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Vaccine Hesitancy and Administrative Burden in the Australian National Immunisation Program: An Analysis of Twitter Discourse

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Abstract: In Australia, the National Immunisation Program and its Standard Vaccination Schedule are administered by the Australian Government Department of Health. While the public vaccination program's safety and worth are generally agreed upon by doctors and public health professionals, some continue to see vaccinations as a source of danger and harm. The burden of vaccination in order to receive public services aligns government and medical interests, but a less-than-trusting public may see conspiracy in such requirements, resulting in vaccine hesitancy. The media's attention to the topic, and a tendency toward misinformation on the part of anti-government opinion leaders, necessitate additional exploration of the administrative burden of vaccinations in an increasingly complex policy environment, where public health benefits are weighed against individual freedom and belief. This paper examines vaccinations as a burden, with costs in compliance, learning, and psychological terms, using posts from the social networking site Twitter as a corpus for exploratory content analysis in the specific case of Australia and its requirements. It is worth considering whether the positive aspects messaged by public health professionals are successfully entering into the discourse on vaccinations.

Keywords: public health preparedness; risk communication; risk perception; Australia; vaccination; immunisation; hesitancy



Citation: Atkinson, C.L.; Atkinson, A.M. Vaccine Hesitancy and Administrative Burden in the Australian National Immunisation Program: An Analysis of Twitter Discourse. *Knowledge* **2021**, *1*, 25–39. <https://doi.org/10.3390/knowledge1010004>

Academic Editor: Jose María Merigo

Received: 11 August 2021

Accepted: 29 September 2021

Published: 6 October 2021

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1. Introduction

In Australia, the National Immunisation Program and its Standard Vaccination Schedule are administered by the Australian Government Department of Health. Public vaccination programs are generally considered safe by doctors and health professionals, but some members of the public continue to see vaccinations as a source of danger and harm. The problem is potentially made worse by mandates for vaccination in order to receive public services; such mandates may serve larger public health objectives, but may also encourage the growth of conspiracy theories, resulting in vaccine hesitancy. The media's attention to the topic and a tendency toward misinformation on the part of anti-government opinion leaders necessitate additional exploration of the administrative burden of vaccinations in an increasingly complex policy environment, where public health benefits are weighed against individual freedom and belief.

This paper examines vaccinations as a possible administrative burden, with costs in compliance, learning, and psychological terms [1]. This inquiry asks: What can be known about vaccine programs and requirements in Australia from tweets, and are these requirements experienced as burden? Posts from the social networking site Twitter form a corpus in the case of Australia and its vaccine requirements. An analysis of posts is employed to discern sentiment and themes that focus on burden and responsibility in the public space, using 'Australia' and related keywords to identify relevant posts; discernment

of costs can shift based on discourse in social networking space. Posts on this topic generally illustrate a negative view of the burden of vaccinations; misinformation can worsen the public's apprehension of costs and overall program burden. Positive aspects of public vaccination programs, messaged by public health professionals, may not successfully enter into the discourse on vaccinations. There may be a failure to engage the negative portrayals of vaccination requirements in a way that challenges the unfair stereotype of an evasive industry with a harmful product. The public, or at least some subset, may desire 100% certainty for vaccinations, and science simply cannot provide that assurance, undermining potential for benefit that extends to society as a whole.

There is need for additional research into the policy area of vaccinations and public health programs, specifically with regard to the experience of such interventions and impositions as administrative burden. In studying the Australian example, Smith, Attwell, and Evers [2] pointed to the fact that most of the extant research is on the United States experience. Considerably less work has been done on the Australian case, which is notable because of its strong emphasis on mandate, few opportunities for exemption, and ties to eligibility for other public services.

The paper begins with a review of literature relevant to the concept of administrative burden. The next section focuses on vaccination programs, their impact on public health, and the administrative burden they may entail. A section on the phenomenon of vaccination hesitancy and behavioural aspects of immunisation programs follows, along with an overview of the Australian National Immunisation Program. Materials and methods, analysis and discussion, and limitations and concluding thoughts complete the paper.

2. Administrative Burden

Bozeman defined red tape as “rules, regulations, and procedures that remain in force and entail a compliance burden, but do not advance the legitimate purposes the rules were intended to serve” [3] (p. 12). Bozeman's scholarship on red tape led to work on administrative burden.

Moynihan and Herd noted that compliance burdens might adversely impact disadvantaged groups, and have a high price to pay in political and social rights. Citizens might be treated by the state with suspicion, and in turn might be less trusting and confident in government interventions. They suggested an approach different from Bozeman's: “administrative rules may achieve their legitimate goal but, at the same time, create a disproportionate negative burden, and/or those burdens may be systematically felt by certain groups” [4] (p. 665).

