and reduce health imbalances. (Robertson et al., 2021) Public health messaging endeavors focusing on boosting the uptake of a COVID-19 vaccine may call upon a thorough knowledge of the psychology of vaccine hesitant and resistant persons. (Murphy et al., 2021)

6. Conclusions and Implications

Readiness to get vaccinated against COVID-19 is dissimilar by age, gender, and race. (Shaw et al., 2021) COVID-19 vaccine hesitancy is extensive amongst marginalized communities who have been worst affected by the pandemic. (Forman et al., 2021) The chief grounds for vaccine hesitancy are fears as regards repercussions of a COVID-19 vaccine. (Robertson et al., 2021) There are heterogeneous psychological dispositions covering personality, cognitive styles, emotion, convictions, confidence, and socio-political positions (Popescu Ljungholm and Olah, 2020; Shchekotin et al., 2021; Williams et al., 2020) differentiating hesitant or resistant persons to a COVID-19 vaccine from individuals who are accepting it. (Murphy et al., 2021) Trust in web-based vaccine-registration systems has impeded subgroups having less access to technology, while work obligations and restricted childcare alternatives decrease their capacity to chase COVID-19 vaccination appointments. (Quinn and Andrasik, 2021) Focusing on personal upside is more effective than highlighting collective benefit for COVID-19 vaccine strongly hesitant persons. (Freeman et al., 2021) As limitations, this article focuses only on COVID-19 vaccine hesitancy attitudes, behaviors, and perceptions. Further research should consider the safety and effectiveness of COVID-19 vaccines.

Compliance with ethical standards

Animal studies statement verification

This article does not require animal studies verification.

Identifiable images and data statement verification

This article does not require identifiable images and data statement verification.

Code availability

This project has employed statistical analytical techniques standard in all statistical packages.

Data and materials availability

All research mentioned has been published and data is available from respective outlets. The statistics that support the findings of this study can be found in the supplementary material of this article. Note: The publisher is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing content) should be directed to the corresponding author for the article.

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Author contributions

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

Conflict of interest statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Would COVID-19 Immunity Passports Undermine the Right to Health of Individuals?

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ABSTRACT. Based on an in-depth survey of the literature, the purpose of the paper is to explore whether COVID-19 immunity passports might undermine the right to health of individuals. Using and replicating data from Ada Lovelace Institute, Censuswide, de Beaumont, and Promoleaf, I performed analyses and made estimates regarding whether demanding individuals who refuse vaccination to bear certain repercussions for their non-acceptance is fair. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

Keywords: COVID-19; immunity passport; human rights; health; ethics; certificate

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1. Introduction

Demanding individuals who refuse COVID-19 vaccination to bear certain repercussions for their non-acceptance is equitable if collectively such hesitancy makes herd immunity unattainable. (Hall and Studdert, 2021) Persons from states that cannot or are reluctant to adopt COVID-19 immunity passport schemes may be excluded from travelling to countries that condition them. (Kofler and Baylis, 2020) As COVID-19 vaccination programs are being carried out on a large scale, the risks generated by SARS-CoV-2 reservoirs should be evaluated and reduced as regards subgroups that cannot or do not plan to be vaccinated. (Van Oosterhout, 2021) Certain concrete hesitancy may disappear as people identify reputable figures being COVID-19 vaccinated with no detrimental health consequences and as related reports are pretty rare. (Largent and Miller, 2021)

2. Conceptual Framework and Literature Review

Advantages of the introduction of the immunological passport for individuals recovered from SARS CoV-2 comprise: the continuation of the immune reaction has not yet been established scientifically because of the insufficient period of effectiveness of observations as regards SARS-CoV-2 disease; it is unclear whether vaccination of a previously SARS-CoV-2 infected individual has any downside for the immune reaction or safety of the vaccine; the evaluation should encompass the clinical diagnosis, centered on cumulative standard symptoms, but infrequent symptoms can be accommodated; and the ethical features of an immune passport should be investigated, taking into account the likelihood of discrimination among individuals (Balica, 2019; Fialova and Vasenska, 2020; Lăzăroiu et al., 2017; Pelau et al., 2021) and the possibility of exclusion. (Fiocchi and Jensen-Jarolim, 2021) Insofar as COVID-19 vaccine passports are convenient, regulating against them is consistent only when they would bring about worse issues than they would elucidate. (Tanner and Flood, 2021) COVID-19 immunity passports would establish an additional risk for bias if employers, insurance firms, law-enforcement officers, etc. could access personal health data aiming their own upside. (Kofler and Baylis, 2020) The incessant monitoring of the COVID-19, the large-scale unveiling of vaccines, inoculation of susceptible host species, together with vaccine passports, constitute decisive measures against such a contagious disease. (Van Oosterhout, 2021) In the light of the scheme option between: a COVID-19 vaccine passport program that would shortly enable vaccinated individuals to travel, attend public events, and congregate for religious services unobstructedly, and continuing, blanket government interdictions as regards such undertakings, the former is not so constitutionally questionable. (Cope and Stremitzer, 2021)

3. Methodology and Empirical Analysis

Using and replicating data from Ada Lovelace Institute, Censuswide, de Beaumont, and Promoleaf, I performed analyses and made estimates regarding whether demanding individuals who refuse vaccination to bear certain repercussions for their non-acceptance is fair. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

4. Survey Methods and Materials

The interviews were conducted online and data were weighted by five variables (age, race/ethnicity, gender, education, and geographic region) using the Census Bureau's American Community Survey to reflect reliably and accurately the demographic composition of the United States. Any survey which did not reach greater than 50% completion was removed from subsequent analysis to ensure quality. The data was weighted in a multistep process that accounts for multiple stages of sampling and

nonresponse that occur at different points in the survey process. Test data was populated and analyzed in SPSS to ensure the logic and randomizations were working as intended before launching the survey. To ensure high-quality data, data quality checks were performed to identify any respondents showing clear patterns of satisficing. The cumulative response rate accounting for nonresponse to the recruitment surveys and attrition is 2.5%. The break-off rate among individuals who logged onto the survey and completed at least one item is 0.2%. Sampling errors and test of statistical significance take into account the effect of weighting. Question wording and practical difficulties in conducting surveys can also introduce error or bias into the findings of opinion polls. The sample weighting was accomplished using an iterative proportional fitting process that simultaneously balanced the distributions of all variables. Stratified sampling methods were used and weights were trimmed not to exceed 3. Average margins of error, at the 95% confidence level, are +/-2%. The design effect for the survey was 1.3. For tabulation purposes, percentage points are rounded to the nearest whole number. The precision of the online polls was measured using a Bayesian credibility interval. Confirmatory factor analysis was employed to test for the reliability and validity of measurement instruments. Descriptive statistical analysis and multivariate inferential tests were undertaken for the survey responses and for the purpose of variable reduction in regression modeling. Multivariate analyses, and not univariate associations with outcomes, are more likely to factor out confounding covariates and more precisely determine the relative significance of individual variables. Independent *t*-tests for continuous variables or chi-square tests for categorical variables were employed. An Internet-based survey software program was utilized for the delivery and collection of responses. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. An informed e-consent was obtained from individual participants. Study participants were informed clearly about their freedom to opt out of the study at any point of time without providing justification for doing so.

5. Results and Discussion

Although possibly ethically legitimate, a COVID-19 immunity certification program brings about ethical concerns as regards risk stratification derived from immunological status and subsequent non-identical reduction of restrictive measures on individuals and communities. (Voo et al., 2021) It would constitute a significant extravagance to provide payment as a catalyst for COVID-19 vaccination to persons who already feel extremely stimulated to get vaccinated without requiring or aiming an incentive payment and to people who demand only reassurance. (Largent and Miller, 2021) Platforms for SARS-CoV-2 immune certification may effortlessly be expanded to comprise additional types of personal health data (e.g., mental health records and genetic test outcomes). (Kofler and Baylis, 2020) (Tables 1–4)

Table 1 COVID-19 status certificates/vaccine passports can be identified through the common properties of linking health status (vaccine status and/or test results) with verification of identity, for the purpose of determining permissions, rights or freedoms (such as access to travel, leisure or work) (relevance, %)

By creating infrastructure for segregation and risk scoring at an individual level, and enabling third-parties to access health information, digital vaccine passports bring profound risks to individual rights and concepts of equity in society.	88
Vaccine passports could allow countries to reopen more safely, let those at lower risk of infection and transmission help to restart local economies, and allow people to reengage in social contact with reduced risk and anxiety.	87
A digital vaccine passport could provide a progressive return to a normal life, for those who meet the criteria now, while vaccines are distributed in the coming months and years.	86
The local and global inequalities and risks might outweigh the benefits and undermine societal notions of solidarity.	83
Any national or regional use of vaccine passports that contributes to hoarding or “vaccine nationalism” will produce extreme local manifestations of existing global inequalities – both in terms of health and economics.	81
Prioritizing national safety over global responsibility risks prolonging the COVID-19 pandemic for everyone by leaving the door open to mutations that are not well controlled by existing vaccines.	79
The progress in accessing and administering vaccinations, local levels of uptake and reasons for vaccine hesitancy, legal regimes, and ethical and social considerations will weigh heavily on whether and how such schemes should go ahead.	77
Even countries that seem to have superficially similar conditions may differ on important and relevant aspects that will need local deliberation of what is justifiable and achievable practically, from the extent of existing digital infrastructure to public comfort with the use of technology, and attitudes towards increased visibility to the state or to private companies.	75
The structure of the economy (whether it is highly reliant on tourism for example, as well as the level of access to the internet and smartphones) will be important factors in calculating marginal costs and benefits of digital vaccine passports.	73
Countries with minimal public health restrictions in place and low rates of COVID-19 face very different calculations in terms of benefits and costs to those in highly restrictive lockdowns with a high rate of COVID-19 in the community.	72
Most of the vaccines now available offer a high level of protection against serious illness from the currently dominant strains of the virus, but it is still too early to know the level of protection offered by individual vaccines in terms of duration, generalizability, efficacy regarding mutations and protection against transmission.	71
Any vaccine passport system would need to be dynamic, taking into account the differing efficacy of each vaccine, known differences in efficacy against circulating variants, and the change in efficacy over time.	70

A vaccine passport should not be seen as a “safe” pass or a proxy for immunity, rather as a lowering of risk that might be comparable to, or work in combination with, other public health measures.	69
Calculating an individual’s risk based on providing test results within a vaccine passport scheme avoids some of the problems associated with relying solely on vaccination, including access, take-up and coverage.	68
Evidence of a negative test offers no “future” protection after the window in which someone can be deemed low risk, making it less desirable for a move to another city or entry to another country.	68
If consistently accurate point-of-care tests become available, that might make testing a more viable route for a passport system, but would also reduce the need for a digital record – as people could simply show the test at the point of access.	67
Almost all models of vaccine passport attempt to manage risk at an individual level rather than using collective and contextual measures: they class an individual as lower risk based on their vaccine or test status, rather than a more contextual risk of local infection numbers and R rate in a given area.	67
The use of a vaccine passport affects vaccine take-up by hesitant groups, providing a clear incentive to disengaged or busy people, but could heighten anxiety from those who distrust the vaccine or the state, if it is seen as mandatory vaccination or surveillance by the back door.	66

Sources: Ada Lovelace Institute; my survey among 5,400 individuals conducted February 2021.