Administrative burden has been defined as “an individual's experience of policy implementation as onerous” [5] (p. 741). Some government requirements can pose significant hardships to lower income populations, for example, and even when compliance with a rule makes sense for the public as a whole, inattention to the experience of individual citizens can be perceived as hurtful or worse, a violation of fundamental rights and personal autonomy. Perception is a key point—what is seen as red tape is a movable target, depending on one's perspective [6].

Citizen experiences of government might be characterized by “confusion, delay, and frustration” [1] (p. 1) or even be seen as “bewildering ... [or] antagonistic” [1] (p. 2). Administrative requirements may be experienced as burdensome in a variety of ways: as learning costs, when the public must research a program to understand it, costs associated with actually complying with rules, and psychological costs, including “the stresses, loss of autonomy, or stigma” that come from encounters with government programs and related requirements [1] (p. 2). In addition to the immediate problems of administrative requirements, the existence of burdens may be experienced differently by various groups, potentially reinforcing systemic inequalities. When programs are perceived as disrespectful, benefits may still be realised, but serious questions may be raised, including a long-term undermining of trust in government institutions. Even in instances where societal benefit

can be realised, program function and perceived undue impacts on individuals are the centre of argument against state action.

While a complete review of administrative burden and its application in research and practice is clearly beyond the scope of this paper, previous work [1] has set a strong foundation for future study of the phenomenon. There has been relatively little work on the topic of administrative burden and vaccination/immunisation programs, an exception being Kotalik [7] who connected vaccination and burden on the part of health practitioners and consequences for public health.

3. Vaccination Programs and Public Health

Successful vaccination programs are a major achievement of modern science and government intervention on behalf of public health. The benefits of vaccination programs are substantial—decreased incidence of grave and fatal disease, improved quality of life, and enhanced longevity are hallmarks of the impact of widespread and effective immunisation [8].

Immunisation programs provide for a public good in the form of improved public health, and society is better off for having such a system in place—a small bit of freedom or expression of individual rights is given up in order to contribute to a better quality of life for the whole. Individuals may not choose to agree with others to organise an immunisation program on a nationwide basis, but this does not mean that such an approach is not warranted—it simply means that doing so is a choice that governments make, and is an expression of government's effort to maximise the greater good. This echoes sentiment of Hobbes, Hume, and Smith on government roles with regard to public goods [9].

With immunisation programs, there is a balancing of societal needs and benefits, and individual rights and the notion of self-determination. Individuals typically decide what to do with their bodies medically, up to a point, because “individuals have a right to make autonomous decisions . . . theoretical justification lies first and foremost in the intrinsic value of treating individuals as autonomous moral agents and allowing them to control diverse aspects of their lives” [10] (p. 363). It is worth noting though that government increasingly wishes to speak to choices that are made or can be made with respect to women's rights, end-of-life decisions, and other difficult and deeply personal choices. A position can be taken that vaccinations are a medical question, more complex than simpler policy questions like mandating wearing of safety belts in automobiles, or banning smoking in public buildings, where there are individual choices that affect individuals, versus choices that adversely affect others. Additionally, reminding the public that it is responsible for making healthy choices can be a source of stress with negative implications for health [11]—public health concerns are complex problems that resist simple solutions.

Ethically, vaccinations have been justified in that they reduce the potential of harm for children and allow for more general herd immunity in the population as a whole [12]. However, not everyone is in agreement that immunisation programs are ethically justified if a disease in question is mostly not fatal; in such instances, acknowledgments of side-effects can be difficult to overcome where parents are concerned [13]. The line for objection to vaccinations might lie where herd immunity is threatened, because the protection of individual rights is analogous to protection of the rights of others [14]—neither may be easily abridged, but it is easier to make an argument in favour of the whole.

In coercive systems, where a mandate is involved, there may be allowances for deviation from the requirement—for clear and compelling needs, as well as rationales that may be less clear and compelling. The question for policy is where to draw the line between eligible for exemptions, or ineligible, requiring imposition of vaccine, which is then perceived as a punishment or worse. Pierik [15] noted a range of exemptions in the United States case; he offered that the failure of rule-and-exemption schemes is due to a lack of separation between profound objections and inconvenience of having to comply, as well as a dearth of justice and allowances that go beyond a vaccination program's ability to yield herd immunity. Kennedy, Brown, and Gust found that the availability of an exemption was

sometimes aligned with parental objections [16]. It is important to allow for minority rights and concerns about programs, but allowing for all manner of exemptions can quickly set the stage for allegations of injustice, not to mention allowing for public health crises when immunity to a disease is no longer widely held.

While free-riding in a vaccination program is a concern, it has been shown that the public is not entirely self-centred when it comes to such matters. Tang, Shahab, Robb, and Gardner showed that parents may be more willing to vaccinate their children than themselves, indicating some understanding of the level of risk associated with not vaccinating [17]. Vietri, Li, Galvani, and Chapman showed that appeals to altruism can be effective in encouraging vaccination among those that may otherwise not be inclined [18]. This point has taken on heightened importance given the COVID-19 pandemic, where the people that would most benefit from widespread vaccination may not be the people who are actually getting vaccinated. Members of the public have willingly put themselves at risk in the cause of developing a vaccine for COVID-19, which speaks to a larger sense of altruism in the face of serious public health threats.

4. Vaccination Hesitancy and Burden

Despite the many benefits, the imposition of a vaccination program involves expenditure of resources, including time and money, a need to access information about vaccinations, and psychological effects, and may be perceived or experienced as a burden. Immunisation programs can be thought to invoke all three of the categories of administrative burden identified by Herd and Moynihan: learning costs, so that the public may understand the nature of the vaccines themselves, and risks and benefits; compliance costs, where citizens must arrange for vaccination treatments, taking time, always a critical resource, and sometimes incurring a financial burden as well; and psychological costs, where citizens are made anxious by a real or perceived loss of autonomy in the choice to comply with vaccination requirements [1].

Dread diseases addressed by vaccinations can easily be seen as burdens, on an individual level as well as at the societal level. However, the burden of complying with an immunisation program is significant, as well. Kashyap, Shrivastava, and Krishnatray put forward a list of ten reasons for vaccine hesitancy, based on a review of the literature: “parental concerns, perceived disease susceptibility, parent–provider relationship, government policies, role of school authorities, weak interpersonal communication (IPC) skills of health workers, religious beliefs, role of media, social media and information on vaccines, and lack of trust” [19] (p. 259). These are all potentially seen as sources of burden, yielding hesitancy if not outright refusal.

Previous work by Lyren and Leonard identified that vaccine refusal may extend from expenses for therapy as well as inconvenience and discomfort [20]. A ‘strained patient-provider relationship’ characterized by “feelings of frustration, tension and mistrust” may be seen as a barrier related to vaccine hesitancy [21] (p. 2073). Kim, Lauria, and Whittington offered that price and distance to travel for vaccines affected demand in a case study in rural China [22]. The relevance is clear—offerings that exceed the public’s ability or desire to meet a burden may be rejected, in a relatively straightforward benefit–cost analysis.

Forms of vaccination hesitancy can vary considerably. Parents may seek to vary the vaccinations received by children, including delaying shots, limiting the number of shots received at any given time, or simply refusing shots entirely. Researchers have found considerable worry among parents, even if most parents comply with the recommended vaccination schedule; concerns exist about the risks posed by diseases, the safety of vaccines, and a desire to avoid ‘overloading’ children and taxing their systems too much [23,24].

Education can be a barrier to vaccination, as evidenced in a study by Lai et al. that looked at Facebook-linked teaching tools; it was shown that online tools can be more effective than in-person education efforts for younger age groups. Using the wrong tools to provide information to impacted groups can have limited positive benefit [25].

Understanding of cultural context is important to the success of immunisation efforts with diverse populations [26]. There is a need to recognise how messages to indigenous groups on immunisation may be received, given that cultural concerns, distrust, and histories of racism may inform health choices [27].

Through coercive vaccination programs, government mandates may seek to avoid the need to change minds or engage in serious discussion of burdens and hesitancy. For the need is reduced for government to act in the role of educator, willing to defend its recommendations and show documentation in ways that can be readily understood by diverse stakeholders of varying capacity. Further, coercive strategies, and government approaches that place compliance and process as priority, may not allow for the compassion, respect, and information sharing needed to make a difference for parents, reducing barriers and the potential that they will avoid or refuse vaccines [28]. This can limit effectiveness of communication, increasing the potential for hesitancy behaviour.

4.1. Public Roles, and the Burden of Engaging Misinformation

It could be argued that engaging in public discussion—making information available and having a conversation where it is needed—is government’s right role. When discussion of burden of a program—vaccination or otherwise—is avoided, this might further undermine public trust and confidence. This is notably true when the concerns raised have at least a hint of truth to them (where predicates for a hypothesis might be established, see for example Kirkland [29]).

There are no studies linking autism in its various forms to vaccines (beyond the discredited, retracted paper by Wakefield and colleagues [30], which presents itself again and again as a sort of gift to the anti-vaccination movement). Still, the belief of a causative connection nevertheless persists. Though two things may occur at the same time, it does not necessarily follow that one causes the other. Consider though that the experience of something as real is real, at least from the person’s perspective, and vaccines could be seen as strange and possibly even terrifying, yielding an opportunity to connect two disparate factors [31]. Appeals are made to risk and uncertainty [32]. Even when matters are proven in court, the fact that scientific evidence is not magic and does not allay all fears is noteworthy [29].