Table 2 Preferred term for a vaccine confirmation document
(% of respondents choosing term as first choice)

Verification	34
Certificate	20
Passport	18
Credential	10
Ticket	8
Permit	7
Visa	3

Sources: de Beaumont; my survey among 5,400 individuals conducted February 2021.

Private entities require criteria and bounds (Bratu, 2020; Fu and Cheng, 2020; Lăzăroiu, 2017), e.g., unambiguous regulations interdicting uses of COVID-19 vaccine certification that represent illegitimate bias. (Hall and Studdert, 2021) By categorizing citizens into various groups of risk of infection and contagiousness, a COVID-19 immunity certification scheme may lead to discriminatory treatment of persons that is derived from ethically nonessential aspects as regards ethnicity, religion, or socioeconomic status. (Voo et al., 2021) For individuals who cannot get inoculated due to their health status or religion, a COVID-19 vaccine passport regime may unjustifiably circumvent their return to normalcy. (Tanner and Flood, 2021) It is ethically untoward to limit the mobility of persons (Nica, 2017) who do not present a risk to other people. (Fiocchi and Jensen-Jarolim, 2021)

Table 3 COVID-19 vaccine passport systems will contain sensitive personal information (relevance, %)

Anyone developing a COVID certification scheme should consider a series of design principles at all stages of developing a system that will help to minimize harms and the risk of unintended consequences, and maximize the chances of a system working and commanding public confidence.	88
Some COVID status certification services would require robust security, particularly if they are bringing together sensitive information. Higher technical security may pose a trade-off for accessibility which will need to be weighed carefully.	87
It is essential that it is clear whether digital vaccine passports will create or expand existing infrastructure, in particular as regards to digital identity.	86
Governments that do not currently use digital identity systems should ensure they do not rush into them because of vaccine certification without due thought, debate and deliberation to explore the potential benefits (greater interoperability of identity, joined up services, etc.) as well as the practical and privacy concerns.	84
Even if governments opted to prohibit the use of vaccine certification, informal uses are possible, so even here governments should play a role in public communication or guidance.	83
Adapting existing systems to accommodate vaccine passports brings risks. If existing systems, especially identity ones, are flawed, existing problems may become further entrenched.	82
If a system is intended to be a temporary response to avoid prolonging lockdowns and to ease other public health restrictions, its lifecycle would depend to a significant degree on the background rate of COVID-19, the speed of vaccination within a jurisdiction, and the subsequent impact of health measures on the risk posed by COVID-19.	82
A vaccine passport scheme may have some utility when a sizeable minority of the population has had two doses, but before a nation has achieved herd immunity. It may have less utility when only a very small percentage of the population is vaccinated (existing lockdowns would be likely to continue, there may not be enough economic incentive for businesses to reopen), or with a large percentage of the population having been vaccinated (herd immunity will have some effect).	81
There may only be a very limited window where vaccine passports could be of any use.	81
Mass vaccination would likely bring the risk to society of COVID-19 down to the level of other illnesses already circulating in society, such as seasonal flu.	80
A COVID-19 passport system might have some appeal in the transition from a pandemic to steadier conditions – when, as with the flu, the disease was endemic but vaccination, herd immunity and better treatment had made it less deadly.	80
Following mass vaccination, any future waves would have a more tolerable impact on health, perhaps comparable impact to annual flu seasons unless the virus mutated into a variant against which existing vaccines are not effective.	79
It is not clear how passports would offer significant public health benefit in a situation of low transmission and high population immunity.	79

The potential scenario of a vaccine-resistant mutation complicates the role of a passport. Those who had previously been considered lower risk would no longer be, and if people behaved as though they were protected because they had a passport, that could potentially accelerate the spread of the disease. If only one vaccine was ineffective against a new variant, vaccine passports could be used to allow a subset of the population to continue movement, or government guidance could pivot to a system that was reliant on testing rather than vaccinations.	79
The end of the COVID vaccine passport lifecycle occurs when it is deemed no longer necessary. Possible end points could include cases falling below a certain level.	78
There will be opportunity costs to focusing on COVID vaccine passports rather than other interventions. Certification schemes will involve political, financial and human capital costs that a government will need to weigh against their benefits.	78
Given that governments have finite resources and attention, focusing on certification schemes should be reviewed in comparison to the costs and benefits of further investment in alternative public health measures intended to lift restrictions, such as investing in greater vaccine supply and roll-out or attempting to improve test, trace and isolate schemes.	77

Sources: Ada Lovelace Institute; my survey among 5,400 individuals conducted February 2021.

Table 4 What precautions would you want in place to be comfortable traveling for business again? (%)

Enforced mask-wearing	59
Recent negative tests for all travelers	55
Increased sanitation	53
Enforced social distancing	52
Vaccines for all travelers	49

Sources: Promoleaf; Censuswide; my survey among 5,400 individuals conducted February 2021.

The introduction of COVID-19 vaccine passports may be pivotal in enabling safe, free movement throughout this pandemic, facilitating continuation of numerous social and economic activities (Androniceanu, 2021; Davies, 2020; Lăzăroiu, 2013; Morgan et al., 2021; Walker et al., 2021), while assisting in discontinuing transmission chains by preventing deaths and putting a stop to the evolution of SARS-CoV-2. (Van Oosterhout, 2021) With all the required cutting-edge technological devices (Chessell and Neguriță, 2020; Kliestik et al., 2020; Lyons and Lăzăroiu, 2020; Svabova et al., 2020), locating the persons who can go from one place to another freely, attend hotels, and perform work activities is crucial. (Fiocchi and Jensen-Jarolim, 2021) Providing payment as a catalyst for COVID-19 vaccination unjustifiably treats unfairly individuals who have become unemployed, put up with food and housing insecurity, or have fallen into poverty throughout the pandemic. (Largent and Miller, 2021) Recurring and adverse consequences of COVID-19 vaccines may decrease the rate of disposition to get inoculated. (Khubchandani et al., 2021)

6. Conclusions and Implications

Governments may be pivotal in reducing discriminations developing out of COVID-19 private certification by increasing the allocation of vaccines while intensifying endeavors to reach inadequately serviced and marginalized communities. (Hall and Studdert, 2021) Governments that implement COVID-19 immunity certification to mitigate restrictive measures should ensure that non-immune persons who need to isolate or preserve physical distance do not confront an immoderate volume of issues. (Voo et al., 2021) The preferential large-scale distribution of COVID-19 vaccine access is extremely disconcerting, but not establishing vaccine passports on nonpartisanship reasons would intensify the negative economic consequences (Coleman, 2020; Krizanova et al., 2019; Mihăilă et al., 2016; Popescu, 2018; Vătămănescu et al., 2020) of the pandemic. (Cope and Stremitzer, 2021) Current imbalances threaten the subsequent fair treatment of any COVID-19 vaccine passport program. (Tanner and Flood, 2021) The extended repercussions of the inoculations will impact the uptake of COVID-19 vaccines. (Khubchandani et al., 2021) As limitations, this article focuses only on whether COVID-19 immunity passports might undermine the right to health of individuals. Further research should consider ethical concerns as regards COVID-19 immunity certification programs.

Compliance with ethical standards

Animal studies statement verification

This article does not require animal studies verification.

Identifiable images and data statement verification

This article does not require identifiable images and data statement verification.

Code availability

This project has employed statistical analytical techniques standard in all statistical packages.

Data and materials availability

All research mentioned has been published and data is available from respective outlets. The statistics that support the findings of this study can be found in the supplementary material of this article. Note: The publisher is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing content) should be directed to the corresponding author for the article.

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Author contributions

The author confirms being the sole contributor of this work and approved it for publication.

Conflict of interest statement

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Ethical Acceptability of COVID-19 Immunity Certification

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ABSTRACT. This article presents an empirical study carried out to evaluate and analyze ethical acceptability of COVID-19 immunity certification. Building my argument by drawing on data collected from Ada Lovelace Institute, Censuswide, de Beaumont, Gallup, King’s College London, Medscape, Promoleaf, the Serco Institute, Survation, and University of Bristol, I performed analyses and made estimates regarding the fair use of COVID-19 immunity passports. Data collected from 5,200 respondents are tested against the research model. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

Keywords: COVID-19; immunity certification; ethics; public health; vaccine; freedom

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1. Introduction

As COVID-19 certification programs grow rapidly, complementary recommendations will be required (Bailey, 2021; Lăzăroiu, 2017), accompanied by thorough implementation of rules (e.g., consideration of disagreements and whistleblower reports). (Hall and Studdert, 2021) The demands for serological tests for COVID-19 immune passport schemes are likely to be less limitative as the pandemic advances: seroprevalence will rise, resulting in increased positive predictive values, and as individuals and communities implement protective behaviors that restrict transmission, the reproductive volume will diminish. (Larremore et al., 2021) Governments should aim to prevent public and private COVID-19 immunity certification schemes from making downsides substandard (Lambovska et al., 2021; Lyons and Lăzăroiu, 2020; Pelau et al., 2021; Vătămănescu et al., 2020) as regards prospects for health care, employment, housing, etc. for certain subgroups. (Voo et al., 2021)

2. Conceptual Framework and Literature Review

COVID-19 vaccine availability is not the same as its accessibility or efficacy. (Su et al., 2021) COVID-19 vaccine passports for travel may necessitate coherent digital data systems that will bring about additional intricacies as regards international law and confidence. (Forman et al., 2021) COVID-19 government-provided vaccine passports would quite definitely satisfy requirements under numerous national legal systems. (Cope and Stremitzer, 2021) Instead of COVID-19 immunity passports, apps that assist persons in making safe options as regards their own movements are to be considered as of greater importance than other matters. (Kofler and Baylis, 2020) There is relevant political and public unwillingness to accept COVID-19 passports, as certain subgroups are apprehensive about their discriminate use against individuals declining a COVID-19 vaccine, consequently applying pressure to increase vaccination rates. (Van Oosterhout, 2021) COVID-19-related immunization coverage enough to attain community immunity would generate substantial health, social, and economic upsides. (Gostin et al., 2021) There is an unambiguous public health interest in strictly monitoring large-scale travel throughout the COVID-19 pandemic, and governments and airlines should adopt evidence of vaccination as a requirement for air transportation. (Tanner and Flood, 2021) Private organizations should ensure that their implementation of COVID-19 immunity certification is equitable and in compliance with governmental schemes that attempt to decrease the intensification of social imbalances due to the current pandemic. (Voo et al., 2021)

3. Methodology and Empirical Analysis

Building my argument by drawing on data collected from Ada Lovelace Institute, Censuswide, de Beaumont, Gallup, King's College London, Medscape, Promoleaf, the Serco Institute, Suration, and University of Bristol, I performed analyses and made estimates regarding the fair use of COVID-19 immunity passports. Data collected from 5,200 respondents are tested against the research model. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

4. Survey Methods and Materials

The interviews were conducted online and data were weighted by five variables (age, race/ethnicity, gender, education, and geographic region) using the Census Bureau's American Community Survey to reflect reliably and accurately the demographic composition of the United States. Any survey which did not reach greater than 50% completion was removed from subsequent analysis to ensure quality. The data was weighted in a multistep process that accounts for multiple stages of sampling and nonresponse that occur at different points in the survey process. Test data was

populated and analyzed in SPSS to ensure the logic and randomizations were working as intended before launching the survey. To ensure high-quality data, data quality checks were performed to identify any respondents showing clear patterns of satisficing. The cumulative response rate accounting for nonresponse to the recruitment surveys and attrition is 2.5%. The break-off rate among individuals who logged onto the survey and completed at least one item is 0.2%. Sampling errors and test of statistical significance take into account the effect of weighting. Question wording and practical difficulties in conducting surveys can also introduce error or bias into the findings of opinion polls. The sample weighting was accomplished using an iterative proportional fitting process that simultaneously balanced the distributions of all variables. Stratified sampling methods were used and weights were trimmed not to exceed 3. Average margins of error, at the 95% confidence level, are +/-2%. The design effect for the survey was 1.3. For tabulation purposes, percentage points are rounded to the nearest whole number. The precision of the online polls was measured using a Bayesian credibility interval. Confirmatory factor analysis was employed to test for the reliability and validity of measurement instruments. Descriptive statistical analysis and multivariate inferential tests were undertaken for the survey responses and for the purpose of variable reduction in regression modeling. Multivariate analyses, and not univariate associations with outcomes, are more likely to factor out confounding covariates and more precisely determine the relative significance of individual variables. Independent *t*-tests for continuous variables or chi-square tests for categorical variables were employed. An Internet-based survey software program was utilized for the delivery and collection of responses. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. An informed e-consent was obtained from individual participants. Study participants were informed clearly about their freedom to opt out of the study at any point of time without providing justification for doing so.

5. Results and Discussion

On the understanding that governments do not remove COVID restrictions for all individuals, privileging vaccinated persons from such limitations might be demanded by certain constitutional systems. (Cope and Stremitzer, 2021) Any COVID-19 vaccine that comes to market should be rigorously tested and maintained to significant safety criteria to increase public confidence. (Forman et al., 2021) Risks to freedom, equity, and public health are intrinsic to any platform that is configured to segregate society (Bell, 2020; Lăzăroiu, 2018; Mihăilă, 2017; Robinson, 2021) by use of biological data. (Kofler and Baylis, 2020) Inconsistent COVID-19 health and communication schemes and regulations may pose a threat to travelers' grasp of the particular directives to follow, subsequently leading to serious personal and public health effects. (Su et al., 2021) (Tables 1–9)

Table 1 The introduction of any vaccine passport system inevitably intersects with a wide range of legal concerns (relevance, %)

The COVID-19 pandemic is necessarily unfair and responses to it, such as lockdowns, have differential effects even if the same rule is applied to all. Some can work from home in secure jobs, while others lose their jobs and businesses, and those providing healthcare and essential services are required to expose themselves to risk.	89
Benefits of COVID status certifications schemes could spill over to those not eligible. For example, greater economic activity would allow the continued existence of hospitality, leisure and cultural venues that might have otherwise been forced to close, and would preserve them for others to access once they become eligible for certification or once restrictions are lifted for all.	88
Certification schemes may exacerbate inequalities between those who might be free to return to work or seek certain kinds of employment, and those uncertified who cannot.	88
Existing distrust of the state, identity infrastructure and vaccines could put some groups at a particular disadvantage.	87
Access to digital technology, forms of identification, tests and vaccines is already unequal, and COVID-19 status certification schemes may unintentionally mirror and reinforce existing inequalities without wider programs for addressing health inequalities.	87
COVID-19 status certification systems discriminate on the basis of COVID-19 risk by design.	86
A vaccination requirement allowing differential access could be challenged on grounds of indirect discrimination on the basis of age, at least until all adults have had fair opportunity to have a COVID-19 vaccination.	83
Many discrimination concerns may be avoided if appropriate alternatives to vaccination certification are available, for example by exempting certain groups or through providing a negative viral test alternative.	82
Labeling people on the basis of their COVID-19 status could happen informally without any certification schemes, as individuals already have access to and can share their own vaccination status, but certification schemes could increase the salience of those distinctions and amplify those distinctions by creating social situations that can only be accessed by those in possession of “immunoprivilege.”	81
The structure of the global economy may push countries whose citizens might be excluded by international COVID-19 vaccine passport schemes into supporting their development.	80
Many low-income countries are dependent on tourism, and thus are incentivized to support schemes in order to restart the flow of visitors.	79
For countries reliant on tourism, and especially lower-income ones with a comparatively younger population and fewer economic alternatives, taking on the risks of virus transmission and discrimination may be worth it for the net economic and wider health benefits.	78
There is pressure on governments to acquire vaccine supplies, which triggers a form of “vaccine nationalism,” where richer countries are able to buy up supplies of vaccines where poorer ones can’t.	77

Tying movement to vaccine certification could entrench existing global inequalities, making international cooperation on any schemes even more important.	77
Any individual country's fate is tied to reaching international herd immunity, as we are already seeing with new strains emerging.	76
Regulators and independent bodies with relevant remits, through the enforcement of existing regulation and issuance of context-specific guidance, will have a role in legal accountability and oversight of COVID-19 status certification systems, both before they are implemented and during any roll-out.	76
Many use cases will necessarily cut across multiple remits, as workplace schemes might engage data protection, contract law, equalities, and workplace health and safety concerns.	75
If governments want to change a law or make a special carve-out for status certification schemes, they should know why the laws preventing it were enacted in the first place and be able to explain clearly why legal changes are necessary and proportionate, acknowledging potential unintended consequences.	75
Governments must act urgently to create clear and specific guidelines and law around any uses, mechanisms for enforcement and methods of legal redress of COVID-19 status certification.	74
If a COVID-19 certification scheme is to be temporary, legislation should include clear sunset clauses and be accompanied by explanations as to how the system will be dismantled.	74

Sources: Ada Lovelace Institute; my survey among 5,200 individuals conducted February 2021.

Table 2 Would the possibility of being able to open up sooner and return to normal travel (the way it used to be) make you more likely to get the COVID-19 vaccine? (%)

Definitely	49
Probably	21
Possibly	13
Probably not	6
Definitely not	11

Sources: de Beaumont; my survey among 5,200 individuals conducted February 2021.

Barring COVID-19 vaccine passports will not restore common discriminations (Keane, 2020; Lăzăroiu et al., 2020; Nica, 2017), and there are indisputable circumstances in which demanding evidence of vaccination is convenient and judicious. (Tanner and Flood, 2021) Amplified social responsibility is required in the uptake of the vaccine and in compliance with directives developed to control the COVID-19 crisis. (Van Oosterhout, 2021) Incentivization of COVID-19 vaccine uptake may be ethically advisable. (Savulescu, 2021) Even though employers, health care, and educational organizations can supervise consonance with COVID-19-related mandates, there should be unambiguous mechanisms to implement population-wide vaccination procedures. (Gostin et al., 2021)

Table 3 In general, do you support or oppose a proposal to create a voluntary document that would verify if a person has been vaccinated against COVID-19? (%)

Strongly support	39
Somewhat support	28
Somewhat oppose	4
Strongly oppose	16
Don't know enough to say	8
I am against COVID-19 vaccines and refuse to get one	5

Sources: de Beaumont; my survey among 5,200 individuals conducted February 2021.

Table 4 As some companies, venues, and governments form plans to implement COVID-19 vaccine passports (and others pledge to prohibit them), individuals may soon face choices about whether to get such proof of vaccination to travel or participate in certain events. (%)

	Very likely	Likely	Somewhat likely	Slightly likely	Not at all likely
How likely would you be to get a vaccination passport to travel if proof of vaccination were required to do so?	58	24	9	6	3
How likely would you be to get a vaccination passport to attend an event if proof of vaccination were required to do so?	59	26	8	5	2

Sources: Medscape; my survey among 5,200 individuals conducted February 2021.

Table 5 For an international vaccine passport system to work you will need a secure, interoperable and agreed format: countries will need to agree what they will use to recognise a person as vaccinated. (yes, %)

Could there be an agreed digital vaccine passport system?	87
If so, technologies could be used to ensure that this system is secure?	85
If a country chooses to bring in a vaccine passporting system, will they only recognise vaccines which their own regulators have approved?	46
Will they choose to expand the range of acceptable vaccines for those with passports to a wider set of jobs?	54

Sources: The Serco Institute; Suration; my survey among 5,200 individuals conducted February 2021.

Table 6 Would you favor businesses requiring people to show proof of COVID-19 vaccination in order to do the following over the next several months? (yes, %)

Travel by airplane	61
Attend events with large crowds, such as sporting events or concerts	59
Go to your worksite to do your job	49
Stay in a hotel	46
Dine in at a restaurant	43

Sources: Gallup; my survey among 5,200 individuals conducted February 2021.

Table 7 Many business travelers are ready to get back on the road, but they are also concerned with safety.

71%	are in favor of a vaccine passport for those who travel regularly.
80%	feel the families of business travelers should also be vaccinated.
47%	stated that everyone who was on the plane should be vaccinated.
82%	would pay for an early vaccine if it meant they could resume business travel.
67%	claim that their job was less satisfying since they could not travel.
73%	feel companies should require people to be vaccinated before they can travel again.

Sources: Promoleaf; Censuswide; my survey among 5,200 individuals conducted February 2021.

Table 8 % who think each of the following statements about vaccination passports are true

Vaccine passports will be sold on the black market.	39
People without a vaccination will be discriminated against.	41
Vaccination passports will be used by the government for surveillance.	19
Vaccination passports will reduce our civil liberties.	22

Sources: University of Bristol; King’s College London; my survey among 5,200 individuals conducted February 2021.