The Internet represents a source of both knowledge and misinformation ready to support practically any beliefs brought to it. For vaccination programs, this can be extremely problematic, as anyone can post a website with misinformation about vaccinations, open a Facebook or Twitter account to share posts with this content, or even organise ad hoc groups to challenge official government recommendations and information. The effect of accessing wrong information is persistent, clear, and even impressive. Betsch, Rekowitz, Betsch, and Ulshofer wrote that “viewing typical vaccine critical websites for only five to 10 minutes increases the perception of risk regarding vaccinations and decreases the perception of risk regarding the omission of vaccinations as compared to visiting a control site. [This] significantly decreased the intentions to vaccinate . . . vaccine critical websites were related to an increased perception of threat, which was at least partially conveyed by case-based information” [33] (p. 453).

A study of mass media coverage of vaccination showed that concerns and scares can be heavily politicised, with presentation of information in newspapers engendering questions about the trustworthiness of official sources of information [34]. Coverage in the media of vaccination programs is often negative, frequently including false information [35]. The MMR-autism row resulted in a negative association between health practice and government officials and efforts deemed to be untrustworthy—there were no winners [36], and we are dealing with the aftermath of this to the present.

The difficult environment of social networking presents significant challenges for officials responding to misinformation. It has been shown that it is worthwhile for officials to respond to misinformation, but the crafting of messages to counterbalance the misinformation must be appropriate to the platform and its users. The original misinformation

message often has much more traction and readership than any subsequent response, even if the official answer corrects the record. It is essential that the public engage in critical evaluation of what they are reading, but this might be a lot to ask [37].

The decision to engage in or forego vaccination occurs in clusters, for example at the level of the household; this can undermine vaccination campaigns, but if communication is managed well and targeted appropriately, members of a household can be encouraged to vaccinate—for example, to protect a fellow household-member who is in a risk group [38].

While it is not a central aspect of this research, the nature of public belief in conspiracy theories has had relevance to the anti-vaccination debate on numerous occasions. Goldberg and Richey found that belief in anti-vaccination ideas correlated with belief in other conspiracies, but ominously, these beliefs have predictors including “a negative correlation with political trust, political knowledge, [and] education, and a positive correlation with authoritarianism” [39] (p. 105). It may be tempting to set aside extreme views, but doing so may encourage growth and development of an entire set of alternative assumptions and even grand designs of control, which have nothing to do with the initial basis for a public health program. Conspiracy theories do their work when answers are not readily given, and air is given to the views and misinformation of uninformed parties.

Having noted this, there is actual risk involved in any sort of medicine. As Offit noted, “Although vaccines have probably saved more lives than any other medical intervention, they have come with a price—occasionally causing severe, even fatal, side effects. Epidemiological studies have been the single most powerful tool to show that vaccines, like all medicines, are imperfect” [40] (p. 110).

Related to the push and pull between individual and societal concerns, it has been offered that universal vaccination “probably does not maximize social utility, and balancing cost-effectiveness and herd immunity might prove to be too great a challenge,” but deciding which groups are vaccinated and which are not, and thus stand to benefit from the actions of others, is not a particularly palatable option. Instead, there are appeals to duty and a need to nudge people to do the right thing; the result may be a public that watches what others are doing, going along with vaccination programs to a point, but resisting when it is apparent that immunity is widespread enough to reduce risk. This is a dangerous sort of gamesmanship [8] (p. 1034).

4.2. Behavioural Aspects

There is a distinct behavioural aspect to the requirement of vaccination, and the experience of immunisation requirements as a burden. In addition to the cost of compliance, a psychological component is felt by citizens. In demanding the public do something and have no choice in the matter, notions of punishment or domination may arise, with a resultant fight or flight response. This brings to mind the idea of counter control, following the work of Skinner, where coercive requirements are met with a robust emotional answer. Especially when there is a lack of agreement with the requirement, or where the public does not fully understand the requirement and its attendant risks, these emotional tolls can be heavy. Children, people with disabilities, and the elderly can be particularly vulnerable to unethical experiences of coercion; it is essential to remember the importance of the dignity of the individual, so that they may advocate for their own treatment. It would be hard to guarantee this if an individual did not understand the treatment, for example, or inherent risks. Rights and autonomy must be central considerations [41].

The medical community and political/government realm may be only marginally aware of one another. Politics may seek to take the information it needs to make a decision, and politicians may not be particularly interested in the uncertainty that is a part of scientific inquiry. Ethical standards save the day, but when they are lacking, the work of government may look more like use and abuse of power. Of course, government may not derive the immediate political rewards sought in allowing for autonomy, persuading the public, and addressing concerns and misinformation. It is sufficient to say that vaccination programs worry many people. Some risks are real and should be addressed.