Table 9 Before progressing further with plans for COVID-19 vaccine passports, governments should ... (relevance, %)

specify the purpose of a vaccine passport and articulate the specific problems it seeks to solve.	87
weigh alternative options and existing infrastructure, policy or practice to consider whether any new system and its overheads are proportionate for specific use cases.	85
clearly define where use of certification will be permitted, and set out the scientific evidence on the impact of these systems.	83
clearly define where the use of certification will not be acceptable, and whether any population groups should be exempted	82
consult with representatives of workers and employers, and issue clear guidance on the use of vaccine passports in the workplace.	81
develop success measures and a model for evaluation.	79

Sources: Ada Lovelace Institute; my survey among 5,200 individuals conducted February 2021.

As a relevant proportion of COVID-19 vaccination can reduce possible inequities arising from nonacceptance, it may be required to take into account insisting on the uptake of vaccines. (Van Oosterhout, 2021) Restricted COVID-19 vaccine mandates with public backing in certain high-risk or exclusive settings and with more extended safety data can integrate into an all-encompassing set of interventions to go back to normalcy. (Gostin et al., 2021) The character and underlying forces of immune reactions to SARS-CoV-2 infection are to be clarified, additionally obscuring the representation of immune passports. (Larremore et al., 2021) Individuals who are categorically for or against the COVID-19 vaccine have irreversible attitudes and further information or time would not influence them. (Momplaisir et al., 2021)

6. Conclusions and Implications

Governments should ensure that certification rules are associated with the most relevant scientific information (Mihăilă et al., 2016; Newburn, 2020; Reza, 2020) as regards vaccine effectiveness and restrictions: the social intricacy of COVID-19 necessitates assistance (Fialova and Vasenska, 2020; Lăzăroiu and Adams, 2020; Smith, 2020) adjusted to ranges of risk. (Hall and Studdert, 2021) People may get documents fraudulently, by use of corruption, transfer between them or falsification, bringing about additional health threats, as individuals claiming COVID-19 immunity may keep on transmitting the virus. (Kofler and Baylis, 2020) A COVID-19 vaccine may be adequate in decreasing community transmission and/or hindering disease progress in individuals. (Savulescu, 2021) Although COVID-19 vaccines are increasingly available, standard safety measures are crucial in saving from harm personal and public health against COVID-19. (Su et al., 2021) Obstacles to COVID-19 vaccine uptake comprise concerns as regards safety, usefulness, inaccuracy, the lobbying of the scientific process, the expeditious interval for vaccine development, and lack of confidence in the scientific and medical communities. (Momplaisir et al., 2021) As limitations, this article focuses only on ethical acceptability of COVID-19 immunity certification. Further research should consider how significant degree of vaccination can mitigate likely discriminations developing out of noncompliance.

Compliance with ethical standards

Animal studies statement verification

This article does not require animal studies verification.

Identifiable images and data statement verification

This article does not require identifiable images and data statement verification.

Code availability

This project has employed statistical analytical techniques standard in all statistical packages.

Data and materials availability

All research mentioned has been published and data is available from respective outlets. The statistics that support the findings of this study can be found in the supplementary material of this article. Note: The publisher is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing content) should be directed to the corresponding author for the article.

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Author contributions

The author confirms being the sole contributor of this work and approved it for publication.

Conflict of interest statement

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Restricting Human Rights and Increasing Discrimination through COVID-19 Vaccination Certificates: Necessity, Benefits, Risks, and Costs

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ABSTRACT. We draw on a substantial body of theoretical and empirical research on restricting human rights and increasing discrimination through COVID-19 vaccination certificates, and to explore this, we inspected, used, and replicated survey data from Access Now, Ada Lovelace Institute, Associated Press, Dynata, Morning Consult, and Redpoint Global, performing analyses and making estimates regarding rational and ethical COVID-19 vaccine certification schemes. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

Keywords: COVID-19; vaccination certificate; human rights; discrimination; ethics

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1. Introduction

COVID-19 vaccine passports could take various forms and be employed to certify that a certain person is at irrelevant risk of acquiring or spreading SARS-CoV-2. (Brown et al., 2021) Rational and ethical COVID-19 vaccine certification schemes will adapt continually as vaccine availability consolidates, herd immunity approaches, and scientific validation of effectiveness or restrictions increases. Clarifying how long vaccines are operational and how adequately they protect against additional variants is pivotal. (Hall and Studdert, 2021)

2. Conceptual Framework and Literature Review

Throughout time intervals of lockdown, COVID-19 immunity passports may enable immune persons to act in accordance with less inflexible demands as regards physical distancing and travel, facilitating their return to work, attending to vulnerable individuals, visiting the loved ones, or performing other activities that expose them to such a contagious virus. (Brown et al., 2021) COVID-19 immunity passports can be employed to mitigate restrictive measures and enable infected and recovered persons to have a normal life again. (Voo et al., 2020) COVID-19 immunity-based licenses bring about significant concerns as regards equity, accountability, and ineffectual incentives, while fostering individual freedom and enhancing public health. (Persad and Emanuel, 2020) Disadvantages of the introduction of the immunological passport for individuals gotten better SARS-CoV-2 encompass the continuance of the immune reaction after a natural infection is possible; a previously SARS-CoV-2 infected individual need not be considered as of greater importance to be vaccinated; despite the possibility that rare symptoms are overseen, the development of antibodies constitute a contingent measure of viral exposure; and an immune passport might mean a return to routineness. (Fiocchi and Jensen-Jarolim, 2021)

3. Methodology and Empirical Analysis

We inspected, used, and replicated survey data from Access Now, Ada Lovelace Institute, Associated Press, Dynata, Morning Consult, and Redpoint Global, performing analyses and making estimates regarding rational and ethical COVID-19 vaccine certification schemes. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

4. Survey Methods and Materials

The interviews were conducted online and data were weighted by five variables (age, race/ethnicity, gender, education, and geographic region) using the Census Bureau's American Community Survey to reflect reliably and accurately the demographic composition of the United States. Any survey which did not reach greater than 50%

completion was removed from subsequent analysis to ensure quality. The data was weighted in a multistep process that accounts for multiple stages of sampling and nonresponse that occur at different points in the survey process. Test data was populated and analyzed in SPSS to ensure the logic and randomizations were working as intended before launching the survey. To ensure high-quality data, data quality checks were performed to identify any respondents showing clear patterns of satisficing. The cumulative response rate accounting for nonresponse to the recruitment surveys and attrition is 2.5%. The break-off rate among individuals who logged onto the survey and completed at least one item is 0.2%. Sampling errors and test of statistical significance take into account the effect of weighting. Question wording and practical difficulties in conducting surveys can also introduce error or bias into the findings of opinion polls. The sample weighting was accomplished using an iterative proportional fitting process that simultaneously balanced the distributions of all variables. Stratified sampling methods were used and weights were trimmed not to exceed 3. Average margins of error, at the 95% confidence level, are $\pm 2\%$. The design effect for the survey was 1.3. For tabulation purposes, percentage points are rounded to the nearest whole number. The precision of the online polls was measured using a Bayesian credibility interval. Confirmatory factor analysis was employed to test for the reliability and validity of measurement instruments. Descriptive statistical analysis and multivariate inferential tests were undertaken for the survey responses and for the purpose of variable reduction in regression modeling. Multivariate analyses, and not univariate associations with outcomes, are more likely to factor out confounding covariates and more precisely determine the relative significance of individual variables. Independent *t*-tests for continuous variables or chi-square tests for categorical variables were employed. An Internet-based survey software program was utilized for the delivery and collection of responses. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. An informed e-consent was obtained from individual participants. Study participants were informed clearly about their freedom to opt out of the study at any point of time without providing justification for doing so.

5. Results and Discussion

COVID-19 immunity passports can be adopted in conformity with either a laboratory test of immune reaction (a complement of protection) or an immunizing event (either infection, or vaccination), clarifying that certain people are improbable to get infected or spread the virus when exposed to SARS-CoV-2. (Brown et al., 2021) Sector-based schemes that straighten out access to testing in conformity with societal requirements would be more impartial and administratively more viable (Fialova and Vasenska, 2020; Lăzăroiu et al., 2017; Mihăilă, 2017; Peters et al., 2020), while decreasing accountability and incentives for deception. (Voo et al., 2020) (Tables 1–6)

Table 1 Adults were asked how concerned they are about health data protection and privacy when it comes to digital vaccine cards. (%)

	Concerned	Don't know	Not concerned
Democrats	53	2	45
Independents	61	10	29
Republicans	67	7	26

Sources: Morning Consult; our survey among 6,200 individuals conducted January 2021.

Table 2 Personalization is key to COVID-19-related travel marketing

71%	express frustration at receiving vacation offers when they are unable (or unwilling) to travel.
76%	are dissatisfied with the travel industry's ability to deliver personalized communications during COVID-19.
22%	believe that travel companies consistently deliver messaging pre-trip, during and post-trip.
75%	expect personalized, real-time messaging to feel safe and comfortable this year.
77%	Hold that communicating with clear information on mask mandates, enhanced cleaning, social distancing protocols, possible COVID-19 testing and crowd management matter more than any other type of touchpoints or offers.
49%	of vaccinated consumers plan to travel at least once during the summer months, with a majority planning interstate travel.
77%	say they eventually plan to travel more or about the same as they did pre-pandemic.
79%	Are interested in travel options based on guest behavior and travel preferences
82%	Argue that communications from travel brands should focus more on safety and personalized messaging rather than deals and low-cost options.
72%	believe having seamless pre-trip, during and post-trip personalization is an ongoing expectation that will last long after the pandemic is over.

Sources: Redpoint Global; Dynata; our survey among 6,200 individuals conducted January 2021.

Table 3 Weighing the benefits, risks and potential mitigations when considering specific use cases (relevance, %)

Based on the health modeling, there may be greater justification for some use cases of digital vaccine passports than others, such as settings where individuals work face to face with vulnerable groups.	87
There may be some uses that should be prohibited as discriminatory (e.g., accessing essential services, public transport or voting) and exemptions that should be introduced for those unable to have a vaccine or regular testing.	85
Developing clear purposes and uses should be carried out with consideration to public deliberation, and law and ethics, and mindful of risks that could be caused in different settings, which might include liability for businesses or insurance costs for individuals, barriers to employment, as well as stigma and discrimination.	83

Sources: Ada Lovelace Institute; our survey among 6,200 individuals conducted January 2021.

Table 4 Would proof-of-vaccination certificates infringe human rights? (relevance, %)

In the case of centralized digital identity systems, the pressure to get a vaccine and a digital vaccine certificate would mean a person is not empowered to fully understand and evaluate the harms of such identity systems before getting onboard, and thus the identity system becomes entrenched in their lives.	88
Ensuring everyone has meaningful options outside of the digital vaccine certificate or digital identity system is an essential component for the design of any rights-respecting system.	87
Access to any digital vaccine certificate should be free of charge, accessible, and paired with easily accessible paper-based forms as an interchangeable alternative. All approved vaccines should hold the same value.	86
Digital vaccine certificates and other COVID-19 response mechanisms must not be treated as a vehicle for accelerating digital transformation more broadly, and must not be used to advance adoption of centralized and mandatory digital identity systems that harm human rights.	85
Governments should include sunset clauses and strict data retention periods in any public policy approving the use of a digital vaccine certificate, and the collection of COVID-19-related data more broadly. Both government agencies and companies who stand to profit from the implementation of digital vaccine certificate systems must refrain from capitalizing on COVID-19 vaccination efforts to expand surveillance, silence dissent, or restrict freedom of expression, assembly, and movement.	85
Digital vaccine certificates should never be mandatory for exercising fundamental rights and freedoms. Systems that make digital vaccine certificates an actual or de facto requirement will divide and exclude, placing the heaviest burden on those who have already suffered the worst consequences of the COVID-19 pandemic.	84
The COVID-19 vaccination process is an opportunity to focus efforts on protecting the vulnerable populations who have been most severely impacted. This situation should not be used as an opportunity to link the vaccination status of an individual with digital identities or to create a separate digital identity framework for recording and authenticating a person's vaccination status.	83
Digital vaccine certificates can lead to exclusion of vulnerable populations, increase security risks through data integration and processing in centralized databases, and undermine the basic freedoms and autonomy of people who already suffer the most.	82

Sources: Access Now; our survey among 6,200 individuals conducted January 2021.

Relevant immunological issues for COVID-19 immunity passports are the level of immunity induced (a resistant reaction may decrease disease severity or keep from happening a symptomatic disease and pathogen carriage, and that is required for herd immunity) and the period of immunity. (Brown et al., 2021) COVID-19 immunity passports can be employed to attain collective upsides (Duft and Durana, 2020; Lambovska et al., 2021; Mihăilă et al., 2016; Pelau et al., 2021) and benefits for certain subgroups, in addition to enabling economic recovery. (Voo et al., 2020)

Table 5 Designing any technical system requires comprehensive thinking about the human or societal as well as technological elements of a system (relevance, %)

COVID-19 vaccine passport systems are part of wider societal systems, being one part of a wider public health system, where consideration needs to be given to how they interact with other interventions and mitigation measures, for example their behavioral impacts on mask wearing and social distancing, or diversion of attention and resources away from other parts of the vaccination program or from test, trace and isolate schemes.	89
Vaccine passports would be part of a wider emerging system of digital identification and the roll-out of biometrics into everyday life around the world.	88
Vaccine passports need to be considered in relation to how their implementation might accelerate the development and implementation of the schemes without sufficient public engagement or response to public concerns, and the risks that accompany embedding technologies that are hard to roll back into everyday life.	87
Vaccine passports will require practical and operational overheads to work – whether that’s scanners to read QR codes at venues, additional staff at the door to check passports, access to wi-fi at vaccination centers, or adequate testing capacity so that test results can be turned around quickly enough to be of practical use.	87
Any vaccine passport system will have the following common components: health information (recording and communication of vaccine status or test result through e.g. a certificate); identity information (which could be a biometric, a passport, or a health identity number); verification (connection of a user identity to health information); authorization or permission (allowing or blocking actions through based on the health and identify information).	86
Schemes will be technically distinct across different countries, depending on a number of factors, including the extent to which health records are digital, whether health systems have existing central databases or are fragmented across providers, whether countries have digital identity infrastructure or whether digital apps already exist in health systems.	86
Depending on design and country context, schemes will have different implications for data infrastructure. Some call back to existing databases (checking with existing medical records or checking acceptable QR codes, for example). Others create a digital credential or token that might be stored on your phone.	85
Vaccine passport schemes might require the creation of new databases, which include biometrics records. Each of these pose different risks and benefits, depending on the wider systems they interface with.	84
Conflating COVID vaccine passports with another controversial technology could undermine public trust and confidence – many people are uncomfortable with biometric data about their faces being gathered by private companies or government, and are concerned about how such data is governed.	84
Regardless of how the scheme is delivered, any vaccine passport system should be compliant with data protection, adopt best-practice design principles, offer high data security, be clear how it links or expands existing state data systems, in particular digital identity, and offer a non-digital route.	83

Any vaccine passport system will involve secure access to an individual's health data, which in many regions will be subject to particular conditions under data protection laws.	82
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Sources: Ada Lovelace Institute; our survey among 6,200 individuals conducted January 2021.

Table 6 COVID-19 vaccine passports are valuable if they are implemented carefully. (relevance, %)

Vaccine passports being developed to verify COVID-19 immunization status and allow inoculated people to more freely travel, shop and dine may affect personal freedom and private health choices.	91
The argument over whether passports are a sensible response to the pandemic or governmental overreach echoes the bitter disputes about masks, shutdown orders and vaccines.	89
Vaccine passports are typically an app with a code that verifies whether someone has been vaccinated or recently tested negative for COVID-19 being intended to allow businesses to more safely open up as the vaccine drive gains momentum, and mirroring measures already in place for schools and overseas travel that require proof of immunization against various diseases.	88
COVID-19 vaccine passports/health certificates/travel passes can be used to bar people from routine activities.	87
Not everyone who would need a passport has a smartphone, passports should be free and in multiple languages, while private health information must be protected.	86
Discrimination based on vaccine status or possession of an immunity passport should be banned.	86
Using vaccine status or passports to obtain certain benefits and services should be prohibited.	85
A COVID-19 vaccine should not be mandated or required by the government for people to integrate back to a sense of normalcy.	85
Smartphone apps should be used to show whether someone has been vaccinated or recently tested negative for COVID-19.	84

Sources: Associated Press; our survey among 6,200 individuals conducted January 2021.

COVID-19 immunity passport schemes are stop-gap procedures within more extended, multidirectional proposals to assist society in transitioning out of restrictive measures (Campbell, 2021; Ionescu, 2020; Lăzăroiu and Adams, 2020; Nica, 2018; Sampson, 2020), being associated with broad availability of effective vaccines. (Voo et al., 2020) COVID-19 immunity licenses are propositions of implementing rigorous public health restrictions or allowing activities that may transmit infection, both intensifying imbalances and imposing challenging difficulties. (Persad and Emanuel, 2020) Growing acceptance should be associated with designed policies (Clark, 2021; Krizanova et al., 2019; Lyons and Lăzăroiu, 2020; Nica et al., 2021; Vătămănescu et al., 2020) tackling individuals' health beliefs, apprehensions, and concerns (Adams, 2020; Gavurova et al., 2021; Lăzăroiu, 2017; Nica, 2017; Ramirez, 2020) as regards the COVID-19 vaccine. (Momplaisir et al., 2021)

6. Conclusions and Implications

Considering the continuing clinical efficacy trials employing prevalent serological and cellular sampling, additional data will clarify whether vaccination may constitute the rationale of a COVID-19 immunity passport with tests supplying correlates of protection. (Brown et al., 2021) Immediate COVID-19-related schemes would provide sound freedom of action for evening out protection of public health with a coming back to normalcy. (Hall and Studdert, 2021) The acceptability of COVID-19 immunity passport schemes calls into action reducing ethical concerns associated with their implementation. (Voo et al., 2020) The ethical case as regards COVID-19 immunity-based licenses can be strengthened by ensuring that such certificates do not intensify imbalance, while the list of undertakings necessitating licenses should be updated according to public health demands. (Persad and Emanuel, 2020) Using reliable figures for vaccine education is pivotal in tackling COVID-19 vaccine hesitancy. (Momplaisir et al., 2021) Uncertainty as regards the period of immunity against SARS-CoV-2 covers both vaccine and natural immunity. (Fiocchi and Jensen-Jarolim, 2021) As limitations, this article focuses only on restricting human rights and increasing discrimination through COVID-19 vaccination certificates. Further research should consider significant concerns as regards equity brought about by COVID-19 immunity-based licenses.

Compliance with ethical standards

Animal studies statement verification

This article does not require animal studies verification.

Identifiable images and data statement verification

This article does not require identifiable images and data statement verification.

Code availability

This project has employed statistical analytical techniques standard in all statistical packages.

Data and materials availability

All research mentioned has been published and data is available from respective outlets. The statistics that support the findings of this study can be found in the supplementary material of this article. Note: The publisher is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing content) should be directed to the corresponding author for the article.

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Author contributions

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

Conflict of interest statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Individual and Psychosocial Features Shaping COVID-19 Vaccine Hesitancy: Attitudes, Beliefs, and Norms

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ABSTRACT. I develop a conceptual framework based on a systematic and comprehensive literature review on individual and psychosocial features shaping COVID-19 vaccine hesitancy. Building my argument by drawing on data collected from AP-NORC, de Beaumont, DHL, KFF, Gallup, McKinsey, and Statista, I performed analyses and made estimates regarding essential drivers for vaccine hesitancy. The data for this research were gathered via an online survey questionnaire. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

Keywords: COVID-19; vaccine hesitancy; human rights; public health; perception

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1. Introduction

COVID-19 vaccine efficacy and safety would stimulate vaccine uptake on a large scale. (Robertson et al., 2021) Public health campaigns should be designed for groups more predisposed to be COVID-19 vaccine hesitant or resistant (e.g., women, adolescents, and individuals having an inferior socioeconomic status). (Murphy et al., 2021) COVID-19 vaccine hesitancy is significant because of lack of confidence in the medical establishment, apprehensions as regards expeditious interval for vaccine development, and insufficient data concerning transient and prolonged repercussions, in addition to the anxiety of possibly getting infected by inoculation and leaning towards enhancing one's physical health by use of unconventional therapies. (Momplaisir et al., 2021) Assisting early adopters of the COVID-19 vaccine in revealing their pro-vaccination option or intention may shape the decisions of other persons positively. (Chevallier et al., 2021)