The use of a coercive system can be harmful to public trust, especially when decisions made were not totally correct, or were based upon incomplete, inaccurate, or misinterpreted data. The problem is in the mechanism employed—there is an effort to control, rather than to shape, behaviour. Shaped behaviour is long-lasting; coerced behaviour, and efforts at controlling behaviour may not result in desired long-term gains. From a behavioural perspective, leading someone to come to their own conclusions, making a more fully aware decision, would seem to be more preferable than a mandate with no questions taken [41].

If government has the role of shaping public actions, if not directing them outright, the Foucauldian perspective as indicated by Dean might be brought in to engage the matter of immunisation programs not only as burden, but as an exercise of power over the population [42]. Where the ability of government to justify intervention in personal lives becomes virtually limitless, even to the power of deciding death and life, the freedom of individuals is in question. A coercive program might not be down to the will of the people as much as it is a statement of government power over populations.

An awareness of self-determination and regard to the autonomy of individuals allow for some insight into how best to address concerns, especially those that lead to vaccination hesitancy. Echoing the language of hesitancy, Betsch, Bohm, and Chapman found that refusal to vaccinate can result from a variety of concerns, including “complacency, inconvenience, a lack of confidence, and a rational calculation of pros and cons” [43] (p. 61). Some may see vaccination programs as a massive experiment with uncertain results [44].

In addition to the potential ethical problem of forcing the public to comply with vaccination mandates, including requiring participation lest individuals be deemed ineligible for public programs, “partial compulsory vaccination may also backfire as it leads to reactance among those with a negative vaccination attitude, decreasing, in turn, their vaccine uptake in other voluntary vaccinations” [43] (p. 67). Vaccination mandates, where they are enacted, may have to be rolled back by politicians, under pressure from the public [44].

It is possible for parents, in rejecting vaccinations, to disconnect their actions from the idea of social responsibility to others. The potential for such disconnects is enhanced by the ability for people to rationalise actions toward self-preservation. Whether or not the basis for this thinking is fake news or sources of dubious quality, the thinking and association between, for example, a vaccination program and the efforts of public institutions to undermine truth generally, becomes more intractable. It can be especially difficult to get at underlying rationales, in an effort to change minds and encourage compliance [45]. However, if professionals and officials are engaging the public, that is what should occur, whether it is challenging to officials or not. One might expect to see, for example, government entities respond to issues using the language of critical forces, as in intertextuality, where discourse occurs across contexts and spaces [46], if this sort of engagement is occurring.

Deciding to impose a program that is coercive, recognising that it might be experienced as a burden by certain groups, especially those groups previously disadvantaged, may be a political choice [1]. The role of politics in programmatic decisions becomes more of a question when the benefits to be realised by a program might be gained in some other less coercive manner, which preserves personal autonomy. The choice to forego less coercive approaches may be political: seeking to shut down opposition to or questions about vaccinations, providing for immediate political capital, and emphasizing the power of the government over people, even if it is for laudable reasons.

Persuasive approaches could play a positive role. Masaryk and Hatokova wrote that new pro-vaccination messages were needed, which are “more balanced...they should talk about both sides of the story, the benefits as well as the side-effects...provide links to the evidence and arguments...the recommendation to vaccinate must be clear to avoid ambiguity” [47] (p. 1807). If parents perceive official agencies as malevolent, they are less likely to be of positive view on vaccination, and the opposite holds as well [48]. However, the instrumentation of government does not always default to persuasion, when tools of force and compliance work more quickly. Proponents of vaccination programs might be

tempted to shame or stigmatize those that may be weary of such efforts. Silverman and Wiley wisely warn against broad public shaming of those who refuse vaccinations, because of the potential for further alienating these people from positive public health efforts, not to mention their overall trust in government and its work to protect the population [49]. Level of knowledge about vaccination does not always correlate to the decision to vaccinate [50].

5. The Australian National Immunisation Program

The Australian experience with vaccinations up to the 1990s might be characterized as lacking prioritization and commitment. “In 1995, an Australian Bureau of Statistics survey found that only 33% of Australian children up to 6 years of age were fully immunized according to the schedule being recommended at the time, and 52% were assessed as being fully immunized” [51] (p. 55). Soon after, nationwide campaigns were undertaken to improve vaccination rates. These included television advertising efforts and registering children with a central database. There was concern at the time though that the marketing press may have also created unnecessary concern among parents about vaccinations and the state’s efforts [52].

In the 1990s experience in Australia, a variety of barriers to vaccination compliance were noted, including trouble remembering whether children had been vaccinated, timing and location of treatments, lack of awareness about vaccination schedules, thinking that the diseases for immunisation were not too serious; and concern about side effects, among others [51].

According to the Australian Government Department of Health, the “National Immunisation Program (NIP) was set up by the Commonwealth and state and territory governments in 1997. It aims to increase national immunisation coverage to reduce the number of cases of diseases that are preventable by vaccination in Australia” [53]. Further, “The NIP provides free vaccines to eligible people to help reduce diseases that can be prevented by vaccination. This improves national immunisation coverage rates” [53].