2. Conceptual Framework and Literature Review

COVID-19 vaccine-hesitants may be inclined to have second thoughts about their perspectives as soon as the safety profile is sound and convenient. (Momplaisir et al., 2021) While most individuals display propensity in receiving the COVID-19 vaccine, hesitant persons are typically younger adults, women, have an ethnic minority background, and have less education. (Batty et al., 2021) Categorical vaccine refusal is related to a reduced perceived severity of COVID-19. Vaccine hesitancy is inferior when herd immunity upsides are disseminated across working versus unemployed people, respectively individuals having experienced COVID-19 or learning about someone who was infected. (Schwarzinger et al., 2021) Standard specified justifications to disapprove vaccines are: being against vaccines, apprehensions as regards their safety, a vaccine manufactured quite swiftly may be dangerous, the vaccine is ineffectual due to the benign character of COVID-19, general skepticism, reservations regarding vaccine efficiency, already immunized conviction, and suspicions in relation to the provenience of vaccine. (Troiano and Nardi, 2021) Belief in personal risk from COVID-19 vaccines should be exemplarily invalidated (Hollings, 2020; Lyons and Lăzăroiu, 2020; Shchekotin et al., 2021) by personal-benefit information. (Freeman et al., 2021)

3. Methodology and Empirical Analysis

Building my argument by drawing on data collected from AP-NORC, de Beaumont, DHL, KFF, Gallup, McKinsey, and Statista, I performed analyses and made estimates regarding essential drivers for vaccine hesitancy. The data for this research were gathered via an online survey questionnaire. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

4. Survey Methods and Materials

The interviews were conducted online and data were weighted by five variables (age, race/ethnicity, gender, education, and geographic region) using the Census Bureau's American Community Survey to reflect reliably and accurately the demographic composition of the United States. Any survey which did not reach greater than 50% completion was removed from subsequent analysis to ensure quality. The data was weighted in a multistep process that accounts for multiple stages of sampling and nonresponse that occur at different points in the survey process. Test data was populated and analyzed in SPSS to ensure the logic and randomizations were working as intended before launching the survey. To ensure high-quality data, data quality checks were performed to identify any respondents showing clear patterns of satisficing. The cumulative response rate accounting for nonresponse to the recruitment surveys and attrition is 2.5%. The break-off rate among individuals who logged onto the survey and completed at least one item is 0.2%. Sampling errors and test

of statistical significance take into account the effect of weighting. Question wording and practical difficulties in conducting surveys can also introduce error or bias into the findings of opinion polls. The sample weighting was accomplished using an iterative proportional fitting process that simultaneously balanced the distributions of all variables. Stratified sampling methods were used and weights were trimmed not to exceed 3. Average margins of error, at the 95% confidence level, are +/-2%. The design effect for the survey was 1.3. For tabulation purposes, percentage points are rounded to the nearest whole number. The precision of the online polls was measured using a Bayesian credibility interval. Confirmatory factor analysis was employed to test for the reliability and validity of measurement instruments. Descriptive statistical analysis and multivariate inferential tests were undertaken for the survey responses and for the purpose of variable reduction in regression modeling. Multivariate analyses, and not univariate associations with outcomes, are more likely to factor out confounding covariates and more precisely determine the relative significance of individual variables. Independent *t*-tests for continuous variables or chi-square tests for categorical variables were employed. An Internet-based survey software program was utilized for the delivery and collection of responses. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. An informed e-consent was obtained from individual participants. Study participants were informed clearly about their freedom to opt out of the study at any point of time without providing justification for doing so.

5. Results and Discussion

COVID-19 vaccine hesitant or resistant individuals are more spontaneous in their cognitive style (Clarke, 2020; Lăzăroiu, 2018; Pelau et al., 2021), and have a personality typified by being more unfriendly and bad-tempered, more psychologically incoherent, and less scrupulous. (Murphy et al., 2021) Among strongly hesitant individuals, the segment who plans to delay COVID-19 vaccination (*vs* anti-vaxxers) coincide with the amount of persons inclined (*vs* unwilling) to be inoculated. (Schwarzinger and Luchini, 2021) Lifting obstacles that are supposed to make vaccination troublesome (Crawford, 2020; Lăzăroiu and Adams, 2020; Scott et al., 2020) should intensify uptake among individuals who are already sympathetic to getting vaccinated against COVID-19 (Krizanova et al., 2019; Lyons et al., 2021; Stehel et al., 2021) and among persons whose rationales will have been altered (Lăzăroiu, 2013; Mircică, 2020; Watkins, 2021) in conjunction with effective communication campaigns. (Chevallier et al., 2021) Categorical COVID-19 vaccine refusal and hesitancy are both considerably related to being a woman, age, inferior educational level, unsatisfactory adherence to previous recommended vaccinations, and no report of definite chronic conditions. (Schwarzinger et al., 2021) (Tables 1–11)

Table 1 Which of the following is a more accurate statement about the COVID-19 vaccines. That they were... (%)

developed quickly but with rigorous testing, proper protocols, and required safety precautions, and therefore safe	89
rushed in their development, clinical trials, and manufacturing, and therefore unsafe	11

Sources: de Beaumont; my survey among 5,300 individuals conducted February 2021.

Table 2 Vaccines have quickly become the most critical asset on which COVID-19 pandemic management depends. (relevance, %)

The vaccine was developed 5x faster than any other in history and its production was ramped up in record time, quadrupling pre-COVID-19 vaccine production capacity.	92
Multilateral action was taken to ensure global access to vaccines, and the newly developed vaccine platforms are likely to help tackle other diseases, too.	88
With the increasing risk of viral mutations, a global vaccination campaign is not only a social obligation, but also a prerequisite to end the pandemic.	91
Getting vaccines from the airport to the patient will require synchronization of the flow of goods, and vaccination points and storage that are specific to the local context.	93
To increase the global willingness to be vaccinated to the levels needed to contain the COVID-19 pandemic, education and targeted communication on vaccines, a user-friendly process, and clear incentives need to be prioritized.	92
The COVID-19 pandemic is a dynamic situation, as is the virus that causes it. It is not only imperative to vaccinate the world as quickly as possible, but to ensure immunization is sustained in the years to come.	91
To ensure success, all actors need to remain prepared for high patient and vaccine volumes, maintain logistics infrastructure and capacity, and plan for seasonal fluctuations. Only then can the supply chain system that is currently being rolled out provide a well-equipped platform for the years to come.	88
While the safety and effectiveness of vaccines is the major concern for the vaccination campaign, economic viability is also important to ensure a quick, large-scale global rollout.	92
The vaccines are not only safe, but also an economically viable, socially accepted lever toward ending the pandemic.	89
While COVID-19 vaccines will be critical tools for an end to the pandemic, diagnostics, antibody medicines, and other therapeutics will be important complements.	91
Based on the lessons learned from COVID-19, infrastructure (e.g., tools, plans, and partnerships) should be built to support in-country distribution of diagnostics, therapeutics, and vaccines as needed.	88

Sources: DHL; my survey among 5,300 individuals conducted February 2021.

Table 3 Common COVID-19 vaccine myths (%)

COVID-19 vaccines currently being distributed contain the live virus that causes COVID-19.	10
COVID-19 vaccines have been shown to cause infertility.	6

Sources: KFF; my survey among 5,300 individuals conducted February 2021.

Table 4 What is the main reason that you would not agree to receive a COVID-19 vaccine? (%)

Don't think health effects of COVID-19 would be serious	20
Concerned about timeline for developing it	19
Don't trust vaccines generally	11
Had the coronavirus/Have antibodies	9
Concerned about allergic reaction to the vaccine	11
Want to wait to see how effective it is	5

Sources: Gallup; my survey among 5,300 individuals conducted February 2021.

Table 5 % of adults who state they are not likely to get a COVID-19 vaccination who gave select reasons for their decision. Select all that apply. (%)

Concern about the side effects and safety of the vaccine	34
Plan to wait and see if it is safe and may get it later	32
Don't trust the government	14
Concern that the vaccine is being developed too quickly	23
Don't like vaccines	19
Plan to use masks/other precautions instead	16
Not a member of any group that is at high risk for COVID-19	14
Don't like needles.	5
The vaccine could give me COVID-19.	2
Had COVID-19 and should be immune.	11
COVID-19 is not a serious illness.	3

Sources: Statista; my survey among 5,300 individuals conducted February 2021.

Concise, precisely fashioned messages (Lăzăroiu, 2013; Mircică, 2020; Watkins, 2021) may modify the disposition to be inoculated against COVID-19 among most strongly hesitant individuals. (Freeman et al., 2021) A significant amount of strongly COVID-19 hesitant persons who have delayed their decision (Clarke, 2020; Lăzăroiu, 2018; Pelau et al., 2021) may be positively influenced by a positive support from official reliable communication as regards vaccination. (Schwarzinger and Luchini, 2021) Vaccine hesitancy has its origins in apprehensions regarding safety, skepticism in relation to political or economic forces configuring the COVID-19 crisis or vaccine development (Hollings, 2020; Lyons and Lăzăroiu, 2020; Shchekotin et al., 2021), insufficient knowledge concerning the vaccine, antivaccine or ambiguous information from important figures, and almost no legal liability from vaccine firms. (Griffith et al., 2021) By being hesitant about the vaccines, individuals are likely to dissuade inoculation against COVID-19. (Chadwick et al., 2021)

Table 6 Because of the COVID-19 pandemic (yes, always/often, %)

	Unvaccinated	Vaccinated
Wearing a face mask when you are around other people outside your home	63	90
Staying away from large groups	54	79
Avoiding nonessential travel	49	72
Avoiding other people as much as possible	44	58

Sources: AP-NORC; my survey among 5,300 individuals conducted February 2021.

Table 7 Were you satisfied with each element of the vaccination process? (yes, %)

Overall satisfaction with the vaccination process	87
Ease of scheduling	76
Availability of convenient appointment times	73
Wait time on the day of vaccination	72
Ability of provider to explain the vaccine technology	70
Ability of provider to explain the difference between vaccines	67
Ability of provider to explain the vaccination process	65
Ability of provider to answer any questions you had about the vaccine manufacturer	66
Ability of provider to answer any questions about what to expect after the vaccination	68
Thoroughness and attention to detail of provider in preparing the vaccine	65
Thoroughness and attention to detail of provider in monitoring you after vaccination	63
Time spent on total process (scheduling, checking in, getting vaccine, etc.)	67
Availability of information provided to me afterwards	66
How close by the vaccination site was to your residence	64
Availability of parking at the vaccination site	62
Cleanliness of the vaccination site	65
Safeguards for preventing COVID-19 at the test site	71
Level of COVID-19 vaccine side effects experienced	67
Learning where I could receive the vaccine	66
Communication content from the vaccination provider	64
Communication frequency from the vaccination provider	63
Follow up communications from the vaccination provider	65

Sources: McKinsey; my survey among 5,300 individuals conducted February 2021.

Table 8 Why would you not get a vaccine against COVID-19? (%)

Feeling no need.	14
I am not clearly informed about the vaccine.	23
Vaccination is dangerous.	20
Impact on the immune system.	19
I don't believe in the existence of COVID-19.	11
Contraindications for vaccines.	1
I don't believe that COVID-19 is dangerous for me.	12

Sources: Statista; my survey among 5,300 individuals conducted February 2021.

Table 9 Top reasons why individuals have not tried to get a COVID-19 vaccine appointment by vaccination intention. Select all that apply. (%)

Busy/Didn't have time/Schedule conflict	11
Can't take time off work/conflicts with work hours	10
Just haven't gotten around to it	19
Don't have proper documentation/not sure if eligible	5
Lack of information about how to get the vaccine	4
Want to wait until more people have gotten it	10
Concerned about safety and/or side effects	13
Vaccine is too new/not enough research	8
Don't want it/need it.	7
Waiting for medical reason	4
Already had COVID	9

Sources: KFF; my survey among 5,300 individuals conducted February 2021.

Table 10 Leading reasons adults state they would definitely not or probably not get a COVID-19 vaccination. Select all that apply. (%)

Worried about possible side effects	57
Do not trust the government to make sure the vaccine is safe and effective.	54
Vaccine is too new and want to wait and see how it works for other people.	50
Politics has played too much of a role in the vaccine development process.	48
The risks of COVID-19 are being exaggerated.	40
Don't trust vaccines in general.	34
Don't trust the healthcare system.	32
Worried that they may get COVID-19 from the vaccine.	24
Don't think they are at risk of getting sick from COVID-19.	18

Sources: Statista; my survey among 5,300 individuals conducted February 2021.

Table 11 When it comes to the COVID-19 vaccine, what evidence would increase your likelihood of taking the vaccine? (%)

Real-life evidence that the vaccine is safe	61
Real-life evidence that the vaccine is effective	39

Sources: de Beaumont; my survey among 5,300 individuals conducted February 2021.

Apprehensions as regards detrimental consequences and safety are essential drivers for vaccine hesitancy (particularly subsequent side effects). (Robertson et al., 2021) Vaccine hesitant or resistant persons are generally less compliant, less balanced, less psychologically coherent, and less scientifically qualified. (Murphy et al., 2021) To attain the degrees of adequate herd immunity or for effective large-scale COVID-19 immunization, custom-designed and community-based interventions tackling political divergences (Hollings, 2020; Lyons and Lăzăroiu, 2020; Shchekotin et al., 2021) and risk perception dissimilarities (Crawford, 2020; Lăzăroiu and Adams, 2020; Scott et al., 2020) will be required, together with coherent strategies to allocate COVID-19 vaccines. (Khubchandani et al., 2021)

6. Conclusions and Implications

Assimilating information that a vaccine is effective in decreasing the transmission of COVID-19 may boost uptake. (Robertson et al., 2021) Disclosed compliance to get inoculated is improbable to correspond strictly with concrete COVID-19 vaccination behavior. (Freeman et al., 2021) COVID-19 vaccine-hesitants' perspectives are disseminated beyond interpersonal connections and possibly influence the perceptions of other individuals. (Chadwick et al., 2021) COVID-19 vaccine hesitancy brings about considerable risks for both persons who postpone or decline to get inoculated and the broader community, making subgroups unable to attain parameters of coverage required for herd immunity against COVID-19, and consequently unacceptably prolonging the pandemic and leading to additional distress and deaths. (Wysonge et al., 2021) Political affiliation and perceived COVID-19 threat constitute relevant predictors of COVID-19 vaccine hesitancy, in addition to prior skepticism, inherited reservations concerning healthcare (particularly among minorities), concerns about expenses, and decreased degrees of awareness. (Khubchandani et al., 2021) As limitations, this article focuses only on individual and psychosocial features shaping COVID-19 vaccine hesitancy. Further research should consider most effective targeted messages in cutting down vaccine hesitancy.

Compliance with ethical standards

Animal studies statement verification

This article does not require animal studies verification.

Identifiable images and data statement verification

This article does not require identifiable images and data statement verification.

Code availability

This project has employed statistical analytical techniques standard in all statistical packages.

Data and materials availability

All research mentioned has been published and data is available from respective outlets. The statistics that support the findings of this study can be found in the supplementary material of this article. Note: The publisher is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing content) should be directed to the corresponding author for the article.

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Author contributions

The author confirms being the sole contributor of this work and approved it for publication.

Conflict of interest statement

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Public Legitimacy of Vaccine Passports: Ethical and Regulatory Issues Raised by COVID-19 Immunity Certificates

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ABSTRACT. Employing recent research results covering ethical and regulatory issues raised by COVID-19 immunity certificates, and building my argument by drawing on data collected from Ada Lovelace Institute, CSA Canada, and Institute for Government, I performed analyses and made estimates regarding the freedoms COVID-19 immunity passports confer. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

Keywords: COVID-19; vaccine passport; immunity certificate; ethics; public health

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1. Introduction

Basing COVID-19 immunity passports on a vaccine encompasses upsides such as the stimulus is stable, possibly having a more unsurprising pattern and timeline of immunity than has infection, and inoculation makes immunity likely convenient to the entire population. The ethical issue concerns prompt access to vaccination for all subgroups. In the establishing of standard immunization in a population, the interval of protection from the virus can be assessed from efficacy studies and serological surveys, collected data reinforcing booster doses instead of persistently reappraising immunity. (Brown et al., 2021) COVID-19 immunity passports may decrease risk of pandemic spread by constituting a permit for travel, comparable with vaccination certificates. (Voo et al., 2020) A vaccine against SARS-CoV-2 may diminish the race mortality breach from COVID-19, but hesitancy as regards inoculation in certain subgroups compromises vaccine uptake. (Mompalaisir et al., 2021)

2. Conceptual Framework and Literature Review

The reason behind asking individuals to stay in lockdown indicates the risk their unrestricted circulation generates to themselves and other people by contracting and transmitting the virus. Persons who are immune to SARS-CoV-2 would be at a significantly diminished risk of acquiring and passing on the virus, and consequently putting an end to their civil liberties seems unreasonable. It is unethical to ask someone not to interact with other individuals if they bring about almost negligible risk of spreading the virus. (Brown et al., 2021) COVID-19 immunity passports have upsides beyond assisting people in continuing normal activities and enabling economic recovery (Davis, 2020; Kovacova et al., 2019; Lyons and Lăzăroiu, 2020; Noyes and Stråth, 2021; Popescu et al., 2020), but remote working policies are unrealistic for employees in certain sectors. Helping recovered persons to return to work more rapidly may be pivotal in fully leveraging convenient state compensatory measures, by directing sustenance to individuals whose movements are still limited because of susceptibility to infection, while being unable to work. (Voo et al., 2020) COVID-19 immunity licenses call into action certain issues associated with both the concrete substantiation and adequate putting into practice: serology tests employed to clarify whether a person has had COVID-19 for licensing grounds must be operational and incontestable, with significant rigorousness and sensitivity; immunity-based licensing necessitates confirmation that a positive serology test result designates protection from the virus; the upsides of licenses may inspire uninfected individuals to ease protective measures or conscientiously attempt to get contaminated; and the privileges of immunity licenses may stimulate falsification, unauthorized markets, or deception by unscrupulous medical staff or testing facilities. (Persad and Emanuel, 2020)

3. Methodology and Empirical Analysis

Building my argument by drawing on data collected from Ada Lovelace Institute, CSA Canada, and Institute for Government, I performed analyses and made estimates regarding the freedoms COVID-19 immunity passports confer. Descriptive statistics of compiled data from the completed surveys were calculated when appropriate.

4. Survey Methods and Materials

The interviews were conducted online and data were weighted by five variables (age, race/ethnicity, gender, education, and geographic region) using the Census Bureau's American Community Survey to reflect reliably and accurately the demographic composition of the United States. Any survey which did not reach greater than 50% completion was removed from subsequent analysis to ensure quality. The data was weighted in a multistep process that accounts for multiple stages of sampling and

nonresponse that occur at different points in the survey process. Test data was populated and analyzed in SPSS to ensure the logic and randomizations were working as intended before launching the survey. To ensure high-quality data, data quality checks were performed to identify any respondents showing clear patterns of satisficing. The cumulative response rate accounting for nonresponse to the recruitment surveys and attrition is 2.5%. The break-off rate among individuals who logged onto the survey and completed at least one item is 0.2%. Sampling errors and test of statistical significance take into account the effect of weighting. Question wording and practical difficulties in conducting surveys can also introduce error or bias into the findings of opinion polls. The sample weighting was accomplished using an iterative proportional fitting process that simultaneously balanced the distributions of all variables. Stratified sampling methods were used and weights were trimmed not to exceed 3. Average margins of error, at the 95% confidence level, are $\pm 2\%$. The design effect for the survey was 1.3. For tabulation purposes, percentage points are rounded to the nearest whole number. The precision of the online polls was measured using a Bayesian credibility interval. Confirmatory factor analysis was employed to test for the reliability and validity of measurement instruments. Descriptive statistical analysis and multivariate inferential tests were undertaken for the survey responses and for the purpose of variable reduction in regression modeling. Multivariate analyses, and not univariate associations with outcomes, are more likely to factor out confounding covariates and more precisely determine the relative significance of individual variables. Independent *t*-tests for continuous variables or chi-square tests for categorical variables were employed. An Internet-based survey software program was utilized for the delivery and collection of responses. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. An informed e-consent was obtained from individual participants. Study participants were informed clearly about their freedom to opt out of the study at any point of time without providing justification for doing so.