While the United States approach has offered many opportunities for exemption against the general requirement, the Australian case does not allow for many exemptions. According to government agency Services Australia, exemptions are allowed for valid medical reasons, including: “anaphylaxis after a previous dose of a vaccine . . . anaphylaxis after a dose of any component of a vaccine . . . [individuals who are] significantly immunocompromised—for live vaccines only, or have natural immunity—for hepatitis B, measles, mumps, rubella and chickenpox only” [54]. The agency provides a list of reasons that are not valid, which is longer. The limitation of exemptions effectively quashes dissent from a legal standpoint, but does possibly raise concern about coercive practices.

Smith, Attwell, and Evers suggested that the Australian public has shown considerable support for the vaccination program across the political spectrum, even though the nation is strict in its mandate [2]. There is less enthusiastic support for the ‘No Jab No Pay’ (and ‘No Jab No Play’) program, though, than there is for vaccinations as a general idea. This was, in fact, the one point of disagreement noted, but the authors suggested that it only extended to a small number of individuals. If this is the case, one may wonder why a coercive strategy is necessary. It is worth asking whether Australia needs to use coercive means to induce the population to vaccinate, when similarly situated nations do not mandate vaccinations and yet have outcomes that are often not markedly different [55]. Canada for example does not have a national vaccination mandate, though the individual provinces do have some requirements [56].

The Australian case presents a diverse, multicultural population, evolving from its founding through migrant inflows in the 1970s to the present. The rich diversity of Australia is increasingly seen as a benefit, but there is also an awareness that messages must be crafted to serve and appeal to diverse audiences [57].

We now turn to the materials and methods for the paper.

6. Materials and Methods

Again, the research question for this paper is What can be known about vaccine programs and requirements in Australia from tweets, and are these requirements experienced as burden?

To collect the data for the corpus, search URLs were copied into the cloud version of ScrapeHero (cloud.scrapehero.com, intro version), and a search was run for tweets with relevant keywords. The searches yielded 5599 subject tweets from 2015 to 2019; 286 pages of tweets were crawled. Table 1 offers information on the tweets by year, and numbers of replies, retweets, and favourites. As may be expected, most often tweets are not retweeted, replied to, or favoured.

Table 1. Distribution of tweet replies, retweets, and favourites in sample, 2015–2019.

Year	N	%	Replies (Mean)	Retweets (Mean)	Favorites (Mean)
2015	605	10.81%	0	1	0
2016	360	6.43%	1	2	2
2017	787	14.06%	1	7	15
2018	1735	30.99%	2	9	16
2019	2112	37.72%	39	50	182
Total	5599				

The search did not incorporate any search of or results from 2020, as the focus of this research is on Australia’s regular immunisation program, rather than any COVID-19 related vaccination. All of the searches incorporated the term “Australia” and an additional term relevant to this study (vaccine, vaccination, immunize, or vaxxer). Two keyword searches were used to avoid overlap between queries. The term vaxxer, as in anti-vaxxer, a derogatory term for those sceptical of vaccines and immunisation programs, was included as there is a tendency in the media to utilize the term; while a biased term, its inclusion may nevertheless allow for uncovering of underlying administrative burden in the immunisation program. This is an exploratory analysis, so the search has been limited to top-level keywords that may provide general insight into public discourse on a particular social networking platform. There is potential for using additional terms and searching other social networks in future research, but this is beyond the scope of the current study.

7. Results

Given the volume of tweets in the sample and the controversial nature of the topic, NVivo 12 was employed as a data reduction tool to identify prevailing sentiment in the corpus of tweets, as well as preliminary assessment of major themes in the dataset. The sentiment analysis of the tweet contents showed that the corpus is skewed with a negative sentiment for the topics searched (2390 very or moderately negative, about 64%, compared with 1352 moderately or very positive, or 36%, out of a total of 3742 separately coded sentences). The corpus was auto-coded for major themes, producing a coding summary by code; this automated coding produced some errors (for example, including https as a major theme), but major themes in the corpus were generally evident. Major themes are presented in Table 2.

Table 2. Major themes from corpus of tweets, 2015 to 2019.