5. Results and Discussion

COVID-19 immunity passports would enable some segment of the population to access increased civil liberties throughout lockdown periods, as limiting constitutional rights, unless there is a concrete risk to other individuals, is unethical. (Brown et al., 2021) Impractical schemes associated with COVID-19 immunity passport programs may generate serious unpurposeful harms (Grant, 2021; Lăzăroiu et al., 2017a, b; Nica, 2017; Popescu, 2017; Svabova et al., 2020) possibly leading to more disproportionate inequity, denigration of particular sectors of society, and escalated risks and unjust treatment of people because of inaccurate test results. (Voo et al., 2020) Individuals having comorbid conditions may perceive their immune system to be easily affected by a COVID-19 vaccine. (Momplaisir et al., 2021) (Tables 1–4)

Table 1 The use of COVID-19 vaccination certificates to support a safe return to travel and other economic activities (relevance, %)

Fully vaccinated individuals have a significantly decreased risk of SARS-CoV-2 infection and likely have a decreased risk of spreading the infection to others.	92
Proof of vaccination is set to be used to reopen international borders without the need for some existing COVID-19 measures, such as traveler testing and quarantine.	91
The use of COVID-19 vaccination certificates to access crowded venues is predicated on the effectiveness of the different vaccines to mitigate the risk of importing or spreading SARS-CoV-2 and its emerging variants.	91
Assuming that vaccines limit disease spread, proof of COVID-19 vaccination may be used to facilitate safer domestic and international travel or for safer reopening of the economy.	90
Vaccination certificates could be used to congregate in larger gatherings such as sporting events, music concerts and festivals, and to physically return to work, especially in higher-risk workplaces where mask wearing and/or maintaining physical distance is difficult or impossible.	90
Essential workers, such as grocery store staff and bus drivers who face the public directly, but who may not have been prioritized for vaccination, could be temporarily disadvantaged by vaccination certificates.	89
The use of vaccination certificates in workplaces could affect job opportunities for those who do not have access to the vaccine or who are exempt for medical reasons.	89
While the anticipation of more freedom may be an incentive for some to get vaccinated, vaccine acceptance could decrease in others if there was a sense of coercion tied to using vaccination certificates.	89
The concept of vaccination certificates is premised on individuals sharing sensitive information about their health in order to gain access (or preferential access) to certain spaces.	88
The processes by which vaccine certificates are issued and controlled need to be fraud proof.	88
Clearly defining in law the contexts in which vaccination certificates must be presented could avoid vaccination certificates becoming a predicate for harassing racialized populations.	88
COVID-19 vaccination certificates present more complexity due to the multiplicity of available COVID-19 vaccines and the uncertainty regarding their efficacy against the different virus strains spread across the globe.	87
The utility of COVID-19 vaccination certificates beyond healthcare settings is predicated on the effectiveness of the vaccines at eliminating or reducing viral transmission and the duration of the protection they confer.	87
The length of time for which a vaccination certificate will be valid before a new one is required will need to be established for each vaccine and will depend on duration of immunity.	86
Varying efficacy at reducing infection by new variants and eliminating viral spread will need to be considered for each class of vaccines.	86
Vaccination certificates may facilitate departure and arrival logistics and decrease airport crowding which in turn increases health safety	85

for travelers and airport workers alike. Issues such as the state of local epidemics and acceptability of vaccines approved by different regulators will determine pre- and post-arrival measures.	
Due to limited vaccine supplies and the fact that certain age and population groups are not eligible for vaccination, alternatives to vaccination certificates need to be available for the foreseeable future.	85
When using vaccination certificates beyond an immunization record, equity, human rights and privacy must be respected to achieve the balance of necessity and proportionality.	84
Fraud, inappropriate use and potential negative impacts on vulnerable populations of vaccination certificates should be minimized.	84

Sources: CSA Canada; my survey among 5,100 individuals conducted February 2021.

Table 2 The risks and benefits of the potential roll-out of digital vaccine certification schemes (relevance, %)

By giving some individuals greater access to travel, employment or entertainment, vaccine passports or COVID-19 status apps constitute a route to move societies out of lockdown and open up parts of the economy.	93
Vaccination status does not offer clear or conclusive evidence about any individual's risk to others via transmission.	91
While vaccine passports will be seen by some as a way to increase freedom, for those without a passport they would constitute a denial of liberties that others are being granted.	89
The government will need to take a clear position outlining the specific purposes and use cases for which vaccine passports can be legally and legitimately used.	88
In allowing some uses or actively facilitating digital vaccine passports, governments must address the issues and risks arising from such schemes or the creation of related digital infrastructure, and whether and how these risks could be mitigated.	87
Most passport models focus on displaying a vaccination status (rather than a more granular or 'live' assessment of risk, which might incorporate other information).	86
By use of a vaccine passport, a better balance could be found between economic activity and community safety, by allowing a more fine-grained and targeted set of restrictions than sweeping measures or national lockdowns.	85

Sources: Ada Lovelace Institute; my survey among 5,100 individuals conducted February 2021.

COVID-19 immunity passports should generally record persons having prior vulnerabilities whose correlate of immunity accurately specifies a low risk of contracting severe disease subsequently. (Brown et al., 2021) Any discrimination generated by COVID-19 immunity licenses should not be unjustified, making a contribution to the interests of public health and of the underprivileged. (Persad and Emanuel, 2020) Advancing adequate health communication proposals designed for populations driven by concerns as regards safety and effectiveness may decrease COVID-19 vaccine refusal. (Callaghan et al., 2021)

Table 3 Certification is set to become a feature of international travel, given different rates of infection and vaccination schedules around the world (relevance, %)

If a vaccine-resistant variant were to emerge and updated vaccines were needed to protect against it, it could become much more beneficial to know (and be able to prove) who had received a booster and who had not.	92
Whether it was newly produced or adapted, the app would need to keep track of vaccine status and time-sensitive test results taken in many different locations. It would need to integrate a wide range of data sources securely, all while ensuring privacy and guarding against fraud.	91
Rather than compulsion, the best way to build vaccine confidence is to inform people about the risks and benefits and allow them to make their own judgments.	90
A rushed or poorly thought through scheme could lead to COVID-19 outbreaks and undermine vaccine confidence.	90
COVID-19 passports in domestic settings may have benefits in improving safety and enabling other restrictions to be lifted more quickly, but there are concerns about how their implementation, as well as about the risk of discrimination and potential breaches of privacy.	89
The government would need to make a case for how it (and the businesses that would need to implement the scheme) would overcome major difficulties around implementation and mitigate risks of exclusion of marginalised people.	88
Implementing a scheme to meet its own target is preferable to other options, such as waiting for further progress on vaccinations at home and the control of outbreaks abroad, strengthening contact tracing or tightening up border quarantine.	87
The government needs to be clear about how difficult developing a COVID-19 passport app will be, whether it has the requisite capability and what timeframe is realistic, must explain how privacy will be protected and fraud prevented, and should lay out in advance details of how the system would work to allow time for scrutiny by parliament and expert bodies.	86
If rapid tests were not deemed sufficiently safe, the widespread use of COVID-19 passports would raise questions about the supply and availability of PCR tests.	86
The government will need to decide what an acceptable level of risk is for using rapid tests as part of a COVID-19 passport scheme.	85
Whatever form COVID-19 passports take, their impact will depend on how well they are enforced.	84
Any problems with an app would make enforcement more difficult, while the government will need to be clear about how it would treat businesses or sectors that wanted to develop their own technology.	84

Sources: Institute for Government; my survey among 5,100 individuals conducted February 2021.

Table 4 Restoring personal freedoms and societal mobility based on certification of COVID vaccination (relevance, %)

Governments must act urgently to create clear and specific guidelines and law around any uses, mechanisms for enforcement and methods of legal redress of vaccine passports.	94
Digital passports should not be rolled out while so much is unknown about COVID-19, particularly the effect of different vaccines (and vaccination regimes)	93

on transmission, the duration of protection and the generalisability of those effects.	
The vaccine passport is premised on the assumption that my vaccine status tells you something about the risk I pose to you, not simply the risk I face from COVID-19.	92
Vaccination status does not offer clear or conclusive evidence about any individual's risk to others via transmission.	91
Vaccination status can never offer absolutely conclusive evidence of an individual's risk to others (or their own risk), since no vaccine will be 100% effective for 100% of recipients.	91
Passport systems would need to be flexible if they are to address the development of mutations, which may reduce the efficacy of vaccines.	90
Mutations make understanding of vaccination effects on individual transmission a moving target, as vaccines must be assessed against a changing background of dominant strains within the population.	89
Booster vaccinations against variants may manage the issue of strains.	88
Governments should identify specific priority use cases (e.g., international travel, key frontline workers, and access to employment) for detailed consideration of whether they justify selective rights and freedoms based on vaccination status, and if so, the best mechanisms for those schemes.	87
Use cases may be satisfactorily addressed by updating existing mechanisms, rather than building a new system of passports and digital identity.	86
If the government allows or actively facilitates the use of digital vaccine passports, they must address the issues and risks arising from such schemes or the creation of related digital infrastructure, and whether and how these risks could be mitigated.	85
Digital vaccine passports may undermine other public health interventions and suggest a binary certainty (passport holders are safe; those without are risky) that does not adequately reflect a more nuanced and collective understanding of risk posed and faced during the COVID-19 pandemic.	84

Sources: Ada Lovelace Institute; my survey among 5,100 individuals conducted February 2021.

COVID-19 immunity passports should confirm that people can circulate without restrictions and network for business or leisure without intensifying the risk of spreading the virus, but only if they are improbable to transmit it. (Brown et al., 2021) Developing strategies to put into effect immunity passport schemes should demand a full-scale evaluation of upsides and iniquities (Durana et al., 2021; Krizanova et al., 2019; Mihăilă, 2017; Pelau et al., 2021; Porter, 2020), and what would most infrequently limit individual liberties without considerably aggravating the threat of COVID-19. (Voo et al., 2020) Pivotal catalysts to COVID-19 vaccine acceptance encompass hoping for sound safety data, learning more as regards the vaccine, and receiving advice to get inoculated from an established healthcare provider. (Momplaisir et al., 2021) Governments should not provide cash incentives to further COVID-19 vaccination as they have generally failed during the current pandemic to ensure that the indispensable needs of most individuals are being satisfied. (Largent and Miller, 2021)

6. Conclusions and Implications

The freedoms COVID-19 immunity passports confer should be contingent on revisions and overrulings, and integrated with additional measures (e.g., contact tracing and physical distancing) to preserve the safety of individuals and perpetuate wellbeing. (Brown et al., 2021) Immunity-based licenses may assist in carrying out significant values, e.g., improving the liberty of COVID-19 infected people without aggravating the situation of individuals who have not been contaminated by the virus, optimizing upsides to citizens and society by enabling immune persons to participate in economic activities, and attending to the least fortunate by facilitating safer assistance for populations at risk. (Persad and Emanuel, 2020) Even though communities immoderately impacted by both the health and economic effects of the COVID-19 crisis (Fialova and Vasenska, 2020; Lambovska et al., 2021; Mihăilă et al., 2016; Popescu Ljungholm, 2020; Sturm et al., 2020) would be presumed to enjoy significant levels of vaccination, more suitable approaches (Costea, 2020; Kirkman, 2020; Lăzăroiu, 2018; Nica, 2018; Popescu, 2018) should be inspected than making use of financial insecurity. (Largent and Miller, 2021) As limitations, this article focuses only on ethical and regulatory issues raised by COVID-19 immunity certificates. Further research should consider impractical schemes associated with COVID-19 immunity passport programs.

Compliance with ethical standards

Animal studies statement verification

This article does not require animal studies verification.

Identifiable images and data statement verification

This article does not require identifiable images and data statement verification.

Code availability

This project has employed statistical analytical techniques standard in all statistical packages.

Data and materials availability

All research mentioned has been published and data is available from respective outlets. The statistics that support the findings of this study can be found in the supplementary material of this article. Note: The publisher is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing content) should be directed to the corresponding author for the article.

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Author contributions

The author confirms being the sole contributor of this work and approved it for publication.

Conflict of interest statement

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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