Major Theme	Supplemental Terms, Example Tweets (In Vivo)
Disease Flu	Foot-and-mouth; killer; preventable; Meningococcal Vaccine; low flu vaccine uptake rates; epidemic; horror flu season; killer flu
Vaccination	No jab, no play; compulsory; ‘carrot and stick approach’; increasing regulation increases vaccination rates; fragmented vaccination histories; coercion; draconian; “A few years of epidemic polio in Australia would remind folks about a world without vaccination protection and the life we enjoy now”; question of ‘mandatory schedules’—whether or not they prevent outbreaks.
Anti-vaccination	Resurgence of disease ‘caused by’ anti-vaccination parents; allegation of ties of leaders to the vaccine industry; “I think we should force all of the anti-vaccine people on an island where they can live together in peace (and probably die) kind of like how England did Australia”; “in Australia you can be an immunologist and vaccine expert just by reading a meme”; “In 2009 in Australia, a citizens’ campaign was launched to silence public criticism of vaccination...”; “In @axios I list the 3 policy/advocacy steps needed to halt #antivax movement, and protect our nation’s children: (1) Close nonmedical exemptions, (2) Begin dismantling antivax media empire, (3) Build a system of robust vaccine advocacy similar to Australia’s”; “The Gov’t of Australia mandating no contradictory information can be stated by any member of the medical profession regarding the horrendous history of current vaccines and vaccinations, or they will lose their licenses.”

In addition to this preliminary coding work, the corpus was also evaluated with an assessment of major tweets that received attention and/or traction in retweets and comments. 59 tweets received more than 100 retweets each (a retweet being additional sharing and a quick, easy to perform reaction that extends the reach of a message). These tweets include risk comparisons (mass shootings, to other modes of death); examples of dread illness (cervical cancer, whooping cough); reports of measles outbreaks and how individuals were unvaccinated; tweets imploring vaccination (“vaccinate your kids so babies don’t die of whooping cough” in light of ‘no jab no play’ rule). Additionally, some shared a link to a paper on presence of aluminium in vaccines and attendant risks [58]; reports of disease outbreaks hitting anti-vaccination communities; allegation of connection between vaccination and autism; and, worryingly, spiking of measles cases even with broad coverage of immunisation [59].

It is clear that the 2017 flu epidemic in Australia provided an inflection point in discussion about immunisation and vaccines. As a focusing event, the epidemic may have changed some minds among the population, and created a more welcoming environment, at least as expressed in the narrow window of online social media, for vaccine uptake.

It is notable that there was not a great amount of sharing of academic literature on Twitter among concerned citizens, many of whom consider themselves informed on the topics involved. One exception was the paper mentioned above on aluminium toxicity due to vaccination [58]; the tweet sharing the link to this paper had 11,229 shares, likes and comments, and 2988 retweets. With regard to aluminium toxicity and risk, Krewski et al. had suggested that “it is difficult to determine what level of exposure poses a risk for human health or which systems are most vulnerable” [60]. Medical research and knowledge continue to advance in this area. This later study points to some potentially serious outcomes for those sensitive to aluminium, and given that risks for aluminium are not all known, it is worth paying attention to studies like these. However, it is also worth asking whether network users had actually read the study, as retweets and sharing do not necessarily equate to public understanding of an academic paper. Sharing and retweeting alone may not yield greater comprehension; this points to the need for public officials to be more involved in engaging discussion, debate, and dissent, toward improving public understanding.

From the perspective of administrative burden experienced as learning, there were some tweets that sought to share information and dispel myths and misinformation, but these were not as widely retweeted and shared. An exception was during the flu outbreak, when official messages appear to have gained some traction, so users of the network may have seen these tweets. When information is not shared via relatable and entertaining

formats like Twitter, the additional burden of finding information, and even knowing what questions to ask, becomes more apparent. What ends up being shared speaks to a problem (among others) of social networking in the public space.

8. Discussion

Program requirements and public comments raise concerns about learning and compliance burden (implicitly, in a mandatory immunisation program), but also about psychological burden, and specifically in how questioning of official sources is handled by the public via the social networking website. Derogatory terms like anti-vaxxer and negative comments invoke allegations and hostility—some claim irresponsible behaviour, invoking liabilities for harm done to others, and other posters just wish away dissenting voices. Not only does the discourse on vaccination indicate burden of various sorts—it is indicative of the potential to misuse science. There are risks associated with any kind of medicine and vaccines are no different. However, vaccines also represent one of the high points of modern medicine, in protecting public health. This is a polarizing topic. Science invites inquiry into grey areas and admits uncertainty, and this might be seen as politically unpalatable, especially when the public discourse amounts to a shouting down of inquiry from either side. At minimum, many in the public are not as well-informed as they like to believe, no matter what they believe—we simply do not know everything there is to know about vaccinations. Unexpected variations and new research prove this point, sometimes to our detriment. There should be a weighing of risk and benefit, politics aside. Still, politics often rules—over the best that scientific knowledge can provide.

From a public policy analysis perspective, there are significant differences between analysing a problem from the perspective of problem representation, and from a perspective of governmentality in the implementation of a program, which might include the views of stakeholders [61]. As a public health issue, vaccination program responses seem split into two camps—those valuing the input of the public as autonomous individuals, and those that view the concern of public health enhancement and preservation from a top-down perspective that limits inclusion of stakeholder views. In Australia, the very limited view of the vaccination question places the program squarely in an analysis of problem representation—meaning that there is a need to say that the response of the state is ethically acceptable, if not morally required to protect the broader interests of the public at large. This perspective, though, does not address concerns of individual autonomy, or the behavioural aspects noted in this paper, of individuals under coercive regimes.

It is clear enough that the thoughts that tend to stick about vaccination programs are those that have emotional weight. Appeals to belief stick, as do emotional stories. Misinformation is insidious and resists rectification; responses from official sources that fail to engage individuals positively and proactively as autonomous in their health decisions (such as those recommended by Lewandowsky et al. [62]), may simply encourage individuals to remain mired in their views, biased against fact and science. There is support in the literature for engaging the feelings and thoughts of individuals to encourage vaccination acceptance [63]—shaping behaviour rather than relying on coercion and punishment.

9. Conclusions

This is an exploratory analysis and an effort to apply the concept of administrative burden to a critical case. This analysis focused only on posts in one social network (Twitter) and on the immunisation program in Australia. These are significant limitations that prevent wide generalization. It should be noted though that some social network websites have become seemingly more hostile to collection and utilization of post data, even in service of academic research projects, without permission. Facebook has indicated its terms of service that it sees scraping as a violation. Data collection and utilization, even in an academic context, requires permission from Facebook, despite the clearly public nature of the discourse and the need to analyse it for the purpose of improving public policy and ultimately public health. The authors simply suggest that social networks are acting

as a public space for airing of concerns about policy, but do not allow transparency that would be associated with a public/government space. Thus, we did not look at Facebook, which is a location for a variety of groups that hold views on the vaccination debate and specifically the immunisation program in Australia. Further research into posts on other networks, and the experience of other places, is worth examining, for future research, and we recommend it.

Additionally, it must be said that the COVID-19 pandemic has likely altered views on vaccines in the time since these posts were made online. It may be interesting to see if and how public views have changed of immunisation programs, given the COVID-19 pandemic. The search of tweets for this paper only extended to the end of 2019, as the COVID-19 factor was purposefully excluded, but it could be a topic of interest for future research. Humankind's response to COVID-19 continues to evolve, as the disease mutates, and knowledge on the disease, prevention, and treatment is evolving as a result.

To conclude, the burdens of policy, and notably immunisation program policy, should be top of mind for policymakers, who seek to engage science to provide greatest benefit for the public. While those that spread misinformation are doing a disservice to the public, government agencies that fail to acknowledge and respond to questions from the public are doing themselves no great favour. Bad actors have an awareness of, and a predilection to misuse, science, cherry-picking desired information and avoiding detail. On the side of misinformation, appeals to academic rigor and quality are used to puff up incomplete perspectives on complex questions, engendering a distrust not only of a vaccination program, but the larger scientific community and efforts by government to employ science in the evidence-based policymaking. On the side of institution-led vaccination efforts, imposition of coercive means to force compliance has a negative aspect, in that it might undermine the very goal government seeks in ensuring public health. Coercion results in the creation and maintenance of an implicit viewpoint, unfair or not, that the science is not good enough to stand on its own, that the public is too ignorant to understand, and that rights and freedoms are under attack by institutions in place ostensibly to help protect the public. The tendency for institutions to speak to scientific principles, but ignore the inability of science in many instances to speak with absolutes (to say that there is absolutely no risk) misses the mark on two accounts: the first, that such a coercive approach would address a minority that distrusts the effort, seeing it as a burden on a number of levels, and second, that being something other than honest with the public would result in an extension of trust, rather than its retraction.

More worrying is an ongoing false equivalency between science (as something to believe in) and other sorts of beliefs, which may be based on very little rational thought and supported by little or no evidence. Publics have shown themselves prone to accepting puffy claims and soothing assurances from self-dealing politicians, who provide in their rhetoric a ground for rejecting research and cogent analyses of risk.

Having noted this, simply recommending that information be provided to parents ignores an important aspect of the discussion—namely that the distrust in public institutions has already been ingrained, leading to the prospect that certain segments of the public may go to grey sources of information for matters of public importance, rejecting government perspectives based upon science. When the government itself embraces an anti-science perspective, it becomes even more difficult for the public to simply trust and abide by what they are being told. Adding coercion to the mix may press individuals beyond their willingness to accept the burden, yielding vocal dissent, if not open conflict. This may be useful to political actors, but it is hurtful to society as a whole. When societal norms and ethical commitments are compromised, trust can be difficult, if not impossible, to regain.

Author Contributions: Conceptualization, C.L.A. and A.M.A.; methodology, C.L.A.; validation, C.L.A.; formal analysis, C.L.A.; investigation, C.L.A.; data curation, C.L.A.; writing—original draft preparation, C.L.A. and A.M.A.; writing—review and editing, C.L.A. and A.M.A. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data available on request from authors.

Conflicts of Interest: The authors declare no conflict of interest.

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